REMEDIAL WORK PLAN
Wills Building
43-01 21st Street
Long Island City, New York 11101
Site No. C241143

Prepared for:

Rockrose Development Corporation
15 East 26th Street, 7th Floor
New York, New York 10010

Prepared by:

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July 7, 2015

PROFESSIONAL ENGINEER CERTIFICATION

I, Sheila Ransbottom, certify that I am currently a New York State Registered Professional Engineer as defined in Title 6 of the New York Codes, Rules and Regulations Part 375 and that this Remedial Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

NYS Professional Engineer Number (Stamp)	Date	Signature
	7/7/15	Sheila Ransbottom

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This Remedial Work Plan (RWP) has been prepared by CORE Environmental Consultants, Inc. (CORE) on behalf of Rockrose Development Corporation (Rockrose) for the Wills Building Site (Site No. C241143) located at 43-01 21st Street, Long Island City, New York (Figure 1). The RWP was prepared consistent with the executed Brownfield Cleanup Agreement (BCA) Amendment between the Volunteer, 43-01 21st Street LLC, and the New York State Department of Environmental Conservation (NYSDEC), effective January 23, 2015.

1.1 PURPOSE

The purpose of this RWP is to identify and evaluate remedial alternatives to address subsurface impacts at the Site. The preferred Track 4 remedy of combined applications of air sparge and soil vapor extraction (SVE) systems with *in-situ* treatment of residual impacts will protect human health and the environment and allow continued commercial use of the existing building.

1.2 REMEDIAL ACTION OBJECTIVES

The following are the primary Remedial Action Objectives (RAOs) of the preferred remedy.

Groundwater

RAOs for the protection of human health:

- Prevent ingestion of groundwater with impacts exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from impacted groundwater.

RAOs for protection of the environment:

- Remove the source of groundwater impacts.
- Bulk reduction of VOCs in groundwater within five years of remedy initiation.

Soil

RAOs for the protection of human health:

- Prevent ingestion and/or direct contact with impacted soil.
- Prevent inhalation of, or exposure to, compounds volatilizing from impacted soil.

RAOs for protection of the environment:

- Prevent migration of impacts that would result in a degradation of groundwater or surface water quality.

Soil Vapor

RAOs for the protection of human health:

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the on-Site building.

2.0 SITE LOCATION AND DESCRIPTION

The Site is located at 43-01 21st Street in Long Island City, in the County of Queens, New York. The Wills Building is currently a mixed-use commercial and manufacturing space. The Site is located in an area designated as zone M1-4 by the New York City Department of City Planning indicating that it can be used for manufacturing and commercial uses. The Site, presently owned by 43-01 21st Street LLC, was formerly used as a medical equipment manufacturer, optical lenses manufacturer, cosmetic manufacturer, and clothing manufacturer. Metal plating operations occurred at the site from at least 1916 through the early 1950s according to documents obtained from the New York City Department of Buildings (NYCDOB) during file reviews. The property is bound by various commercial and industrial properties to the south, 21st Street to the west, 43rd Avenue to the north, and 22nd Street to the east. The East River is located approximately one-half mile northwest of the Site.

The Site is comprised of a large parcel (approximately 1.14 acres) occupying the entire block length between 21st and 22nd Streets. The parcel is approximately 261 feet along 43rd Avenue and 190 feet along the 21st Street frontage, and is identified as Block 441, Lot 16 by the New York City Department of Finance. The Site is currently occupied by one 124,000-square foot, three-story building originally constructed in approximately 1916. A Site Location Map, Site Map, and Area Map are presented as Figures 1 through 3, respectively.

A summary of historical Site usage and previous Site investigations is presented below.

2.1 SITE HISTORICAL USAGE

Sanborn maps and City Directory Abstract listings for the Site indicate that the property was formerly used as a medical equipment manufacturer (Wappler Electric Company/Westinghouse X-Ray Company, Inc.), optical lenses manufacturer (Hudson Optical Corporation), cosmetics manufacturer (Helena Rubenstein), a clothing manufacturer, and uniform services companies. A review of building department files indicated that the Wappler Electric Company operated at the Site from 1916 until it was acquired by Westinghouse X-Ray in 1930. Westinghouse X-Ray operated at the building through at least the 1940s. Both Wappler Electric Company and Westinghouse X-Ray Company performed metal plating operations on the second floor of the building. Nickel sulfate and copper sulfate in solution were stored in wooden tanks. NYCDOB documents indicate Hudson Optical operated a gold plating operation on the third floor in 1954. Historically, chlorinated solvent use has been associated with metal plating operations.

2.2 PREVIOUS SITE INVESTIGATIONS

Three primary investigations have been performed at, or in the immediate vicinity of, the Site. A 2012 Remedial Investigation (RI) performed by Arcadis US (Arcadis), a 2013 Limited Subsurface Investigation (LSI) performed by CORE, and the most recent 2015 RI performed by CORE. The 2012 RI and 2013 LSI are summarized below. Results of the 2015 RI are discussed in Section 3.0.

2.2.1 Remedial Investigation Report, 21-03 44th Avenue Site, Arcadis US (August, 2012)

A Remedial Investigation (2012), performed under direction of NYSDEC, was oriented at determining the nature and extent of chlorinated VOCs in the soil and groundwater in an area immediately north of the Queens Medallion Building, a nearby property located south of the Site which shares a common alley with the Wills Building. Results of this investigation indicated that PCE was present in shallow bedrock and overburden groundwater samples collected on, and in the immediate vicinity of, the Wills Building property. In general, bedrock concentrations were detected at higher levels than those in the overburden. PCE and trichloroethylene (TCE) were not detected in exceedence of NYSDEC Title 6 of the New York Codes, Rules and Regulations Part 375 (6 NYCRR 375) Unrestricted or Commercial Use SCOs in any soil samples collected on, or in the immediate vicinity of, the Site. Sub-slab vapor and indoor air samples were collected from several locations inside the Wills Building during the investigation that indicated exceedences of NYSDOH mitigation guidance values for PCE, with the highest values collected beneath the slab in the western portion of the building. Indoor air samples in the western portion of the building also contained concentrations of PCE and TCE exceeding NYSDOH mitigation guidance values.

The combination of analytical data, groundwater flow direction, and isotope analysis of the PCE plume led Arcadis to conclude that a potential source area for PCE was located under both Queens Medallion and the Wills Building.

2.2.2 Remedial Investigation Report, Phase I – Limited Subsurface Investigation, Wills Building, CORE (September, 2013)

CORE advanced a total of seven soil borings, and installed four groundwater monitoring wells in the northern corner of the property. Low-level concentrations of PCE and associated degradation products were detected in soil samples collected during the investigation, however, no detections were in exceedence of the applicable NYSDEC Part 375 Unrestricted Use SCOs.

Seven overburden monitoring wells sampled during the LSI exhibited PCE concentrations in exceedence of the Part 703.5 Class GA Groundwater Standard. The highest concentration was detected at monitoring well MW-6BA in the Northern Alleyway (between the Site and Queens Medallion property). Bedrock wells sampled during the investigation also contained exceedences of the Class GA Groundwater Standard for PCE. The highest concentration detected was at bedrock monitoring well MW-1D, located in the northwestern corner of the Site.

3.0 REMEDIAL INVESTIGATION FINDINGS

The 2015 CORE RI sampling and analytical program was to define the nature and extent of elevated concentrations of PCE in subsurface media on Site. The following sections summarize findings of the RI.

3.1 NATURE AND EXTENT OF IMPACTS IN SOIL

Low-level concentrations of a limited number of VOCs (acetone, methylene chloride, and PCE) were detected in one or more of the subsurface soil samples collected from borings B-2 through B-4, B-6, and B-7 on Site. No VOCs were detected in the samples collected from soil borings B-5, B-8, or B-9. The low levels detected in subsurface soil samples were consistent with the lack of visual and olfactory evidence of subsurface impacts as well as the only slightly elevated photoionization detector (PID) readings encountered above the water table in all soil borings. No VOCS were detected in exceedence of the Unrestricted Use SCOs in any subsurface soil sample collected.

Concentrations of pesticides (4,4'-DDT and/or 4,4'-DDE) were detected above the Unrestricted Use SCOs in the soil samples collected from borings B-4 and B-8. Metals, including chromium, copper, and zinc were detected above the applicable Unrestricted Use SCOs and barium was detected above the Commercial Use SCO in the soil sample collected from boring B-8. The types and concentrations of impacts present in soil samples collected are typical of urban fill throughout New York City. Soil analytical results are summarized in Table 1.

3.2 NATURE AND EXTENT OF IMPACTS IN GROUNDWATER

3.2.1 Overburden Groundwater

VOCs were detected in overburden groundwater samples analyzed during the 2015 RI. PCE concentrations were detected in each monitoring well in exceedence of Part 703.5 Class GA Groundwater Standards during the RI, with the exception of those collected at monitoring wells MW-215D and MW-219. The highest concentration of PCE in overburden groundwater detected during the RI was 90,000 µg/L in sample GW-2, located inside the southwestern portion of the building. The low-level concentration of PCE in the soil sample collected from the same boring indicates that while a potential source area may exist near the boring and groundwater sample location (based upon overburden groundwater concentrations), that the boring was not installed directly into the source area.

TCE was detected in exceedence of the Class GA Groundwater Standard in grab groundwater sample GW-2 and samples collected from monitoring wells MW-2S, MW-6BA, MW-214D, and MW-218. Other exceedences of VOCs in overburden groundwater are summarized in Table 2 and on Figure 4. Outside of PCE, elevated concentrations of other volatiles are not present in groundwater samples collected in or near the south/east/southeast portions of Site.

Polycyclic aromatic hydrocarbons (PAHs) benzo(a)anthracene and benzo(b)fluoranthene were detected in exceedence of the applicable groundwater standard of 0.002 µg/L in the duplicate grab groundwater sample for GW-9. Other PAHs were detected in groundwater samples GW-2, GW-9, MW-2S, and MW-218; however, none were detected in exceedence of the applicable Part 703.5 Class GA Groundwater Standards. The detection of PAH compounds in Site groundwater is representative of impacts from urban fill underlying the Site and not an on-Site source.

At least one metal was detected in exceedence of the applicable Part 703.5 Class GA Groundwater Standard in every sample for which they were analyzed, with the highest number of exceedences present in groundwater sample GW-2. In addition, GW-2 contained an exceedence of PCB Aroclor 1016. PCBs were not detected in any other overburden groundwater sample for which they were analyzed. The exceedence in GW-2 is not believed to be indicative of dissolved-phase conditions at the Site. Grab groundwater sample GW-2 was collected from a temporary well installed during the RI, and the elevated metals and PCBs in the sample are likely influenced by sample turbidity.

3.2.2 Bedrock Groundwater

Exceedences of VOCs in groundwater samples taken from wells screened in bedrock are similar in pattern to those detected in overburden groundwater monitoring wells. PCE was detected above the Part 703.5 Class GA Groundwater Standard in three bedrock groundwater samples collected during the RI. The highest concentration of PCE was detected at MW-222B (43,000 µg/L) near the western corner of the property. In addition, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene and TCE were detected in exceedence of groundwater standards in two or more bedrock groundwater samples each. Concentrations of PCE in bedrock groundwater detected during the RI were highest near the western and northern corners of the Site, with the lowest concentrations detected along the north/northeastern Site boundary. A summary of VOC concentrations in bedrock groundwater is presented in Table 3 and on Figure 5.

3.3 Nature and Extent of Impacts in Sub-Slab Vapor and Indoor Air

3.3.1 Sub-Slab Vapor

PCE was detected in sub-slab vapor samples collected during the RI. Concentrations in exceedence of applicable NYSDOH mitigation guidance values were detected in each sample with the exception of SS-8 and SS-10 from beneath the southern portion of the building. Exceedences of TCE were also noted for samples SS-1 and SS-3. The highest concentration of PCE detected was at sample point SS-2 adjacent to the highest concentration of PCE detected in overburden groundwater at sample location GW-2. In general, concentrations of PCE in sub-slab samples tend to decrease toward the south/east/southeast portions of the building. A summary of VOCs in sub-slab vapor is included in Table 4 and on Figure 6.

3.3.2 Indoor Air

PCE and TCE were detected in every indoor air quality (IAQ) sample collected as part of the RI. The highest concentrations of PCE were detected in IAQ samples IAQ-1 and IAQ-2, with IAQ-2 being located near sub-slab sample SS-2. Elevated concentrations of VOCs in indoor air, in combination with concentrations present in sub-slab vapor samples indicate that mitigative efforts are required to reduce the potential for soil vapor intrusion. A summary of VOCs in indoor air is included in Table 4 and on Figure 7. A Source Area Map indicating a potential source area for VOC impacts to on-Site media is presented in Figure 8.

3.4 SITE GEOLOGY

Based on previous subsurface investigations in the area of the Site (Arcadis, 2012), observations made during the 2013 LSI, and observations made during CORE's 2015 RI, overburden materials are composed of brown sands, silty sands, and trace amounts of gravel. The top 5 feet of the subsurface are characterized by fill material composed of sands and silty sands with gravel and fragments of concrete and brick.

3.5 SITE HYDROGEOLOGY

Groundwater at the Site occurs in the unconsolidated overburden as well as in the underlying bedrock. During the 2015 RI, groundwater was encountered in three borings at depths ranging from approximately 10 feet below ground surface (bgs) under the eastern portion of the building to 14.5 feet bgs under the western portion of the building.

Static water levels in on-Site monitoring wells range from approximately 13.5 feet bgs to approximately 15.5 feet bgs in overburden wells, and 14.8 to 15.4 feet bgs in bedrock wells. Overburden groundwater flow is to the south; bedrock groundwater flow is westerly. Overburden and bedrock groundwater potentiometric contours are presented on Figures 9 and 10.

An average linear groundwater velocity of approximately 0.1 feet per day was determined by Arcadis during remedial design phase for the 21-03 44th Avenue BCP site (Site No. C241107), located immediately south of the Wills Building.

3.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

Constituents of potential concern (COPCs) were identified in Site subsurface soil, groundwater, sub-slab vapor, and indoor air during the RI. The primary COPCs associated with Site media are chlorinated VOCs; however, SVOCs, pesticides, PCBs, and metals were detected in exceedence of applicable guidance criteria in at least one medium. The following summarized the potential human exposure to Site COPCs.

Potential receptors are identified based on current and probable future use of the Site and surrounding areas. Primary on-Site receptors include tenants of the on-Site building and visitors to

the Site, including customers of the Delicatessen located in the northern corner of the building. Future receptors will also include occupants and visitors to the property if the Site were redeveloped, and construction workers and the surrounding community during any maintenance or Site redevelopment activities that would remove the current foundation slab and surrounding paved sidewalks during redevelopment. Current and future off-Site receptors may be tenants of nearby buildings in downgradient locations who may be exposed to impacted indoor air and workers who may come into contact with downgradient groundwater during groundwater monitoring and sampling activities.

Dermal absorption and ingestion of groundwater and/or subsurface soil on Site are incomplete exposure pathways with current Site usage. The Site is covered with a structure and concrete-paved sidewalks preventing contact with Site subsurface soil and groundwater under current conditions. Groundwater contact may occur during groundwater monitoring and sampling activities, and would generally be performed by trained professionals. Any maintenance or redevelopment activities that remove the foundation slab or surrounding sidewalks would expose subsurface soil allowing the potential for a complete exposure pathway for those at the Site and the surrounding community. This potential pathway would be addressed by implementing Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) measures.

Direct inhalation of sub-slab vapor as ambient air conditions would only occur in the event of an excavation beneath the building, or the removal of building sub-slab components for construction or repair purposes. This potential exposure pathway would similarly be addressed by implementing HASP and CAMP measures.

Environmental Media	Exposure Route	Human Exposure Assessment
Groundwater	Ingestion	Groundwater on Site is not utilized for drinking water, it is supplied municipally.
	Dermal Contact	Dermal contact could occur during pumping operations for non-potable uses or during ground-intrusive work.
Soil	Ingestion	Soil is currently covered by the on-Site building and concrete-paved sidewalks. People could come into contact with soil during ground-intrusive activities.
	Dermal Contact	
Soil Vapor/Indoor Air	Inhalation	Volatilized COPCs from soil and groundwater may enter the on-Site building through cracks in the sub-slab. IRM SSDS is effectively mitigating soil vapor intrusion into the building.

The potential exists for Site occupants and visitors to be exposed to COPCs in sub-slab vapor migrating into indoor air on Site. The primary exposure route of concern for on-Site COPCs is inhalation of impacted indoor air. This exposure route is currently being controlled by a sub-slab

depressurization system (SSDS) installed at the Site as an Interim Remedial Measure (IRM), as discussed in Section 3.7. A round of indoor air samples collected following SSDS start-up contained significantly lower concentrations of VOCs than those collected prior to system installation.

3.7 INTERIM REMEDIAL MEASURE

In order to mitigate elevated concentrations of PCE in sub-slab vapor and indoor air as a result of soil vapor intrusion, an IRM was developed for the Site. The IRM included the installation and operation and maintenance (O&M) of an active SSDS to depressurize the entire building slab. The IRM included the following tasks and was performed in accordance with the Site-specific HASP submitted under the Remedial Investigation Work Plan cover:

- Collection of IAQ samples;
- Installation of, and sample collection from, sub-slab vapor monitoring points;
- Pilot testing for SSDS design;
- SSDS design; and
- SSDS installation and O&M.

A pilot test for the SSDS was performed on September 8, 2014. Utilizing data collected during the test, CORE designed an active SSDS and submitted a Design Analysis Report (DAR) for the IRM for NYSDEC approval on October 17, 2014. The final design was approved on October 17, 2014.

Construction of the active SSDS began in November of 2014 and was completed in January 2015. System startup was initiated in January 2015. A Construction Completion Report was submitted to NYSDEC for approval on January 27, 2015. Monitoring is conducted on a monthly basis to evaluate system efficacy and monitor system discharge in accordance with procedures identified in Section 2.4 of the IRM Construction Completion Report (CORE, June 2015). Concentrations of PCE and TCE in IAQ samples collected after system startup were below applicable NYSDOH mitigation guidance values and were significantly lower than those in samples collected prior to system installation.

4.0 REMEDIAL ALTERNATIVES ANALYSIS

Final remedial measures for the Wills Building Site must meet RAOs for the protection of human health and the environment. Due to the urban setting, appropriate RAOs for the Wills Building Site will primarily be protective of human health and include:

Groundwater
RAOs for the protection of human health:

- Prevent ingestion of groundwater with impacts exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from impacted groundwater.

RAOs for protection of the environment:

- Remove the source of groundwater impacts.
- Bulk reduction of VOCs in groundwater within five years of remedy initiation.

Soil
RAOs for the protection of human health:

- Prevent ingestion and/or direct contact with impacted soil.
- Prevent inhalation of, or exposure to, compounds volatilizing from impacted soil.

RAOs for protection of the environment:

- Prevent migration of impacts that would result in a degradation of groundwater or surface water quality.

Soil Vapor
RAOs for the protection of human health:

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the on-Site building.

The chosen Remedial Action (RA) will be developed based on the following criteria in compliance with NYSDEC Department of Environmental Remediation *Technical Guidance for Site Investigation and Remediation* (DER-10) guidance:

- **Overall protection of human health and the environment** – Assesses the remedy's ability to eliminate or mitigate threats to public health and the environment;

- **Compliance with standards, criteria, and guidance values (SCGs)** – Evaluates the ability of the RA to bring affected media into compliance with applicable environmental SCGs;
- **Long-term effectiveness and permanence** – Evaluates if the remedy is effective in the long-term after implementation and assesses additional controls that might be necessary to address residual impacts on Site;
- **Reduction of toxicity, mobility, or volume with treatment** – Evaluates the ability of the RA to reduce the toxicity, mobility, and/or volume of constituents on Site;
- **Short-term impact and effectiveness** – Assesses whether the RA will have adverse impacts on the community and workers during implementation;
- **Implementability** – An analysis of the administrative and technical feasibility of implementing the RA;
- **Cost effectiveness** – Evaluates the overall cost effectiveness of the RA;
- **Land use** – An evaluation of the current and reasonably anticipated future use of the Site and vicinity as it relates to the RA.

The final criterion of community acceptance will be taken into consideration after a decision document is made available for public comment, and before NYSDEC's final approval of the chosen remedy.

4.1 FUTURE LAND USE EVALUATION

Current Site and vicinity usage is commercial and light industrial/manufacturing. It is anticipated that the current Site and vicinity usage will remain the same; however, given developmental trends in the area of the Site, it is possible that the property may be redeveloped for residential use in the future. As such, a remedial alternative effective for restoration of the Site to Restricted Residential Use is evaluated in the following sections. An unrestricted use scenario has also been evaluated. The alternatives discussed in the following sections include:

- Unrestricted Use cleanup (Track 1) and
- Remediation of PCE source area with Site Management Plan (SMP) and controls (Track 4 - Restricted Residential Use).

4.2 REMEDIAL ALTERNATIVES EVALUATION

The following sections discuss the RAs and how each complies with the criteria discussed above.

4.2.1 Alternative 1: Unrestricted Use Cleanup

This alternative would achieve Track 1 Unrestricted Use cleanup that would require no restrictions on the use of the property. This alternative would include: a full demolition of the existing on-Site structure, excavation of all subsurface soils exceeding applicable Part 375 Unrestricted Use SCOs to bedrock surface, excavation dewatering, *in-situ* treatment of impacts to bedrock groundwater, and the development and implementation of a SMP with Institutional Controls (ICs) for a five year evaluation period. The remedy would include:

- Demolition of the existing on-Site structure;
- Excavation of all overburden soils to bedrock surface and excavation dewatering;
- *In-situ* treatment of residual VOC impacts in bedrock groundwater;
- For a five-year period:
  - ICs including an environmental easement;
  - Engineering controls (ECs) if the Site is redeveloped (e.g. – SSDS);
  - Development and implementation of a SMP;
  - Annual Site inspections to verify that ICs and ECs remain in place at the Site;
  - Remedial system O&M; and
  - A monitoring plan to evaluate remedial system efficacy in affected media.

To achieve an Unrestricted Use cleanup in overburden soils, a full demolition of the existing on-Site structure, excavation of all subsurface soils exceeding applicable Part 375 Unrestricted Use SCOs to bedrock surface, and excavation dewatering would be required. While these actions would likely address impacts in overburden groundwater, impacts to bedrock groundwater would require additional remedial measures via *in-situ* treatment to achieve compliance with SCGs.

To enhance natural biodegradation of remaining VOCs in bedrock groundwater, *in-situ* enhanced bioremediation would be applied. The chlorinated VOCs present at the Site are amenable to bioremediation under anaerobic conditions via reductive dechlorination. Up to five overburden and five bedrock injection wells would be installed at the Site. The necessity for overburden injection wells would be determined based on the presence of residual VOC impacts to overburden groundwater following excavation and dewatering. A controlled-release electron donor slurry, anticipated to have an effective capability of approximately four to five years, would be injected into each newly-installed injection well. Groundwater monitoring would be performed semiannually. Site management would be required for a period of five years. At the end of the five year evaluation period, if Track 1 Unrestricted Use Cleanup is not achieved, the Site will be re-evaluated for an alternative cleanup track.

Overall Protection of Human Health and the Environment

While the approach taken to achieve a Track 1 remedy would result in attaining SCOs via excavation down to bedrock of all impacted soils, it is uncertain if any groundwater remedy implemented at the Site would result in attaining appropriate standards, particularly with respect to bedrock groundwater; however, if a Track 1 remedy were achieved, it would be fully protective of human health and the environment.

Compliance with SCGs

Though COPCs in soil and likely in overburden groundwater may be brought into compliance with SCGs as a result of Track 1 cleanup remediation activities, it is possible that impacts to bedrock groundwater would not be effectively remediated and brought into compliance with SCGs. As a result, VOCs may likely continue to cause vapor migration issues that would require an on-Site SSDS to mitigate if the property were redeveloped within the five year evaluation period. Compliance with SCGs for bedrock groundwater may be achieved following implementation of *in-situ* treatment.

Long-term Effectiveness and Permanence

If Track 1 SCGs could be achieved, this alternative would provide long-term effectiveness and permanence in on-Site media. Site management would be required for a period of five years following remedy implementation. If, after five years, a bulk reduction in VOC impacts to overburden and bedrock groundwater cannot be demonstrated, or it seems likely that Track 1 remedial goals cannot be achieved, the cleanup track would be re-evaluated.

Reduction of Toxicity, Mobility, or Volume with Treatment

The Unrestricted Use alternative would significantly and permanently reduce the toxicity, mobility, and volume of COPCs in Site soil and overburden groundwater. Bedrock, and potentially overburden, groundwater and sub-slab vapor/indoor air would continue to require treatment.

Short-Term Impact and Effectiveness

The short-term impacts to the community and workers associated with the Unrestricted Use cleanup alternative can be managed with proper handling and disposal of impacted Site media. Even with proper management, handling, and disposal of impacted Site media, short-term impacts to the community would be significant, particularly those associated with truck traffic to transport excavated material off-Site.

Implementability

This alternative is currently technically infeasible given the on-Site structure is fully occupied. In addition, it is possible that this RA may not achieve Track 1 cleanup goals. For the five year evaluation period, the remaining impacted groundwater would require additional treatment, Site management, and would result in the need to operate a SSDS on Site to mitigate soil vapor intrusion if the Site were redeveloped within that time.

Cost Effectiveness

The current estimated price of this RA is approximately $14.4 million, and is not cost effective relative to Track 4 cleanup. Refer to the table below for a cost summary.

COST TO RESTORE SITE TO TRACK 1 UNRESTRICTED USE				
Action	**Quantity**	**Units**	**Cost**	**Total Cost**
Building Demolition	1	LS	$ 4,250,000	$ 4,250,000
Soil Excavation and Disposal	37,000	CY	$ 176	$ 6,512,000
Excavation Dewatering	1	LS	$ 1,500,000	$ 1,500,000
Clean Fill Import	37,000	CY	$ 35	$ 1,295,000
***In-Situ* Bedrock Groundwater Treatment**				
Injection Well Installation	10	Each	$ 3,000	$ 30,000
CAMP Implementation	1	LS	$ 3,000	$ 3,000
Injection Event	1	Event	$ 20,000	$ 20,000
Injection Well Abandonment	10	Each	$ 2,000	$ 20,000
Sub-slab Depressurization System	1	LS	250,000	250,000
Institutional Controls				
Site Management Plan	1	LS	$ 35,000	$ 35,000
Environmental Easement	1	LS	$ 6,500	$ 6,500
Final Engineering Report	1	LS	$ 25,000	$ 25,000
Annual Operation Maintenance & Monitoring (OM&M)				
Annual O&M of SSDS	12	Month	$ 4,000	$ 48,000
Carbon Change-out	4	Qtr	$ 8,000	$ 32,000
Site Management				
Semiannual Groundwater Monitoring - Labor	2	Event	$ 6,000	$ 12,000
Semiannual Groundwater Monitoring – Analytical	2	Event	$ 4,000	$ 8,000
Annual Site Inspection	1	Year	$ 1,000	$ 1,000
Total OM&M Cost				**$ 101,000**
Number of Years				5
Interest Rate				7%
Multi-Year Discount Factor				4.100
OM&M Present Worth (PW)				**$ 414,100**
Total Cost				**$ 14,360,600**

Land Use

This alternative assumes Site redevelopment would occur and that Site usage would change. The Unrestricted Use cleanup would require no ICs to limit property and groundwater use, or ECs to prevent public exposure to COPCs after effective *in-situ* treatment of VOC impacts to bedrock groundwater.

If impacted bedrock groundwater remained in-place at the Site at the end of the five year evaluation period, ICs and/or ECs would be required to prevent public exposure to COPCs, and a revised cleanup track would be evaluated.

4.2.2 Alternative 2: Remediation of PCE Source Area with Site Management Plan and Controls

This RA would be performed in addition to the current IRM – a SSDS operating with the goal of mitigating sub-slab vapor intrusion into the on-Site structure. This alternative would achieve Track 4 cleanup that would allow the property to be used for Restricted Residential Use and would include: the installation of air sparge and SVE systems to address groundwater impacts with the implementation of a SMP and ICs, *in-situ* groundwater treatment, and maintenance of current ECs (i.e., SSDS). The remedy would include:

- Installation and long-term operation of air sparge and SVE systems to remediate the PCE source area;
- ICs including an environmental easement;
- ECs including maintenance of existing Site cover systems and SSDS;
- Development and implementation of a SMP;
- Annual Site inspections to verify that ICs and ECs remain in place at the Site;
- Remedial system O&M;
- *In-situ* treatment of residual VOC impacts in overburden groundwater at the downgradient (southern) property boundary; and
- A monitoring plan to evaluate remedial system efficacy in affected media.

Enhanced bioremediation would be implemented to treat Site-related impacts in groundwater on the southern edge of the Site. A treatment agent would be applied via a minimum of five injection points installed below the water table. The precise number and location of injection points and type and volume of treatment agent would be determined based on information gathered during the first year of operation of the air sparge and SVE systems. Periodic groundwater monitoring will be performed to determine the effectiveness of the treatment and the number of additional injections to be performed. Implementation and operation of this system will be addressed under the SMP after issuance of the Certificate of Completion.

Overall Protection of Human Health and the Environment

Implementation of a SMP with ICs and ECs is protective of human health and complies with the RAOs. The potential for human contact with impacted subsurface soils and groundwater would be mitigated by restricted use of the Site and by the ICs. Elevated concentrations of COPCs in Site groundwater would be addressed by the installation of air sparge and SVE systems. *In-situ* treatment at the downgradient property boundary will mitigate off-Site migration of residual VOC impacts to overburden groundwater. The existing SSDS would prevent occupant exposure to elevated concentrations of VOCs in off-gas generated by the air sparge system.

Over time, this alternative would mitigate environmental impacts related to elevated concentrations of VOCs in Site groundwater.

Compliance with SCGs

The remedy would be performed in compliance with applicable NYSDEC regulations. Impacted indoor air and groundwater will be brought into compliance with SCGs with continued operation of the air sparge, SVE, and sub-slab depressurization systems, verified by an ongoing monitoring program. Compliance with NYSDEC groundwater standards is anticipated to occur over an extended period of years; however mitigative measures taken via the installation and operation of the air sparge and SVE systems are expected to significantly reduce levels of VOCs in groundwater migrating off Site. *In-situ* treatment at the downgradient property boundary will further mitigate off-Site migration of residual VOC impacts to overburden groundwater.

This alternative would address impacts to Site soil and overburden groundwater over time and attain SCGs with respect to the primary Site COPCs (i.e., VOCs). Any change in use of the property would require maintenance of the current Site cover, or replacement with similar impervious covers or the addition of a 2-foot layer of clean fill meeting SCOs for cover material for Restricted Residential Use in exposed areas.

Long-term Effectiveness and Permanence

This RA would address overburden groundwater and soil impacts in the long term. The current IRM in place at the Site will address vapor intrusion issues until such a time that it is not needed. The SMP would include appropriate O&M measures for the soil vapor mitigation system and handling procedures for impacted Site media that may be encountered during invasive activities. ICs would restrict groundwater and property use and can be maintained indefinitely, if necessary. ECs can be maintained until such a time they are no longer needed, as determined through long-term monitoring under the SMP.

Reduction of Toxicity, Mobility, or Volume with Treatment

This RA would also reduce and ultimately prevent further off-Site migration of COPCs in Site groundwater and cause a reduction in overall VOC COPCs. The SSDS will continue to reduce the toxicity and mobility of VOCs that could affect indoor air and will reduce the toxicity and mobility of VOCs in soil vapor. The use of a SVE system will cause a reduction in the toxicity, mobility, and volume of VOCs in soil in the presumed source area. In addition, enhanced bioremediation actions performed at the downgradient property boundary will prevent off-Site migration of residual VOC impacts in overburden groundwater.

Short-Term Impact and Effectiveness

Potential short-term impacts associated with remedy implementation include the introduction of VOCs into the building during intrusive activities and/or during initial system operation. These impacts will be addressed via ECs, proper work practices, and monitoring.

Implementability

The SSDS is already in place on Site and is operating to mitigate soil vapor intrusion. The SVE system will tie into the existing SSDS, which was constructed with additional capacity to allow for an SVE extension. At this time, there are no perceived technical or administrative feasibility issues associated with this alternative.

Cost Effectiveness

The cost of implementation of the air sparge and SVE systems, the IRM to address vapor intrusion, and ICs is approximately $667,500. Annual O&M of the air sparge and SVE systems, SSDS, groundwater monitoring, and Site management (including *in-situ* groundwater treatment) are anticipated to cost approximately $233,000 per year for 30 years. The present worth of this alternative is $3,558,797.

COST FOR REMEDIAL SYSTEM WITH CURRENT IRM AND IMPLEMENTATION OF A SITE MANAGEMENT PLAN				
Action	**Quantity**	**Units**	**Cost**	**Total Cost**
Interim Remedial Measure	1	LS	$ 258,000	$ 258,000
Air Sparge and SVE System	1	LS	$ 325,000	$ 325,000
Institutional Controls				
Site Management Plan	1	LS	$ 35,000	$ 35,000
Environmental Easement	1	LS	$ 6,500	$ 6,500
Final Engineering Report	1	LS	$ 25,000	$ 25,000
***In-Situ* Groundwater Treatment**				
Injection Well Installation	5	Each	$ 3,000	$ 15,000
CAMP Implementation	1	LS	$ 3,000	$ 3,000
Total Capital Cost				**$ 667,500**
Annual Operation Maintenance & Monitoring (OM&M)				
Annual O&M of SSDS	12	Month	$ 4,000	$ 48,000
Annual O&M of Air Sparge/SVE	12	Month	$ 4,000	$ 48,000
Carbon Change-out	12	Month	$ 8,000	$ 96,000
Site Management				
Semiannual Groundwater Monitoring - Labor	2	Event	$ 6,000	$ 12,000
Semiannual Groundwater Monitoring – Analytical	2	Event	$ 4,000	$ 8,000
Annual Site Inspection	1	Year	$ 1,000	$ 1,000
***In-Situ* Groundwater Treatment**				
Injection Event - Labor	1	Event	$ 10,000	$ 10,000
Injection Event – Materials	1	Event	$ 10,000	$ 10,000
Total OM&M Cost				**$ 233,000**
Number of Years				30
Interest Rate				7%
Multi-Year Discount Factor				12.409
OM&M Present Worth (PW)				**$ 2,891,297**
Total PW (Capital Cost + OM&M PW)				**$ 3,558,797**

Land Use

This alternative is consistent with current use of the Site and allows for Site redevelopment for commercial or residential purposes.[1] This alternative would require implementation of ICs and maintenance of existing ECs.

[1] The Site is not currently zoned for residential purposes. Any residential redevelopment would be contingent on appropriate zoning changes.

5.0 PREFERRED REMEDIAL ACTION

Based on the evaluation of RAs presented in Section 4.0, Alternative 2, remediation of the PCE source area with SMP and controls, is the preferred remedy. The preferred remedy is protective of both human health and the environment for the current and potential future use of the property. The remedy will achieve Track 4 Restricted Residential Use cleanup goals. The overall goal of the preferred remedy is mass reduction of VOC levels in Site groundwater, mitigation of impacts to indoor air, and the prevention of off-Site migration of groundwater impacts.

The remedy includes the installation of air sparge and SVE systems to operate in conjunction with the current SSDS at the Site, in addition to the implementation of ICs and maintenance of existing ECs. Components of the remedy include:

- Installation and long-term operation of air sparge and SVE systems to remediate the PCE source area;
- IC in the form of an environmental easement on the property;
- ECs including existing Site cover systems, SSDS, and air sparge and SVE systems;
- Development and implementation of a SMP;
- Annual Site inspections to verify that ICs and ECs remain in place at the Site;
- Remedial system O&M; and
- *In-situ* treatment of residual VOC impacts in overburden groundwater at the downgradient (southern) property boundary; and
- A monitoring plan to evaluate remedial system efficacy in affected media.

Elements of the preferred remedy are discussed in the following sections.

5.1 REMEDIAL DESIGN

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and Site management of the remedy as per NYSDEC *Green Remediation* guidance (DER-31). The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;

- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling, and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic, and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

5.2 COVER SYSTEM

A Track 4 cleanup compliant cover system is currently in place at the Site. The on-Site structure will be maintained to allow for Restricted Residential Use of the Site. Any Site redevelopment will maintain the required Site cover, including a building, sidewalks, pavement, or a soil cover in areas where the upper two feet of exposed surface soil will exceed applicable SCOs. If a soil cover is required, it will be a minimum thickness of two feet of soil meeting the SCOs for cover material as set forth in 6 NYCRR 375-6.7(d) for Restricted Residential Use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil in any landscaped areas of sufficient quality to maintain a vegetation layer. Any fill material brought to the Site will meet the requirements for the identified Site use as set forth in 6 NYCRR 375-6.7(d).

5.3 AIR SPARGE WITH SOIL VAPOR EXTRACTION

Air sparge and SVE systems will be installed at the Site to address the groundwater plume of elevated concentrations of VOCs. Mass removal of PCE and other VOCs from Site groundwater and saturated soil will be accomplished by injecting air into the subsurface below the water table. Injected air causes the VOCs to volatilize from the groundwater and/or soil. The VOCs are carried with the injected air into the vadose zone where an SVE system extracts the air via extraction wells with applied vacuum. The extracted air will be treated via vapor-phase granular activated carbon (VGAC) or a catalytic oxidizer to meet NYSDEC air emission guidance values prior to discharge into the atmosphere.

A minimum of seven air sparge (injection) wells will be installed near the southwestern portion/westernmost corner of the building, in the area of the highest VOC detections encountered in overburden groundwater (GW-2), and are anticipated to best address the source area as well as an inferred plume area of elevated concentrations. The injection wells will be installed to the top of the bedrock surface, anticipated to be approximately 20 feet bgs, and will be constructed with 2 feet of screened interval. A minimum of six SVE wells will be installed in conjunction with the air sparge wells at locations intended to capture all injected air and prevent further off-Site migration of

impacted groundwater. SVE wells will be tied into the existing on-Site SSDS and extracted air will be treated via VGAC or catalytic oxidizer prior to discharge. The existing SSDS was designed with a blower capacity capable of providing and maintaining the added vacuum required by the additional SVE wells. Refer to Section 6.0 and Appendix C for details on the air sparge and SVE systems.

5.4 VAPOR MITIGATION

Any on-Site redevelopment (modifications to the existing building or new construction) is required to have a SSDS to prevent migration of vapors into the overlying structure from soil or groundwater. The active SSDS will continue to operate in addition to the SVE system to ensure that elevated concentrations of VOCs present in off-gas generated during operation of the air sparge system do not enter the existing building through the sub-slab.

The eastern portion of the building is being addressed by the SSDS portion of the system only. Low concentrations of VOCs in sub-slab vapor and indoor air in combination with low concentrations of PCE in groundwater beneath that portion of the Site indicate the SSDS is an effective mitigation system for that portion of the building. The SSDS and integrated SVE system will operate in the southwest/western portion of the building to ensure vapor mitigation efforts are effective in areas of highly elevated concentrations of VOCs in subsurface media.

5.5 INSTITUTIONAL CONTROLS

An IC in the form of an environmental easement will be required at the Site. The IC will:

- Require the Volunteer to complete annual inspections and certifications for submission to NYSDEC for all ICs and ECs in place at the Site in accordance with NYSDEC Part 375-1.8(h)(3);
- Allow the Site to be developed for restricted residential, commercial, or industrial uses as defined by Part 375-1.8(g), subject to local zoning laws;
- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH or County DOH; and
- Require compliance with a NYSDEC-approved SMP.

5.6 SITE MANAGEMENT PLAN

A SMP will be required as part of the remedy for the Site. The SMP will include the following, at a minimum:

- An Institutional and Engineering Control Plan that identifies all use restrictions and controls for the Site and details media-specific requirements necessary to ensure the controls applied as part of the remedy remain in place and effective for Site

remediation. This plan will include, but may not be limited to an Excavation Plan detailing the provisions for management of future excavations in areas of remaining impacts to Site media, descriptions of the provisions of the Environmental Easement, provisions for the management and inspection of ECs, maintaining Site access controls and NYSDEC notification, and the steps necessary for periodic reviews and certification of ICs and/or ECs.

- A Monitoring Plan to assess the performance and effectiveness of the remedy. The Plan will include a summary of environmental media to be monitored, a schedule of monitoring frequency, and vapor intrusion monitoring for any on-Site developments.
- A Soil Management Plan that will include measures for managing all soils that may be disturbed at the Site, including excavation, handling, storage, transport, and disposal. The Soil Management Plan will also include protocols for dewatering, if required in connection with any future Site redevelopment. All measures must be performed in accordance with applicable regulations.
- An O&M Plan to ensure continued operation of the remedy. The Plan will include compliance monitoring of the air sparge, SVE, and SSDS systems to ensure proper system O&M, maintenance of Site access controls and NYSDEC notification, and providing NYSDEC with access to the Site and associated O&M records.
- Enhanced bioremediation will be implemented to treat Site-related impacts in groundwater at the southern boundary of the Site. A treatment agent will be applied via a minimum of five injection points installed to depths below the water table. The actual number of injection points and the volume of treatment agent will be designed following data collection during the first year of operation of the air sparge and SVE systems. Periodic groundwater monitoring will be performed to determine the effectiveness of the treatment and the number of additional injections to be performed, if any. Implementation and operation of this system will be addressed under the SMP. The operation of the components of the remedy shall continue until NYSDEC determines that continued operation is technically impracticable or not feasible.

A detailed scope of work is discussed in Section 6.0 with design drawings presented in Appendix C.

6.0 REMEDIAL ACTION SCOPE OF WORK

This section describes the scope of work for implementation of the preferred remedy at the Site. The selected contractor(s) will be required to adhere to CORE's Site-specific HASP or present a HASP for CORE's review prior to initiating field work. The following scope of work contains minimum actions that will be taken by CORE; significant changes to the scope will require NYSDEC approval prior to implementation. A Site-specific HASP is included in Appendix A; a Quality Assurance Project Plan (QAPP) is included as Appendix B.

6.1 PERMITTING

CORE will obtain all required permits through the New York City Department of Buildings (NYCDOB) prior to mobilization. The services of Proceed Permit, Inc. (Proceed Permit) will be utilized to facilitate the process. System design plans will be provided to Proceed Permit for submission to NYCDOB.

6.2 UTILITY MARK OUTS

The interior utilities of the building were located and marked during the 2014 installation of the on-Site SSDS. Exterior utilities will be located by calling 811 One Call services prior to initiation of intrusive activities.

6.3 COMMUNITY AIR MONITORING

Community air monitoring will be performed in accordance with the Site-specific HASP and CAMP, as modified by letter dated June 9, 2015, included as Appendix A of this RWP.

6.4 REMEDY CONSTRUCTION

The general sequence of remedy construction is as follows:

- Installation of air sparge and SVE systems and components;
- System start-up and testing; and
- System operation and maintenance.

6.4.1 System Installation

CORE personnel will drill and install air sparge and SVE wells associated with the remedy. A total of seven air sparge wells and six SVE wells (in addition to the SSDS extraction points that are already in place) are anticipated to be installed in the southwestern portion/westernmost corner of the property. An additional 2-inch groundwater monitoring well will be installed within the effective zone of the remedy to collect groundwater samples for laboratory analysis and dissolved oxygen content. The air sparge well locations were chosen to target the apparent source area for PCE impacts to groundwater at the Site.

Air Sparge System

Air sparge wells will be constructed of 1-inch diameter schedule 40 polyvinyl chloride (PVC) with 0.020-inch (20-slot) screen. It is anticipated the wells will be screened from approximately 18 to 20 feet bgs; however final installation depths will based on in-field observations due to potential variances in bedrock depth. A minimum of 3 feet of water will be present above the top of each well screen. PVC riser will transition to 1-inch diameter schedule 40 steel piping above grade. Above ground, steel riser pipes will be equipped with valves, sample ports, flow meters, and pressure gauges.

Header piping will consist of a single 1-inch schedule 40 steel header pipe connected to five 1-inch diameter schedule 40 steel branch pipes to supply the wells. The piping will be securely fastened to the ceiling structure using the existing pipe hangers where possible, or to newly installed pipe hangers as necessary.

The system will utilize a Beckers rotary-vane compressor with a 12-horsepower motor capable of generating 95 cubic feet per minute (cfm) of airflow at maximum pressure. The compressor will be equipped with built-in inlet and discharge filters. Supply air will be passed through a Fantech AEV1000 Heat exchanger to regulate air temperatures before reaching the sparge well inlet manifold.

The air sparge system was designed with an assumed effective injection radius of 10 feet based on anticipated water table stratigraphy and data for expected radius of influence (ROI) provided by Battelle (2001). Air will be injected at each sparge well at an approximate rate of 10 cfm at a maximum pressure of 11.4 pounds per square inch (psi). All equipment related to the air sparge system will be installed in the equipment room in the partial basement of the building.

Soil Vapor Extraction System

The proposed SVE system will utilize the existing SSDS and include the installation of six new vapor extraction wells and associated piping. SVE wells will be constructed of 2-inch diameter schedule 40 PVC with 20-slot screen from approximately 8 to 13 feet bgs. Well riser piping will consist of 2-inch PVC below grade and transition to 2-inch diameter schedule 40 steel above grade. Steel riser pipes will be equipped with valves, sample ports, flow meters, and pressure gauges. Manifold piping will be composed of schedule 40 steel and will be securely fastened to the ceiling via existing pipe hangers, where possible, or to newly installed pipe hangers as necessary.

The SVE system will tie into the existing on-Site SSDS and utilize the Roots 615 universal positive displacement blower that extracts air from SSDS wells at a rate of approximately 900 to1000 cfm. The anticipated increase in flow as a result of the new SVE wells is approximately 350 cfm. Taking potential bleed air additions to the system into account, the anticipated final point of operation for the combined SSDS/SVE system is 1400 cfm. The anticipated effective ROI of the SVE wells is approximately 40 feet based on data obtained during the pilot study for the SSDS and current SSDS operating data; however the SVE system was designed utilizing a 20 foot ROI to ensure full

capture of volatilized compounds in the vadose zone and prevent additional off-Site migration of impacts. The combined SSDS/SVE system will continue to utilize the existing 2000-pound carbon vessels located in the alleyway to treat system effluent prior to discharge into the atmosphere.

Design drawings (95 percent) for the air sparge system and SVE system upgrades are included as Appendix C.

6.4.2 Pilot Testing

A minimum of six SVE wells and seven air sparge wells will be installed to perform pilot testing for the system. The purpose of the pilot tests will be to verify both radius of influence (ROI) and system coverage prior to full system installation. If the ROI and/or system coverage determined during pilot testing is determined to be inadequate, additional SVE and/or air sparge wells will be installed as necessary. The SVE and air sparge wells will not be permanently connected to a treatment system for pilot testing. SVE wells will temporarily tie in to the existing SSDS for vapor extraction measurements and to treat vapors extracted during testing. Information obtained during completion of pilot testing will be utilized to refine the 95 percent remedial design presented in Appendix C. Final drawings will be provided to NYSDEC for approval.

6.4.3 System Start-up and Testing

Start-up testing will be conducted in an effort to optimize operation of the air sparge and SVE systems. It is anticipated that the initial start-up testing will last approximately one month. Several tests will be performed to ensure system operation:

- The expanded SVE system will be activated while the air sparge system remains off. During this time, air and groundwater samples will be collected to evaluate initial pre-sparging VOCs and dissolved oxygen conditions, as well as key operational parameters such as flow rate and vacuum.
- After the SVE system has been independently analyzed, the air sparge system will be activated one well at a time for analysis. The newly installed groundwater monitoring well, C-MW-3, will be utilized during this time to collect groundwater samples for VOC concentrations and dissolved oxygen conditions. Key operational parameters such as flow rate and pressure will also be recorded. The compressor will be adjusted to varying flowrates and pressures during start-up testing to determine an optimal operating point for the system.

Influent and effluent samples for the combined SSDS/SVE systems will be collected weekly during system start-up to monitor system parameters and determine optimal bleed air percentages required by the system to maintain an influent total VOCs load of 200,000 micrograms per cubic meter ($\mu g/m^3$) at 1400 cfm. An influent concentration of 200,000 $\mu g/m^3$ will allow the system to remove larger volumes of VOCs from the subsurface while maintaining a reasonable cost basis for

system O&M (i.e. – carbon canister change outs). Weekly samples will be collected until four consecutive readings show that the system is operating within applicable State and federal guidelines. After four consecutive compliant samples are obtained, system start-up testing will be considered complete, and the system will be prepared for full-scale operation. A System Start-up Data Monitoring Log is provided in Appendix E.

6.5 SYSTEM OPERATION, MAINTENANCE, AND MONITORING

Following a successful start-up testing phase, the system will be put into full operation. The current on-Site EOS Research, Ltd. (EOS) programmable logic controller (PLC) will be utilized to remotely monitor the air sparge and SVE systems via high temperature, flow rate, pressure, and vacuum alarms. After initiation, the system is not anticipated to require an on-Site operator. The PLC sends daily system status reports containing pertinent system information such as total system flow and any system shutdowns or alarms via fax.

Periodic maintenance of the VGAC canisters will be necessary. After such maintenance events, a technician will be required to monitor system parameters to ensure that the new carbon vessel was installed and is functioning correctly. A manual disconnect switch will be located on Site, and can be activated by a technician in the event the system is malfunctioning.

6.5.1 System Monitoring and Sample Collection

It is anticipated that the SSDS and final remedy of combined applications of air sparge and SVE systems will continue to operate indefinitely at the Site. As such, monitoring will be multi-faceted to verify that all aspects of the system are functioning properly and that overall remediation goals are being achieved.

Monthly Remedial System Monitoring

SSDS monitoring currently occurs on a monthly basis and includes, but is not limited to, extraction point vacuum measurements, vapor monitoring point vacuum measurements, PID readings, and sampling and analysis of untreated vapor influent (pre-carbon) as well as treated system effluent (post-carbon). Similar tasks will continue to be performed on a monthly basis following integration and start-up of the SVE system. Additional samples will be collected between the first and second carbon canisters to evaluate potential breakthrough. Influent, effluent, and inter-carbon canister samples will be collected in 3-Liter Tedlar® bags for analysis of VOCs by USEPA Method TO-15. An anticipated sampling frequency schedule is presented in Appendix D.

Groundwater Monitoring

A groundwater sample will be collected from a newly installed groundwater monitoring well within the effective zone of the remedy prior to system start-up as a baseline sample. Groundwater samples will be collected from groundwater monitoring wells MW-6BA, MW-1D, and MW-222B, as well as the newly installed well on a quarterly basis for one year after full system start-up, then on

an annual basis until such time it is determined by NYSDEC that groundwater monitoring can be ceased. Groundwater samples will be analyzed for Target Compound List (TCL) VOCs.

Indoor Air Quality Monitoring

One round of confirmatory IAQ samples will be collected approximately one month after full system initiation to verify that the SVE and SSDS portions of the treatment system are providing building occupants with an adequate level of protection from vapor intrusion.

IAQ samples will be collected using individually certified clean 6-liter Summa® canisters equipped with pre-calibrated flow controllers over an eight hour time period. The samples will be taken between 3 to 5 feet above ground to most accurately simulate the breathing zone of on-Site personnel. The initial vacuum of each Summa® canister will be recorded immediately after opening; the final vacuum immediately prior to closure. IAQ samples will be analyzed for VOCs by USEPA Method TO-15.

IAQ samples will be compared to NYSDOH air guidance values and decision matrices found in *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (2006), to NYSDOH background databases, and Site-specific prior IAQ sample results.

6.5.2 Vapor-Phase Granulated Active Carbon Maintenance

The SSDS design utilizes two VGAC canisters run in lead-lag configuration. A third, backup canister is utilized when one of the two lead-lag canisters requires service or change out. Bypass piping and valves allow for the maintenance of each canister individually while the remaining two canisters operate. For example, it is anticipated that the lead canister (VGAC-1) will experience breakthrough first. When this occurs valves on either side of the canister can be closed and the flow re-routed through the bypass to VGAC-2 and VGAC-3. The technician will then be able to safely service VGAC-1. In addition if VGAC-2 or VGAC-3 experience breakthrough, it is possible to close the valves on either side of the canisters allowing flow to be redirected through the bypass and to the appropriate VGACs while the technician performs maintenance. The system will not be operated unless two 2000-pound VGAC units are installed, maintained, and are operating in a satisfactory manner. A diagram depicting the current layout of the carbon canisters is located in Appendix D.

An initial breakthrough test of the VGAC will be performed as soon as the system has reached a steady-state condition, but no later than 12 hours after full system start-up. Samples for analytical analysis via USEPA Method TO-15 will be collected at the carbon influent and between canisters VGAC-1 and VGAC-2. Breakthrough is considered a reading at the point between the first and second canisters that is 20 percent or more of the influent concentration. When breakthrough is detected at the operating lead canister, the bypass manifold will be utilized to redirect flow so that the operating lag canister becomes the lead canister and the third, backup canister becomes the lag canister, allowing maintenance to occur on the first canister. An initial test will be performed

each time a carbon canister is replaced and will utilize the resulting influent concentration to establish breakthrough.

The life expectancy of the lead VGAC canister is anticipated to be approximately 31 days, based on an influent concentration of PCE of 200,000 µg/m^3. PCE was utilized to determine VGAC canister life expectancy as it is anticipated to be the predominant constituent of influent air. Monthly system monitoring will assist with determining the percentage of bleed air the system will require at the anticipated combined SSDS/SVE flow rate of 1400 cubic feet per minute (cfm) to maintain an influent concentration of 200,000 µg/m^3 or less. Based on a NYSDEC DAR-1 compliance analysis performed by CORE for the SSDS in February 2015, the VGAC canisters are effective at removing approximately 99 percent of VOCs from the system influent. The resultant atmospheric emissions are well below NYSDEC's annual guidance concentrations (AGCs) for applicable constituents. The system will effectively accommodate the increased VOC load anticipated with start-up of the air sparge and SVE systems, and is anticipated to remove approximately 9200 pounds of VOCs per year, based on determinations calculated utilizing PCE.

Emissions for the proposed air sparge system were estimated by averaging results received during SSDS operation and multiplying them by a "sparging factor." The sparging factor was calculated by establishing an influent concentration of PCE during sparging operations that is both effective at reducing mass at the source and economically feasible, then dividing this concentration by average PCE concentrations observed during SSDS monitoring. The resulting sparging factor of 30.24 was then utilized to estimate the concentration for all other compounds during sparging that were found to be present during SSDS operation. Using a conservative carbon efficiency of 95 percent, estimated emissions were calculated and compared to the NYSDEC DAR-1 values. The anticipated system discharge at the effluent point is approximately 0.06 pounds per hour or 507 pounds per year. All estimated values were determined to be far below published DAR standards and are expected to be within compliance during sparging operations. A summary of this calculation can be found in Appendix D.

6.6 WASTE DISPOSAL

All wastes generated during installation of the remedy (soil and potentially groundwater) will be containerized in New York State Department of Transportation (NYSDOT)-approved 55-gallon drums for off-Site disposal. Additional wastes such as spent carbon and condensate produced by the SSDS/SVE system will be generated through standard operation of the on-Site remedial systems. All wastes will be analyzed for toxicity characteristic leaching procedure (TCLP) VOCs for hazardous waste determination prior to off-Site disposal.

Materials deemed hazardous will be transported to an off-Site disposal facility meeting the requirements of Title 6 of the New York Codes, Rules and Regulations Part 360 (6 NYCRR 360) (or equivalent out-of-State facility). Transportation of any hazardous materials will be performed by

licensed transporters with valid NYSDEC 6 NYCRR 364 Waste Transporter Permits. Waste characterization data will be provided to the proposed disposal facility for review and approval no fewer than 48 hours prior to removal of wastes from Site.

7.0 PROJECT ORGANIZATION

7.1 PROJECT OVERSIGHT

The Professional Engineer (PE) and Qualified Environmental Professional (QEP) for this project are Sheila Ransbottom, PE, and Ronald Tramposch, respectively. On-Site oversight personnel during remedial measures will include a geologist/environmental scientist or an engineer. The oversight personnel will document field activities and ensure that all activities are being performed in accordance with the Site-specific HASP, QAPP, and RWP. On-Site personnel will report directly to the PE and/or QEP on a daily basis. Any issues that arise will be resolved in a timely manner.

Personnel responsible for implementation of this Work Plan are summarized in the table below.

Name	Company/Title	Address	Contact Information
Ronald Tramposch	CORE Project Manager QEP	46-11 54th Avenue Maspeth, NY 11378	Office: (718) 762-0544 Mobile: (917) 804-8717 Email: RPT@coreenv.com
Sheila Ransbottom, PE	CORE PE	46-11 54th Avenue Maspeth, NY 11378	Office: (718) 762-0544 Email: SRansbottom@coreenv.com
William Grutta	Rockrose Project Executive	15 East 26th Street 7th Floor New York, NY 10010	Office: (212) 847-3780 Email: William.Grutta@rockrose.com
Jonathan Greco	NYSDEC Project Manager	625 Broadway Albany, NY 12233-7016	Office: (518) 402-9694 Email: Jonathan.Greco@dec.ny.gov

7.2 EMERGENCY CONTACTS

Primary emergency contacts for this project include the Site Health and Safety Officer (HSO), Ronald Tramposch, and the Project HSO, Fred Smith. Emergency contacts are summarized in the table below and are included in the Site-specific HASP.

Name	Company/Title	Address	Contact Information
Ronald Tramposch	CORE Site HSO	46-11 54th Avenue Maspeth, NY 11378	Office: (718) 762-0544 Mobile: (917) 804-8717 Email: RPT@coreenv.com
Fred Smith, CIH, CSP	Project HSO	46-11 54th Avenue Maspeth, NY 11378	Office: (718) 762-0544 Email: flsmithjr@usa.net
William Grutta	Rockrose Project Executive	15 East 26th Street 7th Floor New York, NY 10010	Office: (212) 847-3780 Email: William.Grutta@rockrose.com

7.3 PROJECT SCHEDULE

A tentative project schedule is included as Figure 11. Actual project scheduling may be revised if necessary, subject to NYSDEC approvals, contractor availability, etc.

8.0 REPORTING

Reporting for the RA will consist of:

- Monthly progress reports; and
- Final Engineering Report.

Monthly Progress Reports

Monthly progress reports will continue to be submitted by the 10th of each month, in accordance with the executed BCA. The monthly progress reports summarize activities during the previous reporting period, upcoming activities, data generated, and other important project-related information.

Final Engineering Report

The Final Engineering Report (FER) will be submitted to NYSDEC by September 15, 2015 and will include:

- Descriptions of work performed for both the remedy and IRM;
- Deviations from approved remedial system designs with explanations;
- An evaluation of the remedy and IRM and their effectiveness in achieving RAOs for the Site;
- As-Built drawings for the remedy and IRM systems; and
- Off-Site disposal receipts for any waste generated during remedy and IRM implementation.

The FER will be prepared in accordance with DER-10 and will contain the appropriate PE certifications as required.

9.0 REFERENCES

Arcadis US (Arcadis), 2012. *Remedial Investigation Report, 21-03 44th Avenue Site, Long Island City, New York, Site # 24110.*

Battelle, 2001. *Naval Facilities Engineering Command NFESC Technical Report. Final Air Sparging Guidance Document, Contract N47408-95-D-0730*.

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CORE, 2015. *Interim Remedial Measure Construction Completion Report, Wills Building, 43-01 21st Street, Long Island City, New York 11101, Site No. C241143.*

CORE, 2015. *DAR-1 Compliance and the Emission Rates of the Sub-Slab Depressurization System (SSDS) Located at The Wills Building, 43-01 21st Street, Long Island City, New York.*

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New York State Department of Environmental Conservation (NYSDEC), 1997. *Guidelines for the Control of Toxic Ambient Air Conditions.*

NYSDEC, 1999. *6 NYCRR Part 703: Surface Water and groundwater Quality Standards and Groundwater Effluent Limitations. Subpart 703.5: Water quality standards for taste-, color- and odor-producing toxic and other deleterious substances.*

NYSDEC, 2006. *6 NYCRR Part 375: Environmental Remediation Programs. Subpart 375-6: Remedial Program Soil Cleanup Objectives for Restricted Use*.

NYSDEC, 2010. *DER-10, Technical Guidance for Site Investigation and Remediation.*

New York State Department of Health (NYSDOH), 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York.*

United States Environmental Protection Agency (USEPA), 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study.*

TABLES

Table 1
Subsurface Soil Analytical Summary
Wills Building
Long Island City, New York

Sample ID	Part 375 Soil Cleanup Objectives*			B-2 (13')	B-3 (9')	B-4 (9')	B-5 (14')	B-5-DUP-1	B-6 (14')	B-7 (14')	B-8 (9')	B-9 (10')
Sample Date	**Unrestricted**	**Restricted Residential**	**Commercial**	11/8/2014	11/8/2014	11/8/2014	11/8/2014	11/8/2014	11/9/2014	11/9/2014	11/9/2014	11/9/2014
Volatile Organic Compounds (mg/kg)												
Acetone	0.05	100	500	<0.0096	**0.0067 U**	<0.0093	<0.0057	<0.0094	**0.0082 U**	**0.012 U**	<0.010	<0.0082
Methylene Chloride	0.05	100	500	<0.0096	**0.012**	<0.0093	<0.011	<0.0094	<0.0096	<0.096	<0.010	<0.0082
Tetrachloroethylene	1.3	19	150	**0.14**	**0.044**	**0.052 J**	<0.0057	<0.0047	**0.0026 J**	<0.0048	<0.0051	<0.0041
Semi-volatile Organic Compounds (mg/kg)												
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NS	<0.0436	**0.403 U**	**0.0564 U**	**0.0414 U**	NS	NS	**0.0759 U**	NS
Pesticides (mg/kg)												
4,4'-DDT	0.0033	7.9	47	NS	<0.00172	**0.00492**	<0.00172	<0.00169	NS	NS	<0.00169	NS
4,4'-DDE	0.0033	8.9	62	NS	<0.00172	**0.0161**	<0.00172	<0.00169	NS	NS	**0.0107**	NS
Polychlorinated Biphenyls (mg/kg)												
Aroclor 1248	0.1	1	1	NS	<0.0174	**0.0766**	<0.0174	<0.0171	NS	NS	<0.0170	NS
Metals (mg/kg)												
Aluminum	NA	NA	NA	NS	**5430**	**6560**	**5250**	**3630**	NS	NS	**5800**	NS
Arsenic	13	16	16	NS	**1.15**	**3.34**	**1.36**	**1.06**	NS	NS	**2.07**	NS
Barium	350	400	400	NS	**39.0**	**55.0**	**37.0**	**30.1**	NS	NS	**531**	NS
Calcium	NA	NA	NA	NS	**3710**	**8880**	**4060**	**341 U**	NS	NS	**7650**	NS
Chromium	30	180	1500	NS	**10.9**	**13.9**	**11.8**	**7.66**	NS	NS	**39.3**	NS
Cobalt	NA	NA	NA	NS	**5.00**	**5.64**	**4.77**	**4.19**	NS	NS	**5.28**	NS
Copper	50	270	270	NS	**11.1**	**29.3**	**12.3**	**12.4**	NS	NS	**80.9**	NS
Iron	NA	NA	NA	NS	**10,700**	**12,700**	**11,000**	**7760**	NS	NS	**14,800**	NS
Lead	63	400	1000	NS	**10.6**	**20.4**	**13.1 J**	**1.9 J**	NS	NS	**33.7**	NS
Magnesium	NA	NA	NA	NS	**2120**	**2260**	**1930**	**993**	NS	NS	**2070**	NS
Manganese	1600	2000	10,000	NS	**320**	**274**	**315**	**238**	NS	NS	**329**	NS
Mercury	0.18	0.81	2.8	NS	<0.0313	**0.0339**	<0.0314	<0.0308	NS	NS	<0.0306	NS
Nickel	30	310	310	NS	**13.3**	**15.0**	**13.5**	**9.56**	NS	NS	**16.9**	NS
Potassium	NA	NA	NA	NS	**919**	**1220**	**801**	**622**	NS	NS	**970**	NS
Selenium	3.9	180	1500	NS	**2.52**	**3.87**	**2.81**	**1.84**	NS	NS	**3.80**	NS
Sodium	NA	NA	NA	NS	**159**	**177**	**149**	**102 U**	NS	NS	**159**	NS
Vanadium	NA	NA	NA	NS	**16.6**	**22.3**	**15.7**	**13.1**	NS	NS	**16.0**	NS
Zinc	109	10,000	10,000	NS	**23.5**	**29.6**	**23.7**	**12.5 U**	NS	NS	**118**	NS

NOTES:

* Soil Cleanup Objectives from New York State Department of Environmental Conservation Part 375 Tables 375-6.8(a) and (b), effective December 14, 2006.

mg/kg = milligrams per kilogram

<# = analyte not detected at concentrations greater than the Reporting Limit shown

J = estimated value

U = not detected at or above stated reporting limit

= exceeds Part 375 Soil Cleanup Objectives, Unrestricted Use

= exceeds Part 375 Soil Cleanup Objectives, Commercial Use

CORE ENVIRONMENTAL CONSULTANTS

Table 2
Overburden Groundwater Analytical Summary
Wills Building
Long Island City, New York

		Grab Sample Analysis				Groundwater Monitoring Well Sample Analysis								
Sample ID		**GW-2**	**GW-6**	**GW-9**	**GW-9 Duplicate**	**MW-1S**	**MW-2S**	**MW-6BA**	**MW-101S**	**MW-214D**	**MW-215D**	**MW-218**	**GW-DUP-2**	**MW-219**
Sample Date	**Part 703.5***	11/9/2014	11/9/2014	11/9/2014		11/11/2014	11/11/2014	11/12/2014	11/12/2014	11/12/2014	11/12/2014	11/11/2014	11/11/2014	11/11/2014
Volatile Organic Compounds (µg/L)														
1,1,1-Trichloroethane	5	**24 J**	<0.50	<0.50	<0.50	<5.0	<1.0	**1.1**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	1	<0.50	<0.50	<0.50	<0.50	<5.0	<1.0	**6.1**	<0.50	**0.38 J**	<0.50	**0.78**	**0.73**	<0.50
1,1-Dichloroethane	5	**0.48 J**	<0.50	<0.50	<0.50	<5.0	<1.0	**0.59**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	5	**16 J**	<0.50	<0.50	<0.50	<5.0	<1.0	**9.0**	<0.50	**0.20 J**	<0.50	**2.7**	**2.4**	<0.50
1,4-Dichlorobenzene	3	**0.27 J**	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Acetone	50	<2.0 UJ	<2.0 UJ	<2.0 UJ	**2.0 U**	<20 UJ	<4.0 UJ	<2.0 UJ	**190 J**	**8.4 UJ**	<2.0 UJ	<0.50 UJ	<0.50 UJ	<2.0 UJ
Benzene	1	**2.4 J**	<0.50	<0.50	<0.50	<5.0	<1.0	**0.79**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chlorobenzene	5	**0.21 J**	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroethane	5	**0.37 J**	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	<0.50	**0.26 J**	<0.50	<0.50	<0.50	<0.50
Chloroform	7	**2.7 J**	**1.4**	**0.23 J**	**0.23 J**	<5.0	<1.0	**0.93**	<0.50	<0.50	<0.50	**0.45 J**	**0.43 J**	**0.32 J**
Chloromethane	NA	**1.1 J**	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
cis-1,2-Dichloroethylene	5	**6.7 J**	<0.50	<0.50	<0.50	<5.0 UJ	**5.3**	**29**	**7.2**	**3.9**	<0.50	**63**	**58**	<0.50
Ethyl benzene	5	**0.38 J**	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Acetate	NA	<0.50	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	**20**	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	5	**0.27 J**	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethylene	5	**90,000 J**	**52 J**	**6.0**	**9.0**	**340**	**75**	**7300**	**83**	**250**	**0.90 J**	**710**	**840**	**1.3**
Toluene	5	**4.1 J**	<0.50	<0.50	<0.50	<5.0	<1.0	<0.50	<0.50	**0.30 J**	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethylene	5	**0.64 J**	<0.50	<0.50	<0.50	<5.0 UJ	<1.0	**0.48 J**	<0.50	<0.50	<0.50	**0.42 J**	**0.30 J**	<0.50
Trichloroethylene	5	**290 J**	**0.48 J**	<0.50	<0.50	<5.0	**7.0**	**75**	**3.8**	**7.2**	<0.50	**32**	**31**	<0.50
Vinyl chloride	2	**0.91 J**	<0.50	<0.50	<0.50	<5.0	<1.0	**0.60**	<0.50	<0.50	<0.50	**0.28 J**	**0.25 J**	<0.50
Semi-volatile Organic Compounds (µg/L)														
Benzo(a)anthracene	0.002	<0.0500	<0.0500	<0.0541	**0.0842**	<0.0541 UJ	<0.0513 UJ	NS	NS	NS	NS	<0.0513 UJ	<0.0513 UJ	NS
Benzo(b)fluoranthene	0.002	<0.0500	<0.0500	<0.0541	**0.0632**	<0.0541 UJ	<0.0513 UJ	NS	NS	NS	NS	<0.0513 UJ	<0.0513 UJ	NS
Bis(2-ethylhexyl)phthalate	5	<0.500	**1.06**	<0.541	**0.568**	**5.28**	**0.615**	NS	NS	NS	NS	**1.79**	<0.513	NS
Fluoranthene	50	**0.0800**	<0.0500	**0.0649**	**0.126**	<0.0541	<0.0513	NS	NS	NS	NS	<0.0513	<0.0513	NS
Fluorene	50	**0.0500**	<0.0500	**0.0541**	<0.0526	<0.0541	<0.0513	NS	NS	NS	NS	<0.0513	<0.0513	NS
Naphthalene	10	**0.110**	<0.0500	**0.0541**	**0.0526**	<0.0541	**0.0513**	NS	NS	NS	NS	<0.0513	<0.0513	NS
Phenanthrene	50	**0.0900**	<0.0500	**0.173**	**0.168**	<0.0541	<0.0513	NS	NS	NS	NS	<0.0513	<0.0513	NS
Pyrene	50	**0.0700**	<0.0500	**0.0541**	**0.126**	<0.0541	<0.0513	NS	NS	NS	NS	<0.0513	<0.0513	NS
Polychlorintated Biphenyls														
Arochlor 1016	0.09	**0.285**	<0.0500	<0.0500	<0.0541	<0.0526	<0.0526	NS	NS	NS	NS	<0.0513	<0.0513	NS

NOTES:

* Guidance values from 6 NYCRR 703.5: Water quality standards for taste-, color-, and odor-producing, toxic and other deleterious substances for Class GA Waters as presented in TOGS 1.1.1 June 1998.

µg/L = micrograms per liter
mg/L = milligrams per liter
NA = not available
NS = not sampled

J = estimated value
UJ = not detected above estimated reporting limit shown
<# = analyte not detected at concentrations greater than the Reporting Limit shown
Shaded value indicates exceedance of TOGS 1.1.1 guidance value.

Table 2
Overburden Groundwater Analytical Summary
Wills Building
Long Island City, New York

		Grab Sample Analysis				Groundwater Monitoring Well Sample Analysis								
Sample ID		**GW-2**	**GW-6**	**GW-9**	**GW-9 Duplicate**	**MW-1S**	**MW-2S**	**MW-6BA**	**MW-101S**	**MW-214D**	**MW-215D**	**MW-218**	**GW-DUP-2**	**MW-219**
Sample Date	**Part 703.5***	11/9/2014	11/9/2014	11/9/2014		11/11/2014	11/11/2014	11/12/2014	11/12/2014	11/12/2014	11/12/2014	11/11/2014	11/11/2014	11/11/2014
Total Metals (mg/L)														
Aluminum	NA	**48.6**	**0.158**	**0.627 J**	**1.98 J**	**0.061**	<0.01	NS	NS	NS	NS	<0.01	<0.01	NS
Arsenic	0.025	**0.005**	<0.004	<0.004	<0.004	<0.004	<0.04	NS	NS	NS	NS	<0.004	<0.04	NS
Barium	1	**0.645**	**0.041**	**0.066**	0.103	**0.614**	**0.232**	NS	NS	NS	NS	**0.147**	**0.147**	NS
Calcium	NA	**167**	**71.8**	**124**	**126**	**439**	**111**	NS	NS	NS	NS	**168**	**170**	NS
Chromium	0.05	**0.203**	<0.005	**0.005**	**0.008**	<0.005	<0.005	NS	NS	NS	NS	**0.01**	**0.01**	NS
Cobalt	NA	**0.069**	<0.005	**0.005**	<0.005	<0.005	**0.005**	NS	NS	NS	NS	<0.005	<0.005	NS
Copper	0.2	**0.188**	<0.003	**0.003**	**0.01**	<0.003	<0.003	NS	NS	NS	NS	<0.003	<0.003	NS
Iron	0.3	**97.9**	**0.357**	**0.271 J**	**2.55 J**	**0.099**	**0.126**	NS	NS	NS	NS	**0.144**	**0.152**	NS
Lead	0.025	**0.073**	<0.003	**0.003**	**0.01**	<0.003	<0.003	NS	NS	NS	NS	<0.003	<0.003	NS
Magnesium	NA	**66.6**	**30.8**	**8.3**	**11**	**46.8**	**52.5**	NS	NS	NS	NS	**81.1**	**82.3**	NS
Manganese	0.3	**5.13**	**0.111**	**0.351**	**0.523**	**1.34**	**5.07**	NS	NS	NS	NS	**0.087**	**0.093**	NS
Nickel	0.1	**0.175**	<0.005	<0.005	**0.007**	**0.007**	<0.005	NS	NS	NS	NS	<0.005	<0.005	NS
Potassium	NA	**18.4**	**3.43**	**8.11**	**6.8**	**10.9**	**4.52**	NS	NS	NS	NS	**5.8**	**5.88**	NS
Selenium	0.01	**0.017**	**0.012**	**0.010**	<0.01	<0.01	<0.01	NS	NS	NS	NS	<0.01	<0.01	NS
Sodium	20	**322**	**35.3 J**	**213**	**206 J**	**1030 J**	**411 J**	NS	NS	NS	NS	**264 J**	**263 J**	NS
Vanadium	NA	**0.132**	<0.01	<0.01	<0.01	<0.01	<0.01	NS	NS	NS	NS	<0.01	<0.01	NS
Zinc	NA	**0.333**	**0.012**	**0.019**	**0.025**	**0.014**	**0.014**	NS	NS	NS	NS	**0.01**	<0.01	NS
Dissolved Metals (mg/L)														
Aluminum	NA	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	NS	NS	NS	NS	<0.01	**0.024**	NS
Barium	1	**0.051**	**0.03**	**0.067**	**0.076**	**0.629**	**0.233**	NS	NS	NS	NS	**0.149**	**0.147**	NS
Calcium	NA	**104**	**74.1**	**120**	**125**	**439**	**111**	NS	NS	NS	NS	**170**	**170**	NS
Magnesium	NA	**35.7**	**289**	**8.57**	**10.5**	**47.9**	**53.2**	NS	NS	NS	NS	**83.6**	**82.7**	NS
Manganese	0.3	**0.143**	**0.046**	**0.397**	**0.287**	**1.39**	**5.07**	NS	NS	NS	NS	**0.091**	**0.097**	NS
Potassium	NA	**6.33**	**3.83**	**7.24**	**6.47**	**11.4**	**4.61**	NS	NS	NS	NS	**5.99**	**5.97**	NS
Selenium	0.01	**0.026 J**	**0.021 J**	**0.015 J**	**0.011 J**	<0.01	<0.01	NS	NS	NS	NS	<0.01	<0.01	NS
Sodium	20	**313**	**36.6**	**210 J**	**217**	**1060 J**	**422 J**	NS	NS	NS	NS	**272 J**	**269 J**	NS
Zinc	2	<0.01	<0.01	<0.01	<0.01	**0.013**	<0.01	NS	NS	NS	NS	<0.01	<0.01	NS

NOTES:

* Guidance values from 6 NYCRR 703.5: Water quality standards for taste-, color-, and odor-producing, toxic and other deleterious substances for Class GA Waters as presented in TOGS 1.1.1 June 1998.

µg/L = micrograms per liter
mg/L = milligrams per liter
NA = not available
NS = not sampled

J = estimated value
UJ = not detected above estimated reporting limit shown
<# = analyte not detected at concentrations greater than the Reporting Limit shown
Shaded value indicates exceedance of TOGS 1.1.1 guidance value.

Table 3
Bedrock Groundwater Analytical Summary
Wills Building
Long Island City, New York

Sample ID		MW-1D	MW-222B	MW-227B
Sample Date	Part 703.5*	11/11/2014	11/11/2014	11/11/2014
Volatile Organic Compounds (µg/L)				
1,1,1-Trichloroethane	5	**11 J**	**7.2 J**	<0.50
1,1,2-Trichloroethane	1	<0.50	**10 J**	**2.4**
1,1-Dichloroethane	5	<0.50	**0.41 J**	**0.98**
1,1-Dichloroethylene	5	**2.4 J**	**16 J**	**8.3**
1,2-Dichloroethane	0.6	<0.50	<0.50	**0.22 J**
Acetone	50	**3.8 UJ**	<2.0 UJ	<2.0 UJ
Benzene	1	**0.20 J**	**0.54 J**	**0.64**
Carbon Disulfide	NA	<0.50	**0.25 J**	<0.50
Chloroethane	5	<0.50	<0.50	**0.46 J**
Chloroform	7	**4.3 J**	**1.3 J**	**0.35 J**
cis-1,2-Dichloroethylene	5	**1.3 J**	**11 J**	**7.1**
Methyl Tert-Butyl Ether (MTBE)	NA	<0.50	**0.23 J**	<0.50
Styrene	5	<0.50	**0.27 J**	<0.50
Tetrachloroethylene	5	**20,000 J**	**43,000 J**	**2500**
Toluene	5	**1.1 J**	**2.0 J**	<0.50
trans-1,2-Dichloroethylene	5	<0.50	**0.73 J**	**0.79**
Trichloroethylene	5	**62 J**	**230 J**	**82**
Vinyl Chloride	2	<0.50	**0.43 J**	**0.51**

NOTES:

* Guidance values from 6 NYCRR 703.5: Water quality standards for taste-, color-, and odor-producing, toxic and other deleterious substances for Class GA Waters as presented in TOGS 1.1.1 June 1998.

µg/L = micrograms per liter.

NA = not available

<# = analyte not detected at concentrations greater than the Reporting Limit shown

J = estimated value

UJ = not detected above estimated reporting limit shown

Shaded value indicates exceedance of TOGS 1.1.1 guidance value

Table 4
Indoor Air and Sub-Slab Vapor Analytical Summary
Wills Building
Long Island City, New York

Sample ID	NYSDOH Final Guidance for Mitigation[1]		Ambient-1		IAQ-1		B-DUP	IAQ-2		IAQ-3	
Sample Type			Outdoor		Indoor Air			Indoor Air		Indoor Air	
Sample Date	Sub-Slab[2]	Indoor Air[3]	10/24/2014	2/15/2015	10/24/2014	2/15/2015		10/28/2014	2/15/2015	10/24/2014	2/15/2015
Volatile Organic Compounds (µg/m³)											
1,1,1-Trichloroethane	1,000	100	<0.55	<0.55	<0.59	<0.55	<0.60	<0.67	<0.7	<0.70	<0.75
1,1,2-Trichloroethane	NA	NA	<0.55	<0.55	<0.59	<0.55	<0.60	<0.67	<0.70	<0.70	<0.75
1,1-Dichloroethylene	1,000	100	<0.40	<0.40	<0.43	<0.40	<0.43	<0.48	<0.51	<0.51	<0.55
1,2,4-Trimethylbenzene	NA	NA	**2.2**	<0.49	**3.9 J**	**0.88**	**0.92**	**6.4**	**1.0**	**2.8**	**0.88**
1,3,5-Trimethylbenzene	NA	NA	**0.69**	<0.49	**1.2 J**	<0.49	<0.54	**1.9**	<0.63	**0.82**	<0.68
1,3-Butadiene	NA	NA	<0.43	<0.43 UJ	<0.47	<0.43 UJ	<0.48 UJ	<0.53	<0.55 UJ	<0.55	<0.60 UJ
1,4-Dichlorobenzene	NA	NA	<0.60	<0.60	<0.65	<0.60	<0.66	<0.73	<0.77	<0.77	<0.83
2-Butanone (Methyl Ethyl Ketone)	NA	NA	**3.3**	**0.62**	**48 J**	**9.1**	**7.5**	**64**	**5.0**	**5.8**	**4.9**
2-Hexanone	NA	NA	<0.82	<0.82	**1.4 J**	<0.82	<0.90	<1.0	<1.0	<1.0	<1.1
4-Methyl-2-Pentanone	NA	NA	**6.8**	<0.41	**10 J**	**6.7**	**5.3**	**21**	**3.1**	**6.0**	**5.5**
Acetone	NA	NA	**300**	**5.5**	**13,000 J**	**180**	**180**	**250**	**150**	**410**	**140**
Benzene	NA	NA	**2.3**	**0.61**	**1.5 J**	**0.77**	**1.5**	**2.1**	**2.6**	**1.1**	**0.88**
Bromodichloromethane	NA	NA	<0.62	<0.62	<0.67	<0.62	<0.68	<0.76	<0.79	<0.79	<0.86
Carbon Tetrachloride	250	5	**0.38 J**	**0.38 J**	**0.41 J**	**0.38 J**	**0.35 J**	**0.46**	<0.20 UJ	**0.32 J**	<0.22 UJ
Chlorobenzene	NA	NA	<0.46	<0.46	<0.49	<0.46	<0.51	<0.56	<0.59	<0.59	<0.63
Chloroform	NA	NA	<0.49	<0.49	<0.52	<0.49	<0.54	<0.60	<0.62	<0.62	<0.67
Chloromethane	NA	NA	**1.7 J**	**1.9 J**	**1.8 J**	**1.9 J**	**1.8 J**	**2.3**	**1.9 J**	**1.5 J**	**1.9 J**
cis-1,2-Dichloroethylene	1,000	100	<0.40	<0.40	<0.43	<0.40	<0.43	<0.48	<0.51	<0.51	<0.55
Cyclohexane	NA	NA	**2.1**	<0.34	<350	**0.69**	**0.68**	**1.6**	**0.75**	**18**	**1.3**
Dichlorodifluoromethane	NA	NA	**1.9**	**1.8**	**1.4 J**	**1.8**	**2.0**	**4.5**	**1.9**	**1.6**	**1.8**
Ethyl Acetate	NA	NA	<0.72	<0.72	<0.77	**8.4**	**10**	<0.88	**9.1**	<0.92	**18**
Ethyl Benzene	NA	NA	**2.6**	<0.43	**3.6 J**	**1.1**	**1.1**	**6.8**	**1.6**	**2.8**	**3.4**
Isopropanol	NA	NA	**23**	**1.1**	**81 J**	**40**	**37**	**73**	**32**	**58**	**50**
Methyl Methacrylate	NA	NA	<0.41	<0.41	<0.44	<0.41	<0.45	<0.50	<0.52	<0.52	<0.56
Methylene Chloride	NA	60	**21**	**1.8**	**54 J**	**28**	**30**	**46**	**38**	**51**	**99**
n-Heptane	NA	NA	<0.41	<0.41	**4.3 J**	**1.3**	**1.1**	**6.4**	**1.1**	**3.1**	**2.0**
n-Hexane	NA	NA	**120**	<0.35	**6500 J**	**2.3**	**2.2**	**18**	**1.7**	**110**	**2.9**
o-Xylene	NA	NA	**3.5**	<0.43	**4.2 J**	**1.4**	**1.4**	**12**	**2.1**	**3.4**	**3.5**
p- & m-Xylenes	NA	NA	**10**	<0.87	**13 J**	**4.4**	**4.4**	**29**	**6.0**	**11**	**14**
p-Ethyltoluene	NA	NA	**2.1**	<0.49	**3.8 J**	**0.84**	**0.86**	**5.6**	**1.0**	**2.4**	**0.81**
Styrene	NA	NA	**4.8**	<0.43	**17 J**	**2.6**	**2.7**	**11**	**5.0**	**20**	**5.9**
Tetrachloroethylene	1,000	100	**20**	<0.17	**37 J**	**3.6**	**3.4**	**37**	**3.3**	**6.2**	<0.23
Tetrahydrofuran	NA	NA	<0.29	<0.29	**10 J**	<0.29	<0.32	**6.2**	<0.38	<0.38	<0.41
Toluene	NA	NA	**43**	**0.79**	**120 J**	**21**	**20**	**160**	**25**	**57**	**58**
trans-1,2-Dichloroethylene	NA	NA	<0.40	<0.40	<0.43	<0.40	<0.43	<0.48	<0.51	<0.51	<0.55
Trichloroethylene	250	5	**0.43**	<0.13	**0.69**	<0.13	<0.15	**0.39**	<0.17	**0.96**	**0.67**
Trichlorofluoromethane (Freon 11)	NA	NA	**1.4**	**1.2**	**1.1 J**	**1.2**	**1.2**	**2.0**	**1.2**	**1.3**	**1.2**

NOTES:
[1] Mitigation Guidance Values from New York State Department of Health Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, Table 3.1 and Soil Vapor/Indoor Air Matrices 1 and 2, effective October 2006.
[2] Values for mitigation regardless of indoor air concentration.
[3] Values for mitigation regardless of sub-slab concentration.
µg/m³ = micrograms per cubic meter.
Shaded cell indicates value exceeds NYSDOH guidance values for mitigation.

NA = not available
<# = analyte not detected at concentrations greater than the Reporting Limit shown
J = estimated value
U = not detected at or above stated reporting limit
UJ = not detected above estimated reporting limit shown

Table 4
Indoor Air and Sub-Slab Vapor Analytical Summary
Wills Building
Long Island City, New York

Sample ID	NYSDOH Final Guidance for Mitigation[1]		IAQ-4		IAQ-5		IAQ-6		IAQ-7		SS-1	SS-2
Sample Type			Indoor Air		Indoor Air		Indoor Air		Indoor Air		Sub-Slab	Sub-Slab
Sample Date	Sub-Slab[2]	Indoor Air[3]	10/24/2014	2/15/2015	10/24/2014	2/15/2015	10/24/2014	2/15/2015	10/24/2014	2/15/2015	10/24/2014	10/24/2014
Volatile Organic Compounds (µg/m³)												
1,1,1-Trichloroethane	1,000	100	<0.64	<0.55	<0.59	<0.73	<0.61	<0.59	<0.67	<0.59	**52**	**130**
1,1,2-Trichloroethane	NA	NA	<0.64	<0.55	<0.59	<0.73	<0.61	<0.59	<0.67	<0.59	**100**	**670**
1,1-Dichloroethylene	1,000	100	<0.46	<0.40	<0.43	<0.53	<0.44	<0.43	<0.48	<0.43	**28**	**140**
1,2,4-Trimethylbenzene	NA	NA	**1.2**	**1.0**	**4.4**	<0.66	**1.6**	<0.53	**1.2**	<0.53	<9.0	<9.2
1,3,5-Trimethylbenzene	NA	NA	<0.57	<0.50	**1.4**	<0.66	<0.55	<0.53	<0.60	<0.53	<9.0	<9.2
1,3-Butadiene	NA	NA	<0.51	**0.79 J**	<0.47	<0.58 UJ	<0.49	<0.47 UJ	<0.53	<0.47 UJ	<7.9	<8.1
1,4-Dichlorobenzene	NA	NA	<0.70	<0.61	**2.5**	<0.81	<0.67	<0.65	<0.73	<0.65	<11	<11
2-Butanone (Methyl Ethyl Ketone)	NA	NA	**3.8**	**5.1**	**2.9**	**3.1**	**1.7**	**6.1**	**7.3**	**0.54**	<5.4	<5.5
2-Hexanone	NA	NA	<0.96	<0.83	<0.88	<1.1	<0.92	**1.5 J**	<1.0	<0.88	<15	<15
4-Methyl-2-Pentanone	NA	NA	**6.1**	**3.9**	**6.4**	**1.4**	**5.0**	**3.1**	**2.9**	<0.44	<7.5	<7.6
Acetone	NA	NA	**240**	**110**	**150**	**87**	**61**	**100**	**800**	**5.1**	**37**	**15**
Benzene	NA	NA	**1.1**	**1.8**	**3.0**	**0.8**	**0.93**	**0.69**	<0.39	**0.62**	**13**	**17**
Bromodichloromethane	NA	NA	<0.73	<0.63	<0.67	<0.83	<0.70	<0.67	<0.76	<0.67	**11**	**15**
Carbon Tetrachloride	250	5	**0.37 J**	**0.32 J**	**0.41 J**	<0.21 UJ	**0.42 J**	<0.17 UJ	**0.38 J**	**0.34 J**	<2.9 UJ	<2.9 UJ
Chlorobenzene	NA	NA	<0.54	<0.47	**3.0**	<0.62	<0.52	<0.49	<0.56	<0.49	<8.4 UJ	<8.6
Chloroform	NA	NA	<0.57	<0.50	<0.52	<0.66	<0.55	<0.52	<0.60	<0.52	**320**	**1000**
Chloromethane	NA	NA	**1.9 J**	**1.9 J**	**1.7 J**	**2.2 J**	**1.5 J**	**2.0 J**	**1.7 J**	**1.7 J**	<3.8 UJ	<3.9 UJ
cis-1,2-Dichloroethylene	1,000	100	<0.46	<0.40	<0.43	<0.53	<0.44	<0.43	<0.48	<0.43	**15**	**45**
Cyclohexane	NA	NA	**9.9**	**1.9**	**4.3**	**0.74**	**4.6**	**0.74**	**540**	<0.37	**9.5**	**16**
Dichlorodifluoromethane	NA	NA	**1.7**	**1.8**	**1.7**	**2.2**	**1.7**	**1.7**	**1.6**	**1.8**	<9.1	<9.2
Ethyl Acetate	NA	NA	<0.84	**13**	<0.77	**21**	**4.9**	**13**	**65**	<0.77	<13	<13
Ethyl Benzene	NA	NA	**2.3**	**2.8**	**2.8**	**3.7**	**1.6**	**2.1**	**1.5**	<0.47	<8.0 UJ	<8.1 UJ
Isopropanol	NA	NA	**53**	**37**	**27**	**35**	**22**	**35**	**27**	**1.4**	<9.0	<9.2
Methyl Methacrylate	NA	NA	<0.48	<0.42	<0.44	<0.55	<0.46	<0.44	<0.50	<0.44	<7.5	<7.6
Methylene Chloride	NA	60	**56**	**88**	**39**	**63**	**48**	**100**	**23**	**1.4**	**17**	**27**
n-Heptane	NA	NA	**3.1**	**2.7**	<0.44	1.3	**2.3**	**1.2**	**73**	<0.44	<7.5	<7.7
n-Hexane	NA	NA	**41**	**9.0**	**41**	**1.5**	**2.0**	**2.4**	**77**	<0.38	**11**	**67**
o-Xylene	NA	NA	**2.6**	**2.9**	**3.9**	**3.3**	**1.9**	**2.1**	**1.7**	<0.47	<8.0 UJ	<8.1 UJ
p- & m-Xylenes	NA	NA	**8.4**	**11**	**11**	**15**	**6.1**	**8.6**	**5.7**	<0.93	<16 UJ	<16 UJ
p-Ethyltoluene	NA	NA	**1.4**	**0.95**	**4.3**	<0.66	**1.4**	<0.53	**1.1**	<0.53	<9.0 UJ	<9.2 UJ
Styrene	NA	NA	**19**	**3.7**	**4.1**	<0.57	**1.1**	**0.92**	<0.52	<0.46	<7.8 UJ	<8.0 UJ
Tetrachloroethylene	1,000	100	**3.6**	<0.17	**11**	<0.23	**0.68 U**	<0.18	**16**	<0.18	**190,000**	**4,200,000**
Tetrahydrofuran	NA	NA	<0.34	<0.30	<0.32	<0.40	<0.33	**1.5**	<0.36	<0.32	<5.4	<5.5
Toluene	NA	NA	**58**	**44**	**42**	**40**	**38**	**39**	**850**	**1.3**	**14**	**64**
trans-1,2-Dichloroethylene	NA	NA	<0.46	<0.40	<0.43	<0.53	<0.44	<0.43	<0.48	<0.43	**22**	**53**
Trichloroethylene	250	5	**0.88**	**0.55**	**0.87**	<0.18	**0.54**	**0.35**	**0.39**	<0.14	**2700**	<20,000
Trichlorofluoromethane (Freon 11)	NA	NA	**1.3**	**1.3**	**1.4**	**1.4**	**1.3**	**1.3**	**1.2**	**1.1**	<10	<10

NOTES:
[1] Mitigation Guidance Values from New York State Department of Health Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, Table 3.1 and Soil Vapor/Indoor Air Matrices 1 and 2, effective October 2006.
[2] Values for mitigation regardless of indoor air concentration.
[3] Values for mitigation regardless of sub-slab concentration.
µg/m³ = micrograms per cubic meter.
Shaded cell indicates value exceeds NYSDOH guidance values for mitigation.

NA = not available
<# = analyte not detected at concentrations greater than the Reporting Limit shown
J = estimated value
U = not detected at or above stated reporting limit
UJ = not detected above estimated reporting limit shown

Table 4
Indoor Air and Sub-Slab Vapor Analytical Summary
Wills Building
Long Island City, New York

Sample ID	NYSDOH Final Guidance for Mitigation[1]		SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9	SS-9-DUP	SS-10
Sample Type			Sub-Slab	Sub-Slab	Sub-Slab	Sub-Slab	Sub-Slab	Sub-Slab	Sub-Slab		Sub-Slab
Sample Date	Sub-Slab[2]	Indoor Air[3]	10/24/2014	10/24/2014	10/24/2014	10/24/2014	10/24/2014	10/24/2014	10/24/2014		10/24/2014
Volatile Organic Compounds (µg/m³)											
1,1,1-Trichloroethane	1,000	100	<210	<220	<21	<110	<22	**6.8**	<14	<9.9	**2.2**
1,1,2-Trichloroethane	NA	NA	<210	<220	<21	<110	<22	<0.55	<14	<9.6	<0.55
1,1-Dichloroethylene	1,000	100	<150	<160	<15	<77	<16	<0.40	<11	<7.0	<0.40
1,2,4-Trimethylbenzene	NA	NA	<190	<190	<19	<95	<19	**3.0**	**27**	**29**	**4.5**
1,3,5-Trimethylbenzene	NA	NA	<190	<190	<19	<95	<19	**0.64**	<13	**12**	**0.74**
1,3-Butadiene	NA	NA	<160	<170	<17	<84	<17	<0.43	<12	<7.7	<0.43
1,4-Dichlorobenzene	NA	NA	<230	<240	<23	<120	<24	<0.60	<16	<11	<0.60
2-Butanone (Methyl Ethyl Ketone)	NA	NA	<110	<120	<11	<57	<12	**5.1**	<7.8	**6.3**	**2.2**
2-Hexanone	NA	NA	<310	<320	<32	<160	<32	**1.0**	<22	<14	**0.94**
4-Methyl-2-Pentanone	NA	NA	<160	<160	<16	<79	<16	**0.61**	**26**	**27**	**0.41**
Acetone	NA	NA	**440**	**320**	**21**	**410**	**12**	**15**	**160**	**160**	**13**
Benzene	NA	NA	<120	<130	<12	<62	<13	<0.32	<8.5	<5.6	<0.32
Bromodichloromethane	NA	NA	<240	<250	<24	<120	<25	<0.62	<16	<11	<0.62
Carbon Tetrachloride	250	5	<60 UJ	<62 UJ	<6.1 UJ	<30 UJ	<6.2 UJ	**1.7 J**	<4.2 UJ	<2.8 UJ	**63 J**
Chlorobenzene	NA	NA	<180	<180	<18	<89	<18	<0.46	<12	<8.1	<0.46
Chloroform	NA	NA	<190	<190	<19	<95	<19	<0.49	<13	<8.6	**17**
Chloromethane	NA	NA	<79	<82	<8.0	<40	<8.2	0.39	<5.5	<3.7	<0.21
cis-1,2-Dichloroethylene	1,000	100	<150	<160	<15	<77	<16	<0.40	<11	<7.0	<0.40
Cyclohexane	NA	NA	<130	<140	<13	<67	<14	<0.34	<9.1	<6.1	**0.72**
Dichlorodifluoromethane	NA	NA	<190 UJ	<200 UJ	<19 UJ	<96 UJ	<20	**1.7**	<13	<8.7	**1.7**
Ethyl Acetate	NA	NA	<270	<280	<28	<140	<28	<0.72	<19	<13	<0.72
Ethyl Benzene	NA	NA	<170	<170	<17	<84	<17	**1.8**	<12	**7.7**	**1.0**
Isopropanol	NA	NA	<190	<190	<19	<95	<19	**1.4**	**110**	**120**	**1.1**
Methyl Methacrylate	NA	NA	<160	<160	<16	**130**	<16	<0.41	<11	<7.2	<0.41
Methylene Chloride	NA	60	**790**	**950**	<27	**1400**	<27	**0.97**	**34**	**33**	**4.9**
n-Heptane	NA	NA	<160	<160	<16	<79	<16	<0.41	<11	<7.2	<0.41
n-Hexane	NA	NA	**340**	**320**	<14	**500**	<14	<0.35	<9.4	<6.2	**3.2**
o-Xylene	NA	NA	<170	<170	<17	<84	<17	**2.1**	**13**	**13**	**1.6**
p- & m-Xylenes	NA	NA	<330	<340	<34	<170	<34	**6.1**	**33**	**32**	**3.9**
p-Ethyltoluene	NA	NA	<190	<190	<19	<95	<19	**3.8**	**13**	**13**	**2.8**
Styrene	NA	NA	<160	<170	<17	<83	<17	**3.2**	<11	<7.5	**1.6**
Tetrachloroethylene	1,000	100	**550,000**	**110,000**	**7300**	**32,000**	**8700**	**240 J**	**2800 J**	**2900 J**	**50 J**
Tetrahydrofuran	NA	NA	<110	<120	<11	<57	<12	2.5	<7.8	<5.2	**0.59**
Toluene	NA	NA	<140	<150	<15	**80**	<15	**4.5**	**79**	**81**	**4.1**
trans-1,2-Dichloroethylene	NA	NA	<150	<160	<15	<77	<16	<0.40	<11	<7.0	<0.40
Trichloroethylene	250	5	**1600**	**170**	**58**	**83**	**45**	<0.13	<3.6	<2.4	**14**
Trichlorofluoromethane (Freon 11)	NA	NA	<210	<220	<22	<110	<22	**1.6**	<15	<9.9	**1.6**

NOTES:
[1] Mitigation Guidance Values from New York State Department of Health Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, Table 3.1 and Soil Vapor/Indoor Air Matrices 1 and 2, effective October 2006.
[2] Values for mitigation regardless of indoor air concentration.
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µg/m³ = micrograms per cubic meter.
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NA = not available
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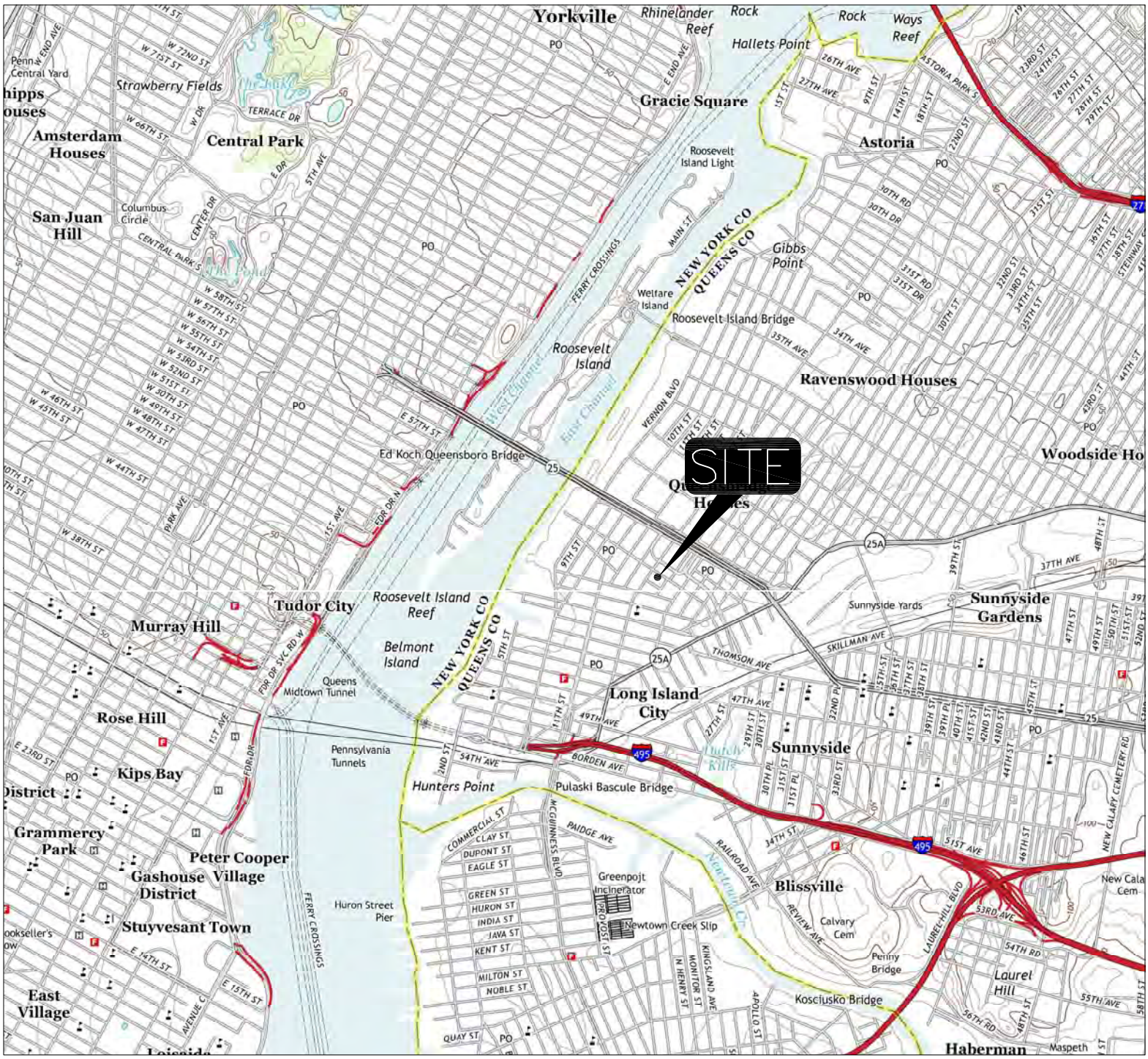
FIGURES



1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

Source: USGS Topographic map Brooklyn 2013
USGS Topographic map Central Park 2013

QUADRANGLE LOCATION

JOB TITLE AND LOCATION:
WILLS BUILDING
43-01 21st STREET
LONG ISLAND CITY, NEW YORK

WARNING
IT IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, OTHER THAN THOSE WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

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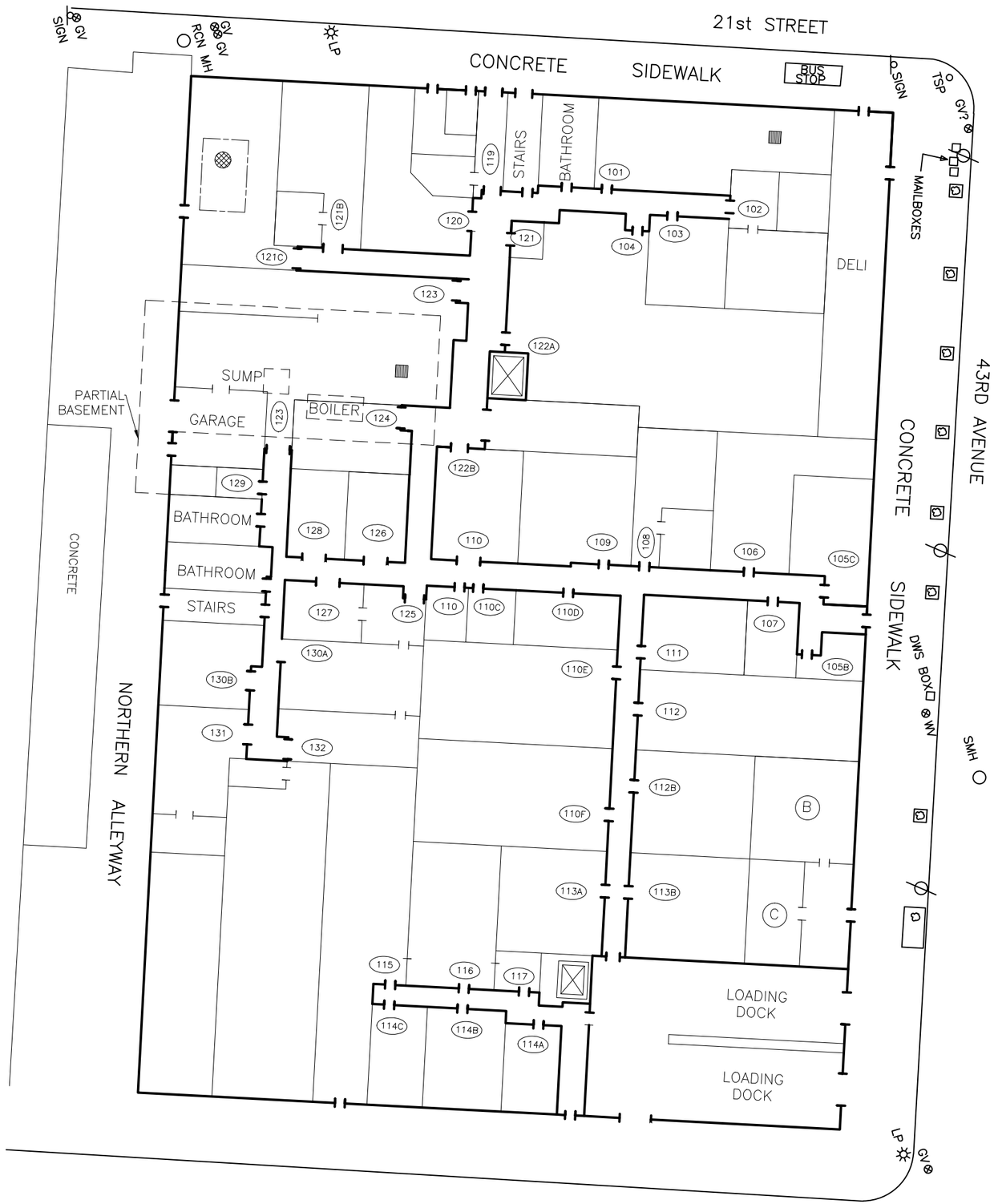
DRAWING TITLE:
SITE LOCATION MAP

DATE:	JOB NO.:	FIGURE NO.:
9/6/2013		1
DESIGNED BY: BDB	CHECKED BY: RPT	SCALE: 1 : 24000
DRAWN BY: BDB	PROJ ENG.: RPT	SHEET OF



LEGEND:

- (121C) SUITE/OFFICE NUMBER
- ELEVATOR
- FLOOR DRAIN (10"X10")
- MANHOLE (24")
- HOUSE SEWER TRAP VAULT (4'x8')

15FT 0 15FT
SCALE

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY

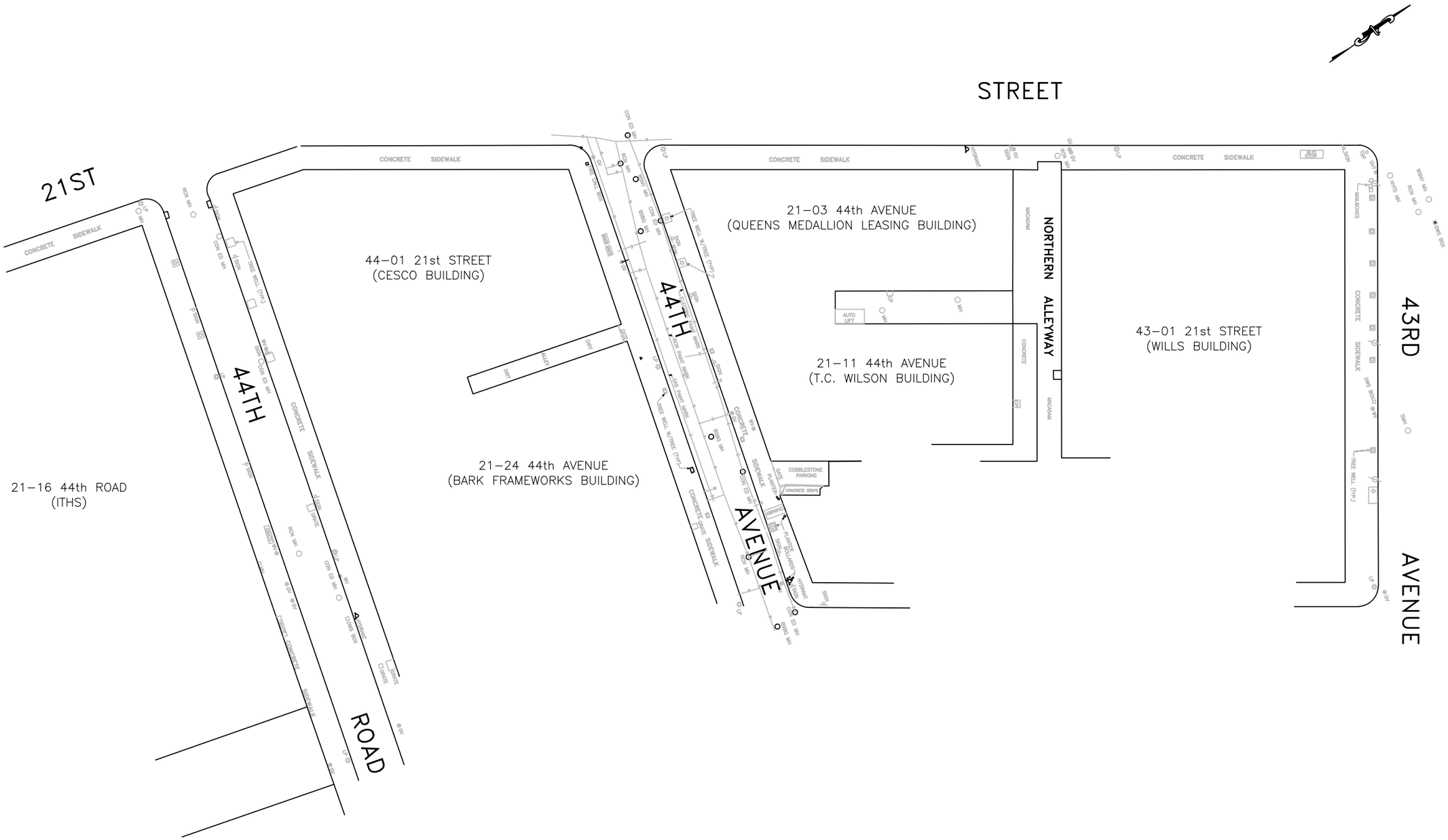
DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

SITE MAP

SEAL & SIGNATURE		
	DATE:	04/01/2015
	PROJECT No.:	–
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	RPT
	FIGURE No.:	2
SCALE: 1" = 30'	SHEET No.:	OF:
	REVISED BY:	–



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CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
46-11 54TH AVENUE
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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43–01 21ST STREET
LONG ISLAND CITY, NY

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

AREA MAP

SEAL & SIGNATURE		
	DATE:	04/01/2015
	PROJECT No.:	–
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	RPT
	FIGURE No.:	3
SCALE: 1" = 30'	SHEET No.:	OF:
	REVISED BY:	–

MW-1S	11/11/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	<5.0
Tetrachloroethylene	340
trans-1,2-Dichloroethylene	<5.0
Trichloroethylene	<5.0
Vinyl chloride	<5.0

GW-2	11/9/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	6.7
Tetrachloroethylene	90,000
trans-1,2-Dichloroethylene	0.64
Trichloroethylene	290
Vinyl chloride	0.91

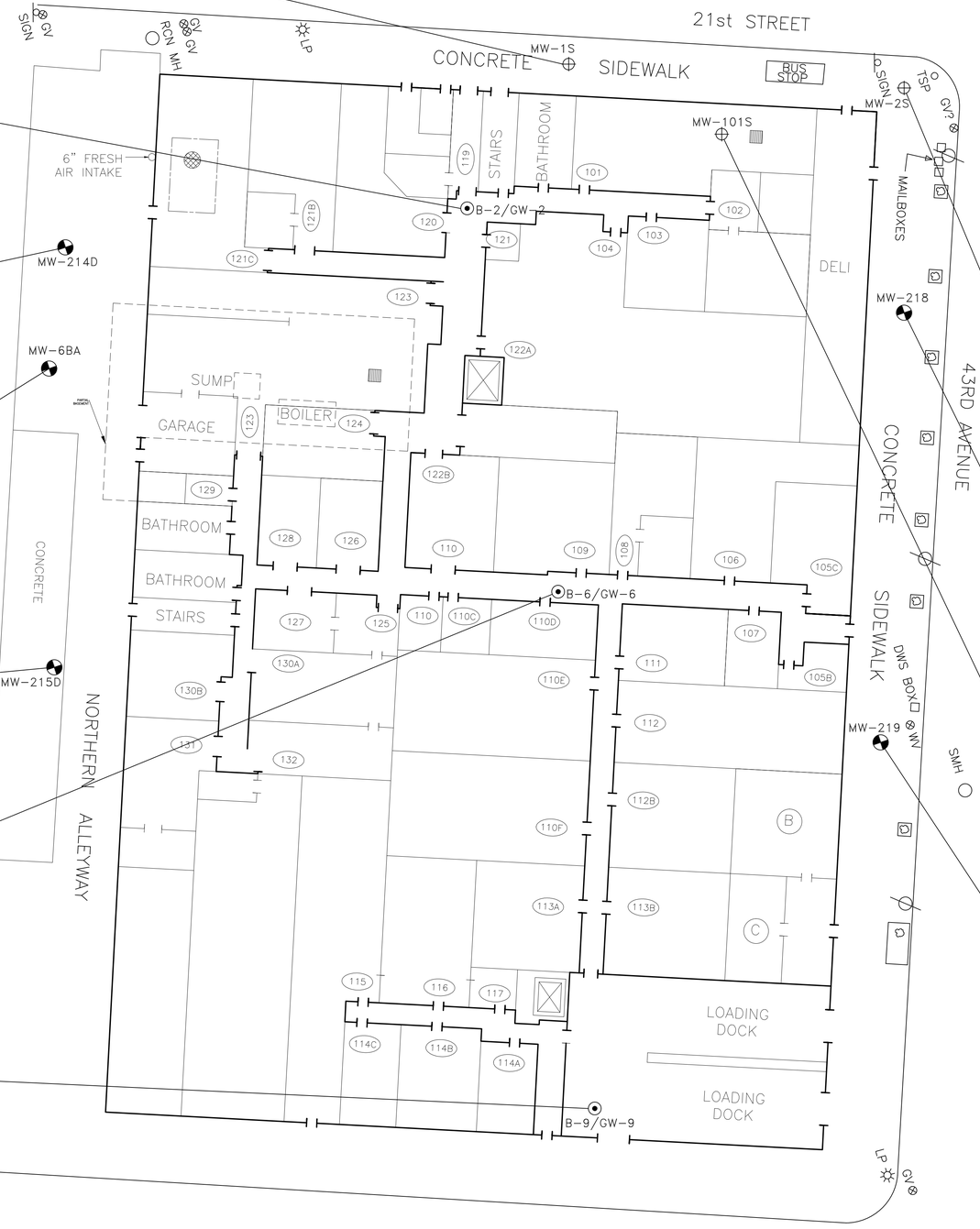
MW-214D	11/12/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	3.9
Tetrachloroethylene	250
trans-1,2-Dichloroethylene	<0.50
Trichloroethylene	7.2
Vinyl chloride	<0.50

MW-6BA	11/12/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	29
Tetrachloroethylene	7300
trans-1,2-Dichloroethylene	0.48 J
Trichloroethylene	75
Vinyl chloride	0.60

MW-215D	11/12/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	<0.50
Tetrachloroethylene	0.90
trans-1,2-Dichloroethylene	<0.50
Trichloroethylene	<0.50
Vinyl chloride	<0.50

GW-6	11/9/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	<0.50
Tetrachloroethylene	52
trans-1,2-Dichloroethylene	<0.50
Trichloroethylene	0.48 J
Vinyl chloride	<0.50

COMPOUND	GW-9	GW-9 (DUP)
	11/9/2014	11/9/2014
	RESULTS (µg/L)	
cis-1,2-Dichloroethylene	<0.50	<0.50
Tetrachloroethylene	6.0	9.0
trans-1,2-Dichloroethylene	<0.50	<0.50
Trichloroethylene	<0.50	<0.50
Vinyl chloride	<0.50	<0.50



LEGEND:

- 121C — SUITE/OFFICE NUMBER
- ELEVATOR
- FLOOR DRAIN (10"X10")
- MANHOLE (24")
- HOUSE SEWER TRAP VAULT (4'x8')
- MW-214D — EXISTING OVERBURDEN MONITORING WELL
- MW-1S — CORE OVERBURDEN MONITORING WELL
- B-2/GW-2 — SOIL BORING AND GROUNDWATER SAMPLE LOCATION

MW-2S	11/11/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	5.3
Tetrachloroethylene	75
trans-1,2-Dichloroethylene	<1.0
Trichloroethylene	7.0
Vinyl chloride	<1.0

COMPOUND	MW-218	GW-DUP-2
	11/11/2014	11/11/2014
	RESULTS (µg/L)	
cis-1,2-Dichloroethylene	63	58
Tetrachloroethylene	710	840
trans-1,2-Dichloroethylene	0.42 J	0.30 J
Trichloroethylene	32	31
Vinyl chloride	0.28 J	0.25 J

MW-101S	11/12/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	7.2
Tetrachloroethylene	83
trans-1,2-Dichloroethylene	<0.50
Trichloroethylene	3.8
Vinyl chloride	<0.50

MW-219	11/11/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	<0.50
Tetrachloroethylene	1.3
trans-1,2-Dichloroethylene	<0.50
Trichloroethylene	<0.50
Vinyl chloride	<0.50

NOTE:

<# - ANALYTE NOT DETECTED AT CONCENTRATIONS GREATER THAN THE REPORTING LIMIT SHOWN.

HIGHLIGHTED CELLS INDICATE EXCEEDENCE OF APPLICABLE NYSDOH MITIGATION GUIDANCE VALUES.

* BASEMAP BASED ON ARCADIS REMEDIAL INVESTIGATION REPORT, FOR 21-03 44TH AVENUE FIGURE 4, DATED AUGUST 2012.

16FT 0 16FT
SCALE

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

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F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

SUMMARY OF VOCS IN OVERBURDEN GROUNDWATER

SEAL & SIGNATURE		
	DATE:	04/01/2015
	PROJECT No.:	-
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	RPT
	FIGURE No.:	4
SCALE: 1" = 16'	SHEET No.:	OF:
	REVISED BY:	-

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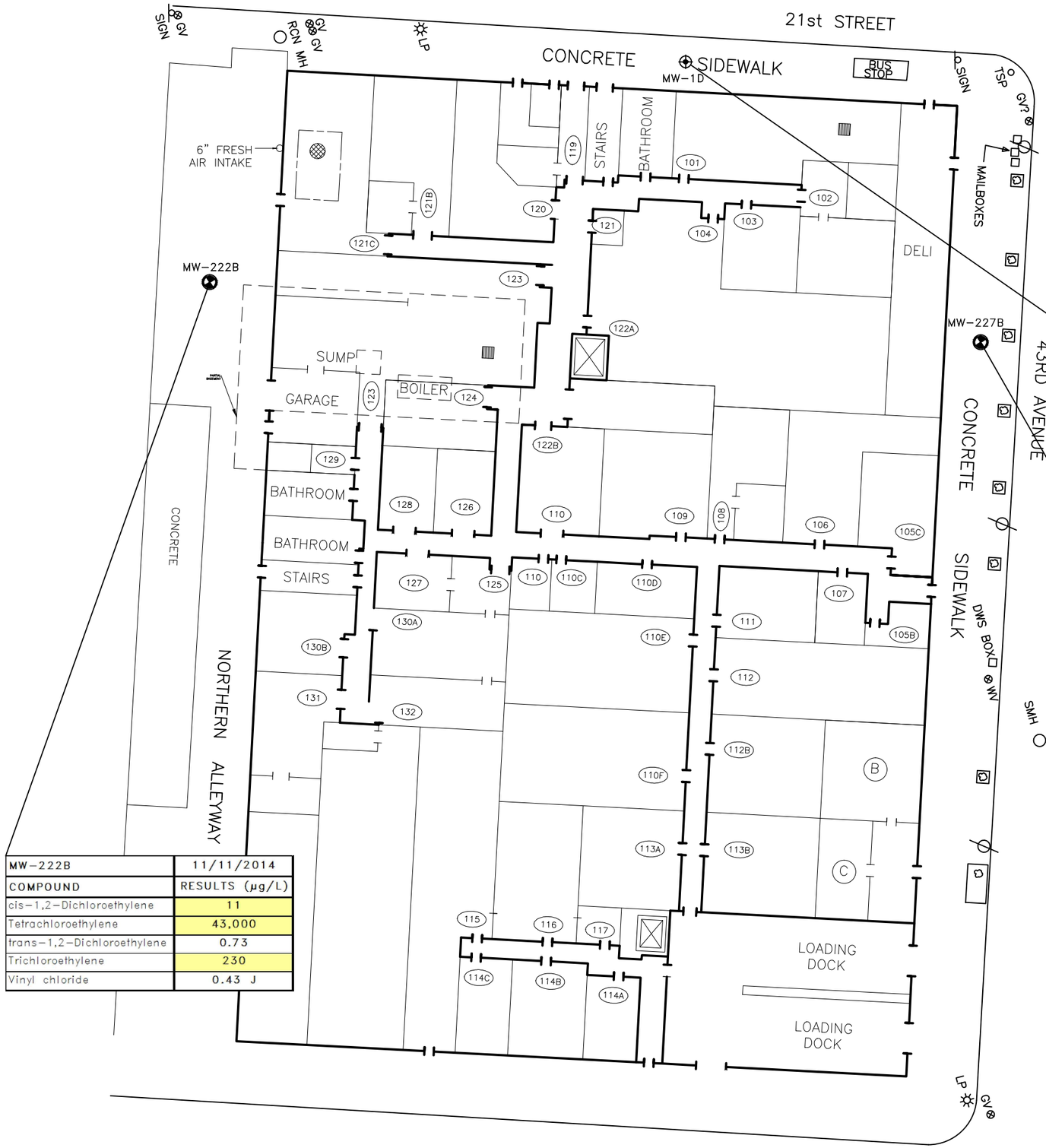

LEGEND:

- (121C) SUITE/OFFICE NUMBER
- ELEVATOR
- FLOOR DRAIN (10"X10")
- MANHOLE (24")
- HOUSE SEWER TRAP VAULT (4'x8')
- MW-222B — EXISTING BEDROCK MONITORING WELL
- MW-1D — CORE BEDROCK MONITORING WELL

MW-1D	11/11/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	1.3
Tetrachloroethylene	20,000
trans-1,2-Dichloroethylene	<0.50
Trichloroethylene	62
Vinyl chloride	<0.50

MW-227B	11/11/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	7.1
Tetrachloroethylene	2500
trans-1,2-Dichloroethylene	0.79
Trichloroethylene	82
Vinyl chloride	0.51

MW-222B	11/11/2014
COMPOUND	RESULTS (µg/L)
cis-1,2-Dichloroethylene	11
Tetrachloroethylene	43,000
trans-1,2-Dichloroethylene	0.73
Trichloroethylene	230
Vinyl chloride	0.43 J

NOTE:
< # - ANALYTE NOT DETECTED AT CONCENTRATIONS GREATER THAN THE REPORTING LIMIT SHOWN.

HIGHLIGHTED CELLS INDICATE EXCEEDENCE OF APPLICABLE NYSDOH MITIGATION GUIDANCE VALUES.

* BASEMAP BASED ON ARCADIS REMEDIAL INVESTIGATION REPORT, FOR 21-03 44TH AVENUE FIGURE 4, DATED AUGUST 2012.

15FT 0 15FT
SCALE

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11101

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

SUMMARY OF VOCs IN BEDROCK GROUNDWATER

SEAL & SIGNATURE	DATE:	04/01/2015
	PROJECT No.:	-
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	BDB
	FIGURE No.:	5
SCALE: 1" = 30'	SHEET No.:	OF:
	REVISED BY:	-

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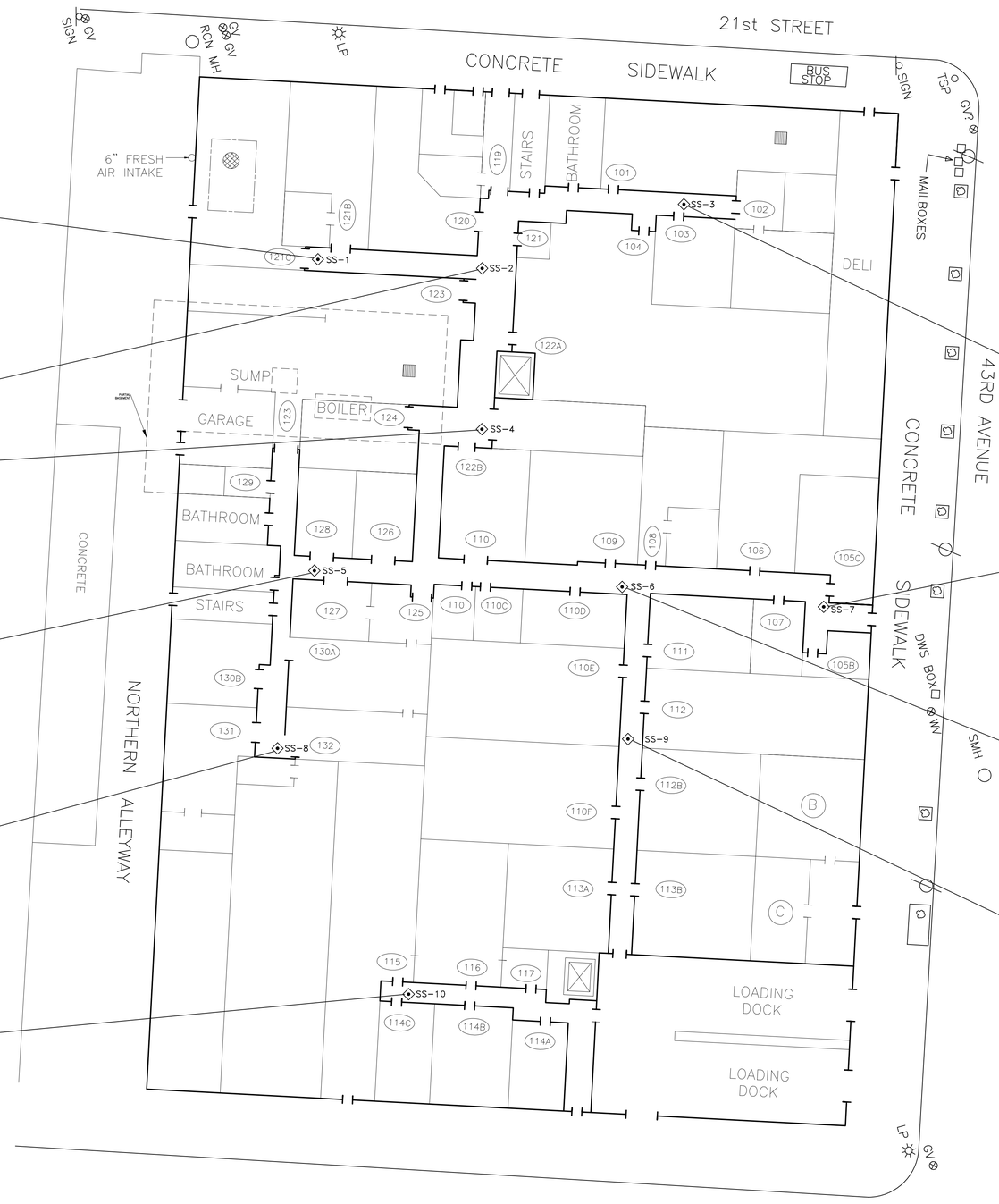

LEGEND:

- 121C — SUITE/OFFICE NUMBER
- ELEVATOR
- FLOOR DRAIN (10"X10")
- MANHOLE (24")
- HOUSE SEWER TRAP VAULT (4'x8')
- SS-1 — SUB-SLAB VAPOR SAMPLE LOCATION

SS-1	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	15
Tetrachloroethylene	190,000
trans-1,2-Dichloroethylene	22
Trichloroethylene	2700

SS-2	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	45
Tetrachloroethylene	4,200,000
trans-1,2-Dichloroethylene	53
Trichloroethylene	<20,000

SS-3	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<150
Tetrachloroethylene	550,000
trans-1,2-Dichloroethylene	<150
Trichloroethylene	1600

SS-4	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<160
Tetrachloroethylene	110,000
trans-1,2-Dichloroethylene	<160
Trichloroethylene	170

SS-5	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<15
Tetrachloroethylene	7300
trans-1,2-Dichloroethylene	<15
Trichloroethylene	58

SS-6	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<77
Tetrachloroethylene	32,000
trans-1,2-Dichloroethylene	<77
Trichloroethylene	83

SS-7	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<16
Tetrachloroethylene	8700
trans-1,2-Dichloroethylene	<16
Trichloroethylene	45

SS-8	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.40
Tetrachloroethylene	240 J
trans-1,2-Dichloroethylene	<0.40
Trichloroethylene	<0.13

	SS-9	SS-9-DUP
	10/24/2014	10/24/2014
COMPOUND	RESULTS (µg/m3)	
cis-1,2-Dichloroethylene	<11	<7.0
Tetrachloroethylene	2800 J	2900 J
trans-1,2-Dichloroethylene	<11	<7.0
Trichloroethylene	<3.6	<2.4

SS-10	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.40
Tetrachloroethylene	50 J
trans-1,2-Dichloroethylene	<0.40
Trichloroethylene	14

NOTE:

<# – ANALYTE NOT DETECTED AT CONCENTRATIONS GREATER THAN THE REPORTING LIMIT SHOWN.

HIGHLIGHTED CELLS INDICATE EXCEEDENCE OF APPLICABLE NYSDOH MITIGATION GUIDANCE VALUES.

* BASEMAP BASED ON ARCADIS REMEDIAL INVESTIGATION REPORT, FOR 21-03 44TH AVENUE FIGURE 4, DATED AUGUST 2012.

16FT 0 16FT
SCALE

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
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F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

SUMMARY OF VOCs IN SUB-SLAB VAPOR

SEAL & SIGNATURE		
	DATE:	04/01/2015
	PROJECT No.:	–
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	RPT
	FIGURE No.:	6
SCALE: 1" = 16'	SHEET No.:	OF:
	REVISED BY:	–

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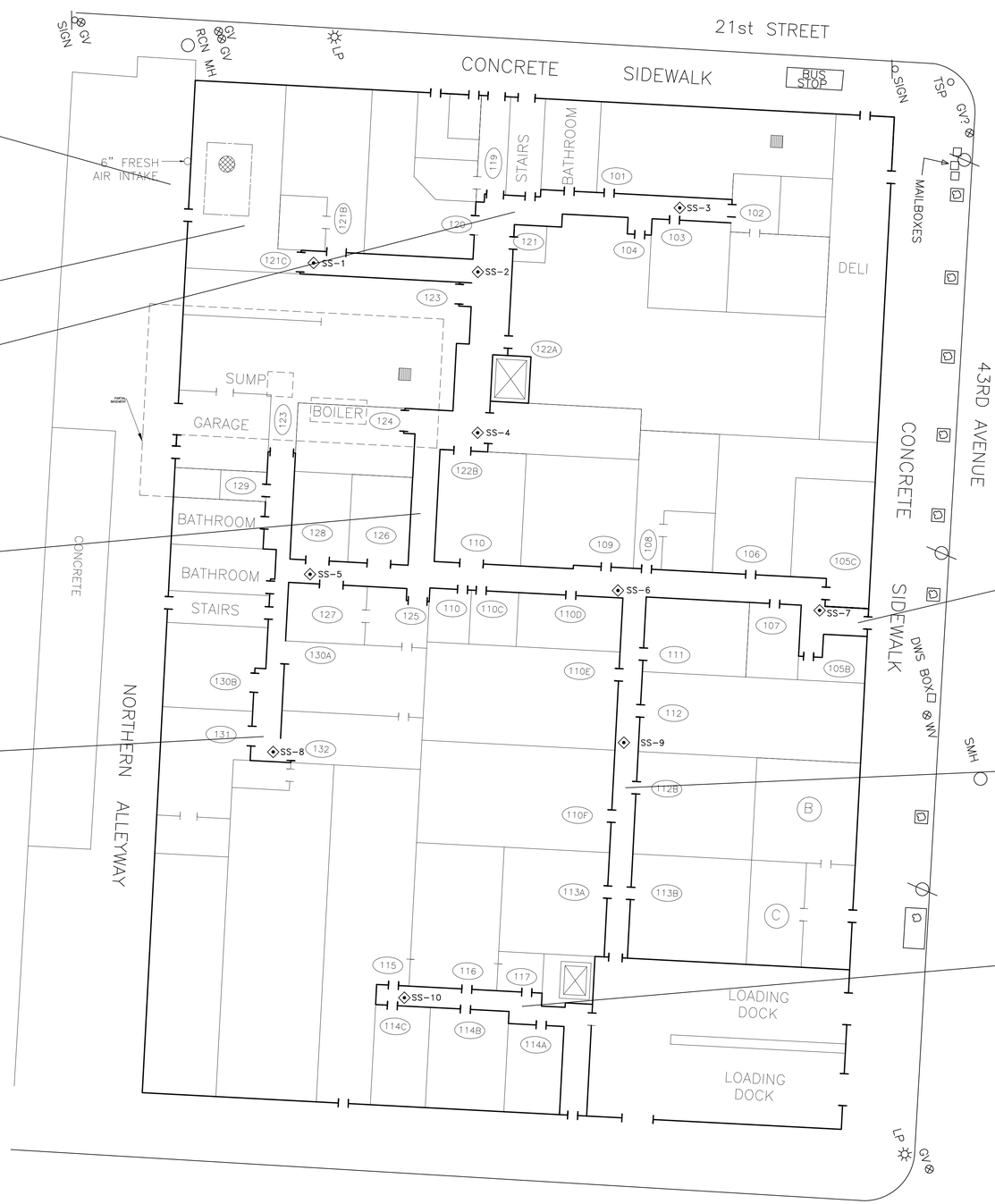
AMBIENT-1	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.40
Tetrachloroethylene	20
trans-1,2-Dichloroethylene	<0.40
Trichloroethylene	0.43

IAQ-1	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.43
Tetrachloroethylene	37 J
trans-1,2-Dichloroethylene	<0.43
Trichloroethylene	0.69

IAQ-2	10/28/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.48
Tetrachloroethylene	37
trans-1,2-Dichloroethylene	<0.48
Trichloroethylene	0.39

IAQ-3	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.51
Tetrachloroethylene	6.2
trans-1,2-Dichloroethylene	<0.51
Trichloroethylene	0.96

IAQ-4	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.46
Tetrachloroethylene	3.6
trans-1,2-Dichloroethylene	<0.46
Trichloroethylene	0.88



LEGEND:

- 121C — SUITE/OFFICE NUMBER
- ELEVATOR
- FLOOR DRAIN (10"X10")
- MANHOLE (24")
- HOUSE SEWER TRAP VAULT (4'x8')
- SS-1 — SUB-SLAB VAPOR SAMPLE LOCATION

IAQ-5	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.43
Tetrachloroethylene	11
trans-1,2-Dichloroethylene	<0.43
Trichloroethylene	0.87

IAQ-6	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.44
Tetrachloroethylene	0.68 U
trans-1,2-Dichloroethylene	<0.44
Trichloroethylene	0.54

IAQ-7	10/24/2014
COMPOUND	RESULTS (µg/m³)
cis-1,2-Dichloroethylene	<0.48
Tetrachloroethylene	16
trans-1,2-Dichloroethylene	<0.48
Trichloroethylene	0.39

NOTE:

<# – ANALYTE NOT DETECTED AT CONCENTRATIONS GREATER THAN THE REPORTING LIMIT SHOWN.

HIGHLIGHTED CELLS INDICATE EXCEEDENCE OF APPLICABLE NYSDOH MITIGATION GUIDANCE VALUES.

* BASEMAP BASED ON ARCADIS REMEDIAL INVESTIGATION REPORT, FOR 21-03 44TH AVENUE FIGURE 4, DATED AUGUST 2012.

16FT 0 16FT
SCALE

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

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www.COREenv.com

PROJECT TITLE:

WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

SUMMARY OF VOCs IN INDOOR AIR

SEAL & SIGNATURE		
	DATE:	04/01/2015
	PROJECT No.:	–
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	RPT
	FIGURE No.:	7
SCALE: 1' = 16'	SHEET No.:	OF:
	REVISED BY:	–

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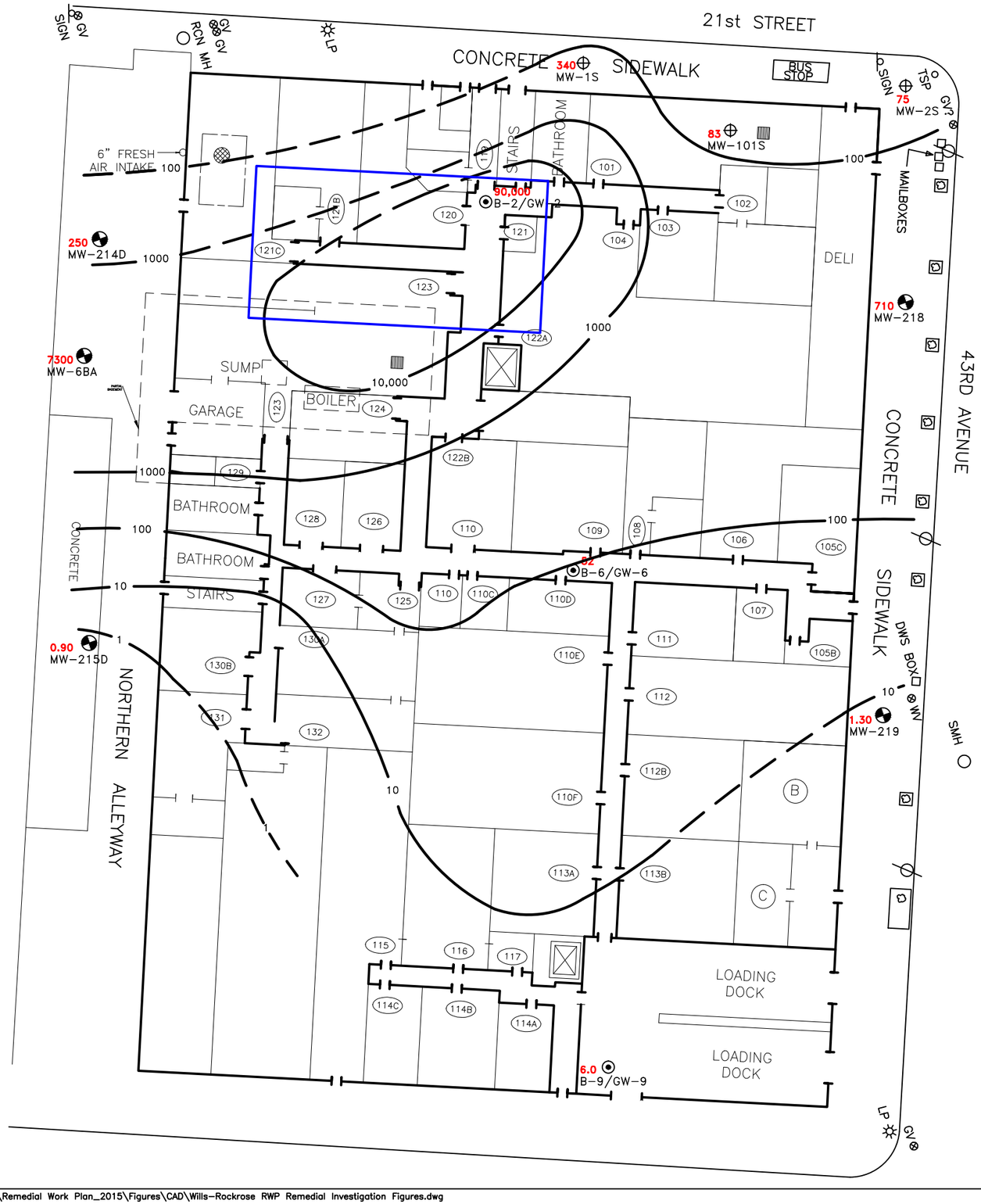

LEGEND:

- 121C — SUITE/OFFICE NUMBER
- ELEVATOR
- FLOOR DRAIN (10"X10")
- MANHOLE (24")
- HOUSE SEWER TRAP VAULT (4'x8')
- MW-214D — EXISTING OVERBURDEN MONITORING WELL
- MW-1S — CORE OVERBURDEN MONITORING WELL
- B-2/GW-2 — SOIL BORING AND GROUNDWATER SAMPLE LOCATION
- 340 MW-1S — PCE CONCENTRATION (ppb)
- -10- — PCE ISOCONCENTRATION CONTOURS (ppb)
- ---- — INFERRED PCE ISOCONCENTRATION CONTOURS
- PRESUMED SOURCE AREA

* BASEMAP BASED ON ARCADIS REMEDIAL INVESTIGATION REPORT, FOR 21-03 44TH AVENUE FIGURE 4, DATED AUGUST 2012.

15FT 0 15FT
SCALE

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
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2312 WEHRLE DRIVE, BUFFALO, N.Y. 14221, T: 716-204-8054, F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11101

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

PCE IN GROUNDWATER SOURCE AREA MAP

SEAL & SIGNATURE		
	DATE:	04/01/2015
	PROJECT No.:	-
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	BDB
	FIGURE No.:	8
SCALE: 1" = 30'	SHEET No.:	OF:
	REVISED BY:	-

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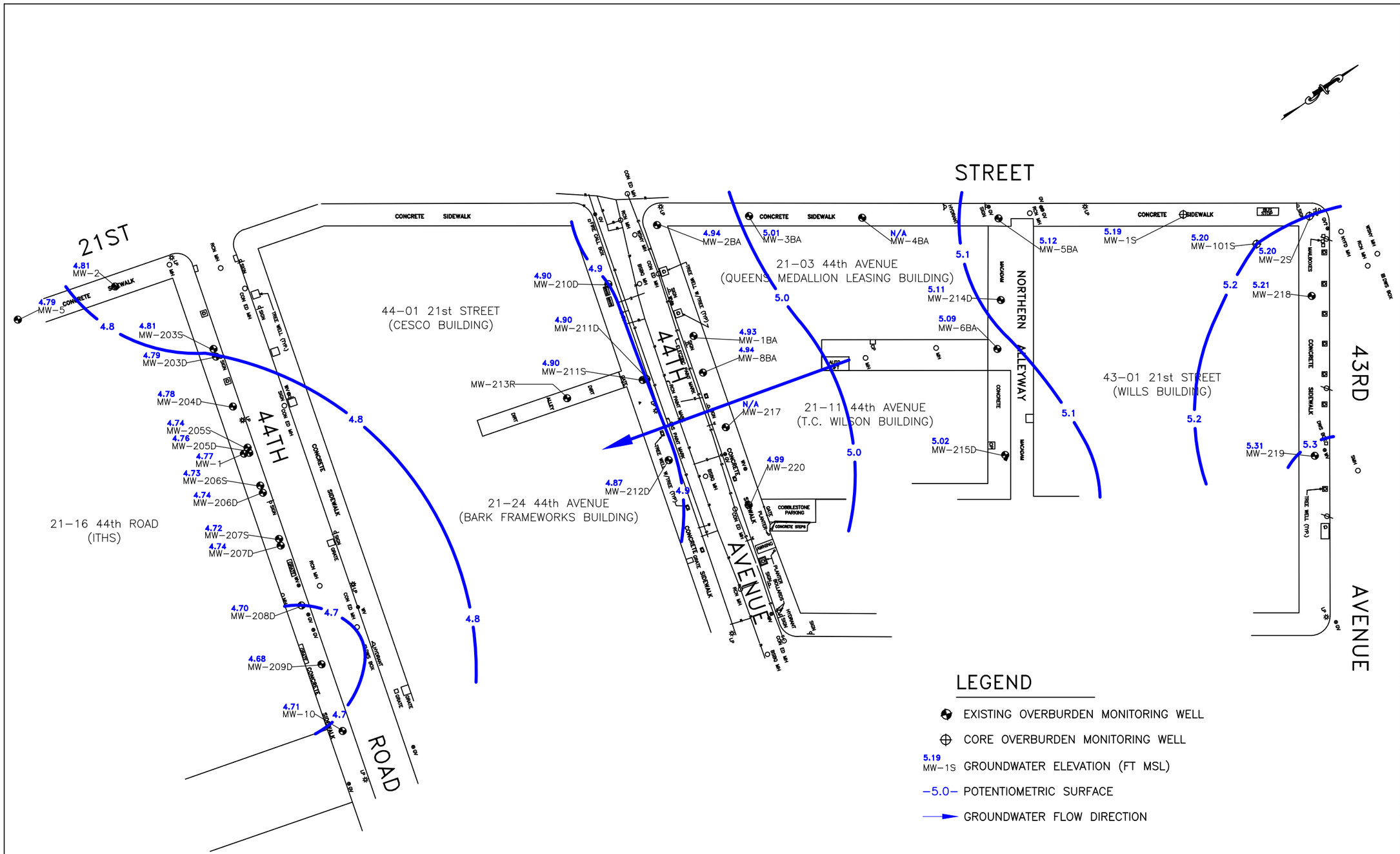

LEGEND

- EXISTING OVERBURDEN MONITORING WELL
- CORE OVERBURDEN MONITORING WELL
- 5.19 MW-1S GROUNDWATER ELEVATION (FT MSL)
- –5.0– POTENTIOMETRIC SURFACE
- GROUNDWATER FLOW DIRECTION

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
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PROJECT TITLE:

WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

OVERBURDEN GROUNDWATER CONTOUR MAP
DECEMBER 5, 2014

SEAL & SIGNATURE		
	DATE:	04/01/2015
	PROJECT No.:	–
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	RPT
	FIGURE No.:	9
SCALE: AS NOTED	SHEET No.:	OF:
	REVISED BY:	–

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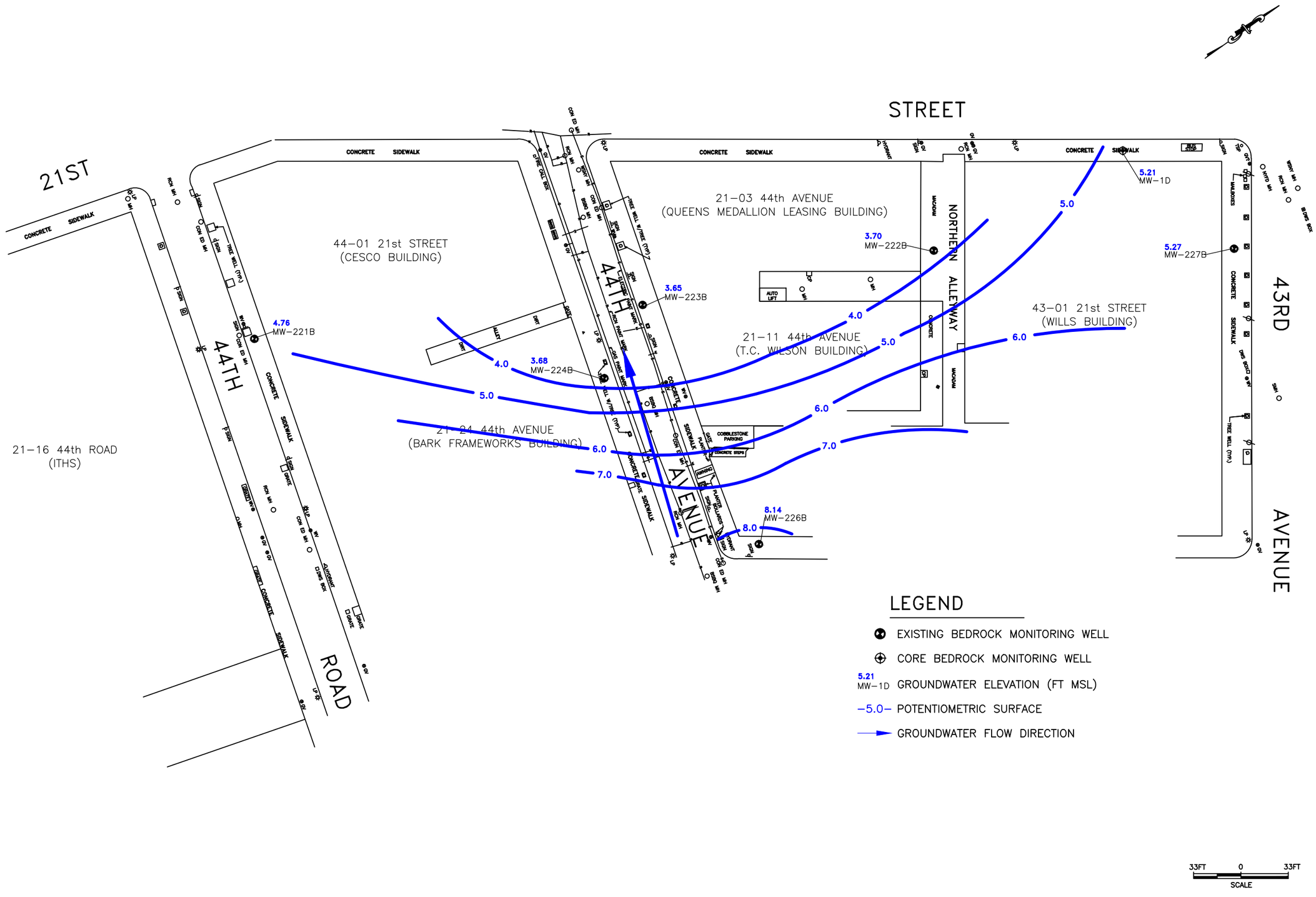

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
46-11 54TH AVENUE
MASPETH, N.Y. 11378
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F: 718-762-0545
2312 WEHRLE DRIVE
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T: 716-204-8054
F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

WILLS BUILDING
43–01 21ST STREET
LONG ISLAND CITY, NY

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

BEDROCK GROUNDWATER
CONTOUR MAP
DECEMBER 5, 2014

SEAL & SIGNATURE	DATE:	04/01/2015
	PROJECT No.:	–
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	RPT
	FIGURE No.:	10
SCALE: AS NOTED	SHEET No.:	OF:
	REVISED BY:	–

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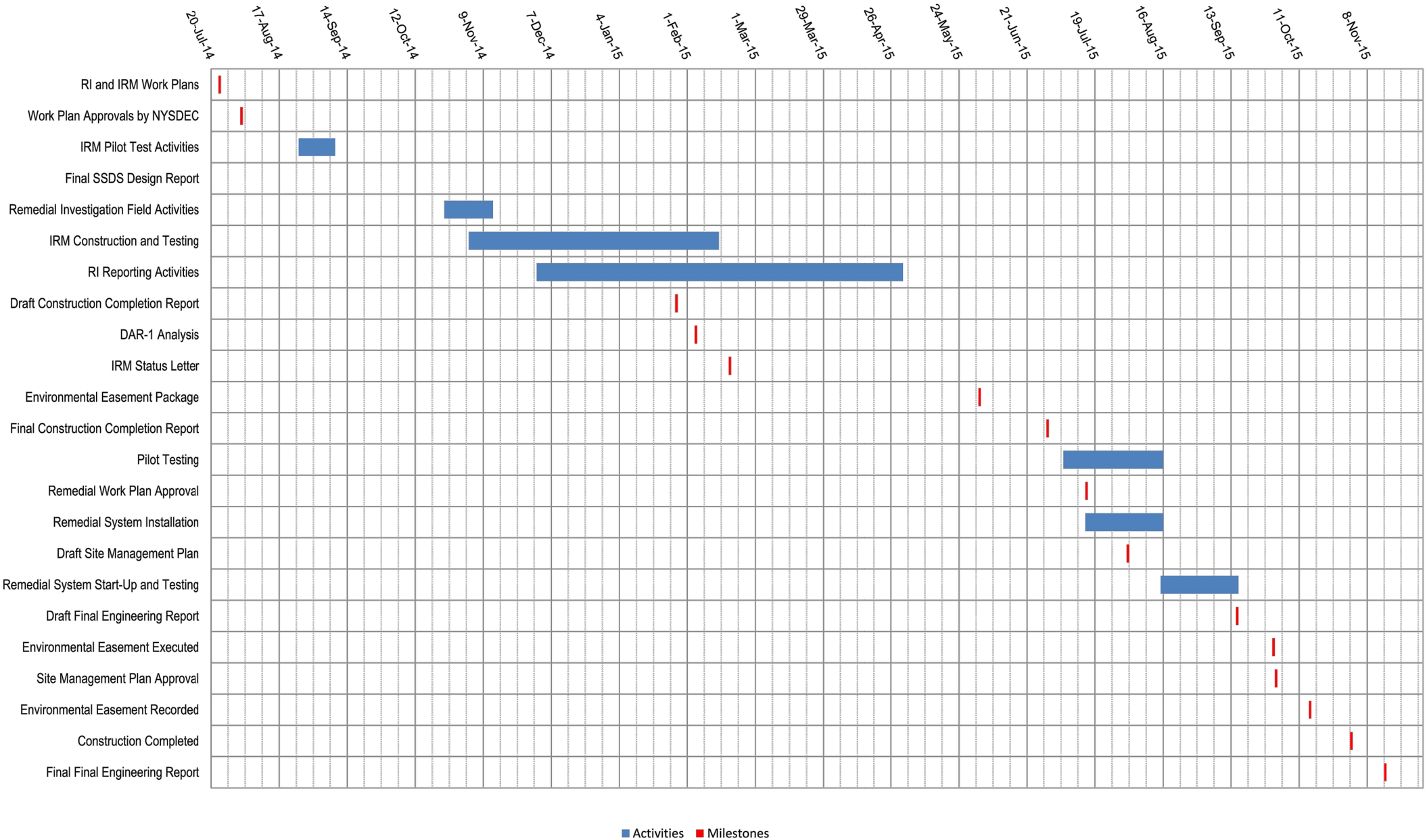

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

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PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11101

DESCRIPTION:

REMEDIAL WORK PLAN

DRAWING TITLE:

PROJECT SCHEDULE

SEAL & SIGNATURE	DATE:	04/01/2015
	PROJECT No.:	-
	DRAWN BY:	BDB
	DESIGNED BY:	AKC
	CHECKED BY:	AKC
	APPROVED BY:	BDB
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	REVISED BY:	-

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APPENDICES

APPENDIX A

Health and Safety Plan

CORE ENVIRONMENTAL CONSULTANTS

HEALTH AND SAFETY PLAN
Wills Building
43-01 21st Street
Long Island City, New York 11101
Site No. C241143

Prepared for:

Rockrose Development Corporation
15 East 26th Street, 7th Floor
New York, New York 10010

Prepared by:

46-11 54th Ave
Maspeth, New York 11378

July 7, 2015

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLES

FORMS

ATTACHMENTS

1.0 INTRODUCTION

Rockrose Development Corporation (Rockrose) retained CORE Environmental Consultants, Inc. (CORE) to provide environmental consulting services related to the Wills Building Site located at 43-01 21st Street, Long Island City, New York. This Site-specific Health and Safety Plan (HASP) is an update of the 2014 New York State Department of Environmental Conservation (NYSDEC)-approved HASP to include information and data gathered during the 2014 Remedial Investigation (RI) and Interim Remedial Measure (IRM).

1.1 PROJECT DESCRIPTION

The purpose of this HASP is to set forth appropriate health and safety procedures to be followed by CORE personnel and contractors during on-Site remedial activities, including intrusive activities, and soil, groundwater, and sub-slab vapor sampling.

This document will serve not only to explain the chemical and physical hazards associated with working on Site, but will also outline approved measures for dealing with such hazards. The project Health and Safety Officer (HSO) will be responsible for the development and implementation of project Health and Safety protocols. In addition, the contractor(s) will be required to designate a Site HSO for their personnel and to follow, at a minimum, the requirements of this HASP. All personnel who will be involved with sampling on Site must have completed the appropriate Hazardous Waste Operations (HAZWOPER) Site Worker Training - i.e., 24 hour or 40 hour, as required by the Occupational Safety and Health Administration (OSHA) in Title 29 of the Code of Federal Regulations (29 CFR), Part 1910.120(e)(2), 1910.120(e)(3), and 1910.120(e)(8), as applicable, and the required medical surveillance as required by 29 CFR 1910.120(f).

The remedial work efforts will include:

Air Sparge and Soil Vapor Extraction

Remedial activities primarily include air sparge and soil vapor extraction (SVE) for removal of volatile organic compounds (VOCs) from Site groundwater. Installation of the overall remedial system will include drilling for well installation, potential soil sample collection for VOCs analysis, and system construction.

Groundwater Monitoring Program

The groundwater monitoring program will involve the collection of groundwater samples from monitoring wells location on Site, as well as from sparge wells, to evaluate system efficacy.

Soil/Sub-Slab Vapor and Indoor Air Quality Monitoring Program

The soil vapor and indoor air quality (IAQ) monitoring program will involve the installation of SVE points, and soil vapor and indoor air quality (IAQ) sample collection for analysis. Samples will be

analyzed to verify air sparge system operation and continued effectiveness of the existing on-Site sub-slab depressurization system (SSDS) in mitigating impacts to indoor air as a result of soil vapor intrusion.

Sample Analysis

Select soil and groundwater samples collected for analysis will be analyzed for Target Compound List (TCL) VOCs. Analysis of soil vapor and IAQ samples will be via United States Environmental Protection Agency (USEPA) Method TO-15. Soil vapor samples will be collected in individually certified clean 6-liter SUMMA® canisters.

Community Air Monitoring

VOCs and particulates are not anticipated to be a concern to building tenants during intrusive activities based on the non-detection of both in the breathing zone during previous subsurface intrusive activities performed within the building structure. Exhaust generated by drilling activities will be vented via pipe to the exterior of the building. Community air monitoring will be performed in accordance with New York State Department of Health (NYSDOH) guidance to guarantee the safety of both workers and building tenants. Generic NYSDOH Community Air Monitoring requirements are included in Attachment A.

1.2 SITE DESCRIPTION

The Site is located at 43-01 21st Street in Long Island City, Queens, New York. The Wills Building is currently a mixed-use commercial and manufacturing space. The Site is located in an area zoned M1-4 by the New York City Department of City Planning, indicating that it can be used for manufacturing and commercial uses. The Site is presently owned by 43-01 21st Street LLC, and is bound by various commercial and industrial properties to the south, 21st Street to the west, 43rd Avenue to the north, and 22nd Street to the east. The East River is located approximately one-half mile northwest of the Site.

The Site is comprised of a large parcel occupying the entire block length between 21st and 22nd Streets. The parcel is approximately 261 feet along 43rd Avenue by 190 feet along the 21st Street frontage, and is identified as Block 441, Lot 16 by the New York City Department of Finance. The Site is currently occupied by one 124,000 square foot, three-story building originally constructed in approximately 1926. The property is relatively flat, with an approximate ground elevation 19 feet above mean sea level (msl). General topography in the area of the Site slopes slightly to the west. A Site Location Map is presented as Figure 1 and a Site Plan is included as Figure 2.

2.0 KEY PERSONNEL

Personnel responsible for implementation of this Health and Safety Plan are:

Name	Company/Title	Address	Contact Information
Ronald Tramposch	CORE Site HSO	46-11 54th Avenue Maspeth, NY 11378	Office: (718) 762-0544 Mobile: (917) 804-8717 Email: RPT@coreenv.com
Fred Smith, CIH, CSP	Project HSO	46-11 54th Avenue Maspeth, NY 11378	Office: (718) 762-0544 Email: flsmithjr@usa.net
William Grutta	Rockrose Project Executive	15 East 26th Street 7th Floor New York, NY 10010	Office: (212) 847-3780 Email: William.Grutta@rockrose.com

2.1 SITE HEALTH AND SAFETY OFFICER

The responsibilities of the Site HSO are as follows:

- Implement this HASP on Site;
- Enforce day-to-day health and safety protocols on Site;
- Require that all personnel entering the Site understand the provisions of this HASP;
- Conduct periodic training sessions on use/maintenance of personal protective equipment (PPE) and safety practices;
- Conduct daily health and safety meetings each morning;
- Direct and advise CORE's Site personnel, visitors, and contractor(s) on the specific hazards associated with the Site as well as any changes related to health and safety requirements at the Site;
- Conduct necessary health and safety monitoring;
- Oversee air monitoring program, including monitoring logs;
- Monitor Site conditions and determine if changes in PPE levels are required;
- Execute work stoppages, if required; and
- Report changes in Site conditions and changes in PPE requirements to the Project HSO.

3.0 MEDICAL SURVEILLANCE REQUIREMENTS

All personnel who engage in waste Site activities for 30 days or more per year will participate in a Medical Surveillance Program. All project personnel involved in on-Site activities in impacted areas will be required to undergo annual medical examinations. This examination must take place not more than one year prior to and one year after the completion of Site work and must be conducted by a physician who is board-certified in occupational medicine. The physician should be familiar with the job-related duties of each worker examined. The physician must certify whether the individual is fit to conduct work on hazardous waste Sites using personal protection, or whether he or she must work within certain restrictions.

Any person exposed to high levels of hazardous substances will be required to undergo a repeat medical exam at, or before, the conclusion of the project to determine possible health impacts. Any person suffering a lost-time injury or illness must receive medical approval prior to returning to work. When employment is terminated for any reason, the employee must receive an exit medical examination.

All medical records will be held by the employer for the period of employment plus at least 30 years, in accordance with OSHA regulations on confidentiality and any other applicable regulations and will be made available to OSHA upon request. The components of Medical Surveillance include:

- Medical and occupational history;
- Physical examination, with particular attention to the cardiopulmonary system, general physical fitness, skin, blood-forming, hepatic, renal, and nervous systems;
- Blood and urine analyses;
- Pulmonary function testing; and
- Additional tests as appropriate, such as x-ray, stress tests, etc.

4.0 SITE HAZARD/RISK ANALYSIS

Physical hazards include the dangers of tripping and falling on uneven ground, operation of heavy equipment such as drill rigs, vehicular traffic, and utilities either above-ground or buried. The following are physical hazards which may be encountered during remedial activities

4.1 HAZARD ANALYSIS

PPE is the initial level of protection based on the activity hazards and Site conditions which have been identified. Upgrades to respiratory protection may be required based on the action levels discussed in Section 7.0. General on-Site provisions will include: extra nitrile, leather, and/or Kevlar gloves, extra protective coveralls, drinking water and electrolyte fluids, reflective vest, first aid kit, fire extinguisher, hearing protection, and washing facilities.

If Site conditions suggest the existence of a situation more hazardous than anticipated, the Site personnel will evacuate the immediate area. The hazard, level of precautions, and PPE will then be reevaluated.

4.2 HANDLING DRUMS AND CONTAINERS

Regulations for handling drums and containers are specified by OSHA in 29 CFR 1910.120(j). Potential hazards associated with handling drums include vapor generation, fire, explosions, and possible physical injury. Handling of drums/containers during remedial activities may be necessary. If drum/container handling is necessary, it will be performed in accordance with applicable regulations.

4.3 ELECTRICAL HAZARDS

4.3.1 Utilities

The Site may have shallow, buried utilities and also overhead utilities in certain areas. It will be necessary for parties disturbing the existing ground surface and conducting operations with heavy equipment having high clearances to exercise caution in performing project-related work with respect to the presence of utilities. Utility companies with active, buried lines in the Site area will be asked by the contractor performing intrusive activities to mark their facilities. Employees will use these data to choose work locations.

4.3.2 Underground Utilities

No excavating, drilling, boring, or other intrusive activities will be performed until an underground utility survey, conducted by knowledgeable persons or agencies, has been made. This survey will identify underground and in-workplace utilities such as the following:

- Electrical lines and appliances;
- Telephone lines;

- Cable television lines;
- Gas lines;
- Pipelines;
- Steam lines;
- Water lines;
- Sewer lines; and/or
- Pressurized air lines.

The location of utilities will be discussed with CORE personnel and contractors during a Site safety briefing. Utilities identified during survey should be marked or access otherwise restricted to avoid chance of accidental contact.

Even when a utility search has been completed, drilling, boring, and excavation should commence with caution until advanced beyond the depth at which such utilities are usually located. Utilities will be considered "live" or active until reliable sources demonstrate otherwise. Geophysical surveys, including ground penetrating radar (GPR) and electromagnetic (EM) survey, if necessary, will be completed in the area of all indoor boring locations to further refine the presence and locations of potential subsurface utilities.

4.3.3 Overhead Utilities

CORE does not anticipate performing work in the area of overhead utilities; however, if present, clearances will be adequate for the safe movement of vehicles and for the operation of construction equipment.

Overhead or above-ground electric lines should be considered active until a reliable source has documented them to be otherwise. Elevated work platforms, ladders, scaffolding, man-lifts, and drill or vehicle superstructures will be erected a minimum of 20 feet (the actual distance is dependent upon the voltage of the line) from overhead electrical lines until the line is de-energized, grounded, or shielded so arcing cannot occur between the work location or superstructure.

4.4 PHYSICAL HAZARDS

The drilling program poses the greatest potential threat to the safety of Site personnel. The following sections describe specific safety measures to be implemented during specific activities.

4.4.1 Heat Stress

Employees may be exposed to the hazards associated with heat stress when ambient temperatures exceed 70 degrees Fahrenheit (ºF). Employees should increase water intake while working in

conditions of high heat. Enough water should be available so that each employee can consume 1 quart of water per hour. In addition, they should increase number of rest breaks and/or rotate employees in shorter work shifts. Employees should rest in cool, dry, shaded areas for at least 5 minutes. Employees should not wait until they feel sick to cool down. Watch for signs and symptoms of heat exhaustion and fatigue. In the event of heat stroke, bring the victim to a cool environment, call for help, and initiate first aid procedures.

The following prevention, recognition, and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress, and to apply the appropriate treatment.

Prevention

- Provide plenty of liquids. A 50 percent solution of fruit punch (or similar) in water, or plain water to be taken with salted foods such as pretzels will be available in the support zone.
- Buddy system. No individual will attempt to undertake any activity alone.
- Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing, and/or act as a quick-drench shower in case of an exposure incident.
- Adjustment of the work schedule. As is practicable, the most labor intensive tasks should be carried out during the coolest part of the day.

Recognition and Treatment

Any person who observes any of the following forms of heat stress, either in himself or in another worker, will report this information to the Site HSO as soon as possible.

1. Heat Rash (or prickly heat)

   Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.

   Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.

   Treatment: Remove source of irritation and cool skin with water or wet clothes.

2. Heat Cramps (or heat prostration)

   Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

   Symptoms: Sudden development of pain and/or muscle spasms in the abdominal region.

Treatment: Remove the worker to the contamination reduction zone. Provide fluids orally. Remove protective clothing. Decrease body temperatures and allow a period of rest in cool location.

3. Heat Exhaustion

Cause: Overexertion in a hot environment and profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

Treatment: Perform the following while simultaneously making arrangements for transport to a medical facility: Remove the worker to the contamination reduction zone. Remove protective clothing. Lie the worker down on his or her back, in a cool place, and raise the feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of a salt water solution, using one teaspoon of salt in 12 ounces of water. Transport the worker to a medical facility.

4. Heat Stroke

Cause: Same as heat exhaustion.

Symptoms: Dry and hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.

Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

4.4.2 Cold Stress

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and/or frost bite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on Site field personnel should be closely monitored. Personnel and supervisors working on Site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light, and numbing of the toes and fingers. The potential for wetting of protective clothing should be of concern, since wet clothing (from sweat or splashes) will provide poor insulation against the cold.

4.4.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators. Employees who will perform suspected or established high noise tasks and operations for short durations (less than 1 hour) will wear hearing protection. If deemed necessary by the HSO, additional hearing protection may be added and the need to monitor sound levels for Site activities will be determined. Other employees who do not need to be in proximity should distance themselves from the equipment generating the noise.

4.4.4 Hand and Power Tools

In order to complete the various tasks for the project, personnel may use hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating personnel when using hand and power tools.

4.4.5 Slips, Trips, and Falls

Working in and around the Site may pose slip, trip, and fall hazards due to slippery and uneven surfaces. Personnel will wear proper foot gear and will employ good work practice and housekeeping procedures to minimize the potential for slips, trips, and falls.

4.4.6 Manual Lifting

Manual lifting of objects and equipment may be required. Failure to follow proper lifting technique can result in back injuries and strains. Employees should use a buddy system and/or power equipment to lift heavy loads whenever possible and should evaluate loads before trying to lift them. Carrying heavy loads with a buddy and proper lifting techniques include: 1) make sure footing is solid; 2) make back straight with no curving or slouching; 3) center body over feet; 4) grasp the object firmly and as close to your body as possible; 5) lift with legs; and 6) turn with your feet, don't twist.

4.4.7 Overhead Dangers

Overhead dangers, including but not limited to falling debris and equipment, can occur while operating drill rigs and installing overhead remedial system components. CORE personnel will maintain a minimum distance from large overhead operations and proper communication with heavy equipment operators and their handlers, should work necessitate their presence beyond the minimum safety distance. Proper PPE will be worn during these types of activities including steel-toed/shank boots, safety vests, and hard hats.

4.4.8 Cuts and Lacerations

Field activities that involve drilling and sampling activities usually involve contact with various types of machinery. At least one person on Site must be currently certified in first aid and cardiopulmonary resuscitation (CPR) techniques. Personnel trained and certified in first aid should be prepared to

take care of cuts and bruises as well as other minor injuries. CORE will have a first aid kit approved by the American Red Cross available during all field activities.

4.4.9 Traffic Hazards

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state, and federal, and agency regulations regarding such traffic and in accordance with direction of the Owners. Traffic hazards will be limited as the remediation project is to be completed primarily on private land and not in public right of way areas.

4.5 CHEMICAL HAZARDS

Chemicals that may potentially be encountered at the Site include VOCs, primarily tetrachloroethylene (PCE) and trichloroethylene (TCE). The health/safety characteristics and exposure limits of these compounds are listed in Table 1. The risk of exposure can be by dermal, ingestion, or respiratory routes, depending on the type of compound and intrusive activity being performed.

Particulate matter and VOCs in the breathing zone are not anticipated to pose a threat at the Site as neither was detected during previous Site investigations within the building structure. Exhaust from drilling activities will be vented via pipe to the exterior of the building.

If during air sparge and SVE well installation, the potential for workers to be exposed to particulates and compounds, such as VOCs, dusts, and metals, in soil and development water through inhalation/ingestion/dermal contact routes, workers may need to apply water or an amended water solution to the area to help control the generation of airborne dusts, particulates, and VOCs. Workers may also use respiratory protection including the use of an air-purifying respirator equipped with approved filter/cartridges. An analysis of the work tasks and potential for chemical exposure should be performed to determine the correct PPE, and/or respirator cartridge(s), if needed. The analysis should include a chemical waste profile to help ensure that PPE specified will be appropriate for the respective chemical hazard(s).

4.6 BIOLOGICAL HAZARDS

There are no anticipated biological hazards associated with the Site.

5.0 SITE CONTROL

In order to keep unauthorized personnel from entering the work areas during drilling activities without proper protective equipment, and for good control of overall Site safety, two work zones will be established. The two work zones are the support zone and the contamination reduction zone/exclusion zone. Actual zone width will be determined by optimal size of work area and by obstructions, if any. A brief description of the Site work zones follows.

5.1 SUPPORT ZONE

The support zone at the Site will be a mobile unit (automobile) including a cellular telephone for communication. The support zone will be located as near as practicable to the active work areas and decontamination areas.

5.2 CONTAMINATION REDUCTION ZONE/EXCLUSION ZONE

Due to the environmental setting for this project, the contamination reduction zone and exclusion zone will be incorporated into one zone at each well installation or construction location. This zone will be mobile and the location will be dependent upon where active work is being performed. The decontamination of personnel, light equipment, and heavy equipment will be performed at each well installation location.

A temporary storage location will be established at the Site for the storage of any drummed drill cuttings, decontamination water, core water, well purge water, recovered oil, and disposable clothing. The location will be situated away from vehicular and pedestrian traffic.

5.3 SITE VISITATION

It is possible that the Owners or officials from regulating bodies and jurisdiction will visit the Site during operations. It is also possible that an OSHA representative will wish to inspect the Site. All such officials must meet the requirements of occasional Site workers (24 hour OSHA-approved training and Site-specific training) before going into any active contamination reduction zone/exclusion zone. Visitors other than the Owners, NYCDEC, or OSHA representatives will be subject to the additional requirements of having to receive written permission from the Owners to conduct a Site visit. Because of the nature of the work, the work zone will be continually supervised. Signs will be used to prevent the entrance of unauthorized visitors.

All visitors must supply their own PPE and will be directed to appropriate disposal areas for soil or used PPE.

6.0 PERSONAL PROTECTIVE EQUIPMENT

Since personnel working on Site may be exposed to unexpected levels of hazardous airborne chemicals or compounds released during drilling activities, or may come in contact with VOCs, SVOCs and metals in drill cuttings or soil, various levels of protection will be utilized during field activities. Components of all levels of personal protection that will be available are listed in Table 2. Planned levels of protection for various activities are given in Table 3.

In the event that unexpected levels of organic vapors are encountered, any personnel working at Level D protection will don their respirators at once (upgrade to Level C). The Site HSO will consult with the Project HSO to decide if and when Level D protection may be resumed, or if a higher level of PPE is required. Some modification in safety equipment (e.g., switching from polycoated disposable coveralls to standard disposable coveralls) may be implemented in order to balance concerns for full contaminant protection against concerns for the possibility of heat stress resulting from the need to wear more restrictive PPE. Such modifications may be implemented only if approved in advance by the Site HSO, following consultation with the Project HSO. PPE which fully complies with the requirements of all required levels of protection should be immediately available at all times on the Site.

Level C respiratory protection will be provided using The National Institute for Occupational Safety and Health (NIOSH) -approved half-face respirators, with appropriate NIOSH approved cartridge for removal of organic vapors. All team members will be fit-tested for respirators using irritant smoke. Due to difficulties in achieving a proper seal between face and mask, persons with facial hair will not be allowed to work in areas requiring respiratory protection.

For the fullest protection of on-Site personnel, the supervising field engineer/geologist will conduct organic vapor monitoring at closely spaced intervals during subsurface intrusive activities. Monitoring will be accomplished by real-time monitoring equipment, such as a photoionization detector (PID).

The primary purpose of this monitoring will be to assess the adequacy of respiratory protection and to make it possible to stop work quickly if explosive or hazardous gases are encountered, or if an oxygen-deficient atmosphere is detected. The air monitoring to be carried out during all intrusive activities is summarized below.

Site personnel timesheets with employee and Project Manager signatures will serve to document the amount of time spent on Site by each team member.

7.0 COMMUNITY AIR MONITORING

Air monitoring will be performed throughout subsurface intrusive activities by trained CORE personnel. This includes any time that the building is occupied by any persons that are not associated directly with remedial activities and/or staff that are not properly trained in HAZWOPER procedures. Air will be monitored for total volatiles with a photoionization detector (PID). All air monitoring results and meteorological data (e.g., temperature range, wind speed, wind direction, etc.), if applicable, will be recorded on monitoring logs.

VOCs and particulates are not anticipated to be a concern to building tenants during intrusive activities based on the non-detection of both in the breathing zone during previous subsurface intrusive activities performed within the building structure. However, appropriate measures will be taken to ensure the safety of building occupants.

- If the work area is contained, such as in specific rooms with sealed doorways, and only persons directly involved in remedial activities that are HAZWOPER trained are present, community air monitoring is not required.
- In areas where work is not isolated (e.g. – hallways, occupied suites), or persons not directly associated with remedial activities are present, the work area will be enclosed with a minimum of two millimeter plastic sheeting and all seams between sheets of plastic as well as along the ceiling, walls, and floor will be sealed with duct tape.

Community air monitoring will be performed in accordance with NYSDOH guidance to guarantee the safety of both workers and building tenants. The NYSDOH Generic Community Air Monitoring Plan (CAMP) is included as Attachment A.

7.1 TOTAL VOLATILES

During intrusive activities performed indoors, air monitoring for VOCs will be performed within the work zone and immediately outside the work area using a PID equipped with a 10.2 eV lamp to detect target volatiles typical to the impacts previously identified on Site. When readings up to 1 part per million (ppm) above background in the breathing zone are observed, work activity will continue. Monitoring will be continuous, and recorded at 15-minute intervals.

Levels less than 1 ppm of total volatiles are permissible. If the concentrations of VOCs in ambient air in the work zone area exceed 1 ppm for the 15-minute average, work activity must be temporarily halted. Air monitoring is to remain continuous while work is halted. If vapor levels decrease below 1 ppm, work can resume with continued monitoring.

If vapor levels between 1 and 25 ppm are detected, work must be halted, the vapor source identified, abatement actions taken, and air monitoring continued. If sustained readings from 1 to 25 ppm above background in the breathing zone are observed, work will only be allowed to continue after an

upgrade to Level C PPE. Intrusive activities will be shut down if vapor in the work area exceed 25 ppm.

Air outside the work area will be continuously monitored. If action levels are exceeded outside the work area, the level will be compared to the level within the work area to determine if the exceedence is associated with remedial activities. During subsurface intrusive activities, a minimum of one SUMMA® canister with a flow controller pre-calibrated for a two hour sample will be available on Site. If air monitoring levels indicate that VOCs may have migrated out of the work area, or if there is a question about air quality, a sample will be collected to determine if elevated VOCs are the result of remedial activities or other activities within the building. If an action level exceedence outside the work area is determined to be the result of remedial activities, work will stop until the source of VOCs is identified and abated (e.g. – verifying floor and ceiling seals are intact, drill rig is properly exhausted to outside the building, etc.). Air monitoring will continue following abatement activities.

7.2 PARTICULATE MONITORING

For intrusive activities performed within the building structure, particulate concentrations will be continuously monitored within, and immediately outside of, the work area. A background reading will be recorded prior to initiation of intrusive activities. Real-time monitoring equipment capable of detecting particulate matter less than 10 micrometers (PM-10) in size will be utilized. Monitoring will be continuous and recorded at 15-minute intervals.

If the work area PM-10 level is 100 micrograms per cubic meter (µg/m3) greater than background concentrations over a 15-minute average period, dust suppression procedures will occur. If PM-10 concentrations in the work area exceed background concentrations by 150 µg/m3 or more, work must be halted while additional dust suppression measures are implemented.

Air outside the work area will be continuously monitored. If action levels are exceeded outside the work area, the level will be compared to the level within the work area to determine if the exceedence is associated with remedial activities. If an action level exceedence outside the work area is determined to be the result of remedial activities, work will stop until the source of excess particulate matter is identified and abated (e.g. – verifying floor and ceiling seals are intact). Air monitoring will continue following abatement activities.

7.3 AIR MONITORING EQUIPMENT CALIBRATION

The PID will be calibrated to a benzene surrogate (an isobutylene standard with a 100 ppm concentration) daily (prior to field activities) and the results will be recorded. Intrusive activities will not begin until all instruments are calibrated and ambient air conditions are recorded. The PID will be recalibrated throughout the day as necessary.

7.4 WORK STOPPAGE RESPONSES

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage is exceeded:

- The Site HSO will be consulted immediately;
- All personnel will be cleared from the work area until appropriate mitigation techniques have been implemented;
- Monitoring will be continued until the soil boring is grouted or finished as a monitoring well, air sparge well, or SVE well; and
- NYSDEC and NYSDOH will be notified as soon as possible.

Any chemical release to air, water, or soil must be reported to the Site HSO at once. Any exposure resulting from protective equipment failure must be immediately reported to the Site HSO and to the Project HSO in writing within 24 hours.

8.0 DECONTAMINATION PROCEDURES

8.1 DECONTAMINATION OF PERSONNEL

Decontamination of personnel will be performed at each contamination reduction zone/exclusion zone. This can be accomplished by washing and rinsing the outer gloves and outer boots over the decontamination trough. Disposable clothing can then be removed and discarded into a 30-gallon trash can with a vinyl liner. If personnel are in Level C protection, the above procedures will be followed and the respirator will be removed, sanitized, and placed in a plastic bag.

8.2 DECONTAMINATION OF EQUIPMENT

Heavy Equipment

Decontamination of heavy equipment (such as augers, core bits, rods) will be accomplished by steam cleaning on a decontamination pad constructed of wood and covered with water retaining polyethylene sheeting with a minimum thickness of 6 mil. Washing of heavy equipment will be completed with attention to minimize any overspray of water, debris and/or soil. All wash water and debris will be collected and containerized in Department of Transportation (DOT)-approved 55-gallon drums for later off-Site disposal. The polyethylene sheeting will be examined frequently for any tears or punctures that may cause a leak. The sheeting will be discarded in a municipal trash dumpster.

Mid-Weight Equipment

Decontamination of mid-weight equipment (such as split spoons, cutting shoes, pumps, non-disposable bailers, etc.) will be accomplished by scrubbing the equipment with a heavy duty bristle brush in a 5-gallon bucket containing water and Alconox® detergent. After washing and scrubbing, the equipment will be rinsed by placing it in a separate bucket of water to remove soap and debris. The wash and rinse water will be containerized in DOT-approved 55-gallon drums for later off-Site disposal.

Light Equipment

Decontamination of light equipment (such as tools, containers, monitoring instruments, radios, clipboards, etc.) will be accomplished by wiping equipment off with clean, damp cloths. The cloths can be discarded in the trash can with disposable clothing.

9.0 EMERGENCY PROCEDURES

The most likely incidents for which emergency measures might be required are:

- A sudden release of hazardous gases/vapors during drilling or excavating;
- An explosion or fire occurring during drilling or excavating; and/or
- A heavy equipment-related accident, or other accident resulting in personal injury.

Emergency procedures established to respond to these incidents are covered under the sections that follow.

9.1 COMMUNICATIONS

A portable telephone will be maintained by the Site HSO during the entire project. The phone will be frequently checked to ensure an appropriate signal is available for the phone to work properly.

9.2 FIRE/EXPLOSION

It will be the responsibility of the contractors to have a fire extinguisher available at the drill rig and/or excavation locations. The operator will have further responsibility of taking fire prevention measures such as the continuous removal from the rig of accumulated oil, grease, or other combustible materials.

In the event of a fire that cannot be controlled with available equipment, or in the event of an explosion, the local fire department will be summoned immediately by the Site HSO, who shall apprise them of the situation upon their arrival. The Owners will also be notified.

9.3 FIRST AID

First aid for personal injuries will be administered by the Site HSO. All accidents, however insignificant, will be reported to the Site HSO. Personnel designated to administer first aid will have received a minimum of eight hours training in first aid and CPR, and be certified by the American Red Cross. If a Site worker should require further treatment, he/she will be transported to the hospital. The on-Site vehicle will carry a copy of the HASP which includes written directions to the hospital, as well as a map showing the route.

The following sections are intended as a “quick guide” to basic first aid only. Effective CPR and first aid require hands-on training that is best accomplished by attending a class in person.

One common formula for performing first aid:

Do a primary scene and patient survey, followed by checking airway, breathing, and circulation (ABCs).

Survey the scene and approach the victim. Determine whether the scene is safe. Look for dangers, such as downed power lines, traffic, unstable vehicles, or accidents. Determine what may have happened, how many victims are involved, and if any bystanders can help. If several persons appear to be injured, perform triage.

Survey the patient and perform an initial assessment. Get consent from a conscious victim (parent/guardian if the victim is a minor) before providing care. If the victim is unconscious, consent is implied. Use infection control precautions and check for signs and symptoms of any life-threatening conditions and care for them. To perform an initial assessment:

- Check the victim for consciousness and obtain consent if the victim is conscious;
- Check the ABCs (airway, breathing and circulation); and
- Check for severe bleeding.

Provide brief care for the conditions. If the patient lacks air or circulation, they may begin to suffer brain damage after approximately four minutes. After ten minutes, they most likely will have some permanent brain damage. To care for breathing and circulation means first clearing the airway, and briefly attempting to restart their breathing or circulation with rescue breathing or CPR (and use of a portable defibrillator, where available). This step is crucial, because an unconscious person's airway can be blocked by a normal, comfortable-looking head position (e.g., on their back with a pillowed head). Often, simply tilting the head back will open the airway and restart their breathing. Likewise, many people recovering from a blocked airway vomit, and if they are unconscious, they can drown in the vomit. The standard prevention for both these issues is to turn a breathing, unconscious patient on their side, turning their head and spine in the same movement to avoid spinal injury, pillowing their head on one of their arms. Do not move casualties unless it is necessary to remove them from danger, or to make treatment possible (such as onto a hard surface for CPR).

1. Call for emergency services

Calling for emergency medical services must take priority over extended care such as long term rescue breathing or extended CPR, since these techniques are intended to gain time for emergency services to arrive as part of the chain of survival. However, if bystanders are available, both can be pursued at the same time. If you ask others to call an ambulance for you, make sure they report back to you once released by the emergency operator to confirm that the call has been made.

2. Do a secondary patient survey, and provide appropriate emergency first aid

The secondary survey is to gather information about conditions or injuries that may not be life threatening, but may become so if not cared for. Perform a secondary survey only if you are sure that the victim has no life-threatening conditions. A properly trained and certified person performs three stages in the secondary survey:

1. Interview the victim and include bystanders to supplement info from the patient:
    - Signs and Symptoms - Visible indications of injury and patient reported sensations (e.g. pain)
    - Allergies - especially those relevant to injury (i.e. allergy to latex, penicillin, etc.)
    - Medications - what current or recent medications the patient is taking
    - Past Medical History - any related history, or medical conditions that could complicate treatment (e.g. heart condition)
    - Last meal - last food and/or drink
    - Events - confirm how injury most likely occurred
2. Vitals
    - LOC - Level of Consciousness description (e.g. - alert, aware, disoriented, confused, unresponsive) or AVPU (Alert, Voice, Pain, Unresponsive)
    - Breathing Rate - Number of breaths per minute. Calculate by counting breaths for ten seconds and multiplying by six, or 15 seconds and multiplying by four.
    - Pulse Rate - Number of heart beats per minute. Calculate by counting pulse for ten seconds and multiplying by six, or 15 seconds and multiplying by four. Pulse for an unconscious person is taken on the neck (carotid pulse) and on the wrist (radial pulse) for a conscious person.
    - Skin Condition - Pale vs. normal, cool/cold vs. hot, clammy/sweaty vs. dry
3. Head-to-toe examination
    - Perform a head-to-toe examination
    - Look for medical alert bracelets or medallions.
    - Compare one side of the patient against the other
    - Look for pain or deformity

9.4 EMERGENCY ASSISTANCE

The following table list telephone numbers of police, fire, hospital, and other agencies whose services might be required, or from whom information might be needed. A hospital route map and directions to Mount Sinai Hospital Queens, is included in Attachment B.

Name	Contact Numbers
Mount Sinai Hospital Queens 25-10 30th Avenue Long Island City, New York 11102	Main Number: (718) 932-1000
NYCDEP	311
Fire Department	911
Police Department	911
Poison Information Center	1-800-222-1222
NYSDEC Emergency Hotline	1-800-457-7362

10.0 SAFETY CONCERNS AND CONTINGENCY MEASURES

Normally, it is the drilling program that poses the greatest potential threat to the safety of Site personnel. Drilling at the Site will be conducted under the OSHA Safety and Health Standards (29 CFR 1926/191) relative to heavy equipment operation. The following sections describe specific safety measures to be implemented during specific activities.

10.1 BUDDY SYSTEM

The buddy system is an arrangement in which persons are paired, as for mutual safety or assistance. All field work will be completed by at least a two person team.

10.2 SOIL BORINGS

An active drilling exclusion sub-zone is established by opening a borehole. A PID calibrated to a benzene surrogate will be used in this zone. Monitoring with real-time instrumentation will be performed at the borehole. Action levels will be considered to have been reached when a continuous, steady reading has been observed.

If at any time during subsurface intrusive activities, underground storage tanks (USTs), metal, or concrete are penetrated, drilling activities will cease immediately. After obtaining instrument readings, the project geologist/Site HSO will decide whether to continue or discontinue drilling.

10.3 DEVELOPMENT AND DECONTAMINATION WATER

Excess soil and purge and decontamination water generated during field activities will be screened with a PID. Investigation-derived waste (IDW) will be containerized in DOT-approved 55-gallon steel drums. All containers will be labeled with the contents and date, and will be stored at an on-Site staging area for later off-Site transport and disposal.

A waste management firm capable of handling both hazardous and nonhazardous wastes, such as National Response Corporation (NRC) of Great River, New York, will be employed to perform waste analysis and profiling, transport, and disposal for all IDW.

TABLES

TABLE 1
HAZARD CHARACTERISTICS OF SUSPECTED CONTAMINANTS

Substance	Incompatibles/Reactive	Exposure Routes/Target Organs	Standards
Tetrachloroethylene (PCE)	Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash	Inhalation, skin absorption, ingestion, skin and/or eye contact Central nervous system depression with dizziness and muscular incoordination; Eye and skin irritation upon contact; Liver and kidney damage	NIOSH REL: TWA Ca Minimize exposure OSHA PEL: TWA 100 ppm STEL 100 ppm IDLH: 150 ppm
Trichloroethylene (TCE)	Strong oxidizers, many fluorides	Inhalation, skin absorption, ingestion, skin and/or eye contact Eyes, skin, respiratory system, blood, central nervous system	TWA: 350 STEL: 440 CEIL: from ACGIH CEIL: 2380 (mg/m3) from ACGIH OSHA PEL: 100 ppm TWA IDLH: 1,000 ppm

REL = NIOSH recommended exposure limits, up to 10 hour work day exposure limit, 40 hours/week.
PEL = OSHA permissible exposure limit, 8 hour exposure limit, 40 hours/week, 29 CFR 1910.1000.
REL, PEL in mg/m^3 = (PEL in ppm x molecular weight) / 24.45.
STEL = Short Term Exposure Limit
TWA = time weighted average
OSHA = Occupational Safety and Health Agency
NIOSH = National Institute for Occupational Safety and Health
N.A. = No applicable value available
ND = no detectable exposure levels for proven carcinogenic substances

TABLE 2
COMPONENTS OF PERSONAL PROTECTION LEVELS

Level D Protection	Level C Protection
❒ Safety glasses with side shields (or goggles) ❒ Hard Hat ❒ Face Shield (optional) ❒ Ordinary coveralls ❒ Ordinary work gloves ❒ Steel-toe, steel-shank works shoes or boots (chemical resistant) ❒ Ordinary work gloves	❒ Hard Hat ❒ Ploy-coated disposable (or standard disposable) overalls ❒ Inner gloves of tight-fitting latex or vinyl ❒ Outer gloves of neoprene or nitrile ❒ Steel-toe, steel-shank work shoes or boots (chemical resistant) ❒ Outer boots of neoprene or butyl rubber ❒ Disposable outer "booties" (optional work shoes or boots) ❒ Full-face air-purifying respirator (to be worn)** ❒ Taping of gloves and boots to disposable coveralls

* Respirator to be fitted with NIOSH/MSHA - approved high-efficiency filter (HEPA) combination respirator cartridges approved for organic vapors, particulates, gases, and fumes.
** Half-face respirator, face shield, and safety glasses with side shields (or goggles) may be substituted with approval of the Site HSO.

TABLE 3
ANTICIPATED LEVELS OF PERSONAL PROTECTION FOR PLANNED ACTIVITIES

Task	PPE Level	Site-Specific Requirements	Respirator
Mobilization/Demobilization			
Reconnaissance	D	Safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D - None
Mobilization/Demobilization of Equipment and Supplies	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D – None
Establishment of Site Security, Work Zones, and Staging Area	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D - None
Groundwater/Soil Sampling			
Drilling, Groundwater Well Installation, Excavation, Digging Test Pits, Backfilling, Grading Observation, Sampling	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	Level D initially, Level C-If action levels exceeded

TABLE 4
ACTION LEVELS DURING INTRUSIVE ACTIVITIES

Organic Vapors (PID)	Responses
0 to 1 ppm above Background	Continue drilling, decontamination, characterization, etc. Level D protection Continued monitoring every 15 minutes
1 ppm above Background	Temporarily halt work activity. Work may resume if vapor levels readily decrease to <1 ppm above Background. Continued monitoring every 15 minutes.
>1 to 25 ppm above Background, Sustained Reading	Discontinue drilling, decontamination, characterization, etc. Identify source of vapors, abatement actions. Work can resume when concentrations immediately outside the work area are <1 ppm. Continued monitoring every 15 minutes.
>25 ppm above Background, Sustained Reading	Discontinue intrusive activities

CORE ENVIRONMENTAL CONSULTANTS

ATTACHMENTS

ATTACHMENT A

New York State Department of Health Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

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

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

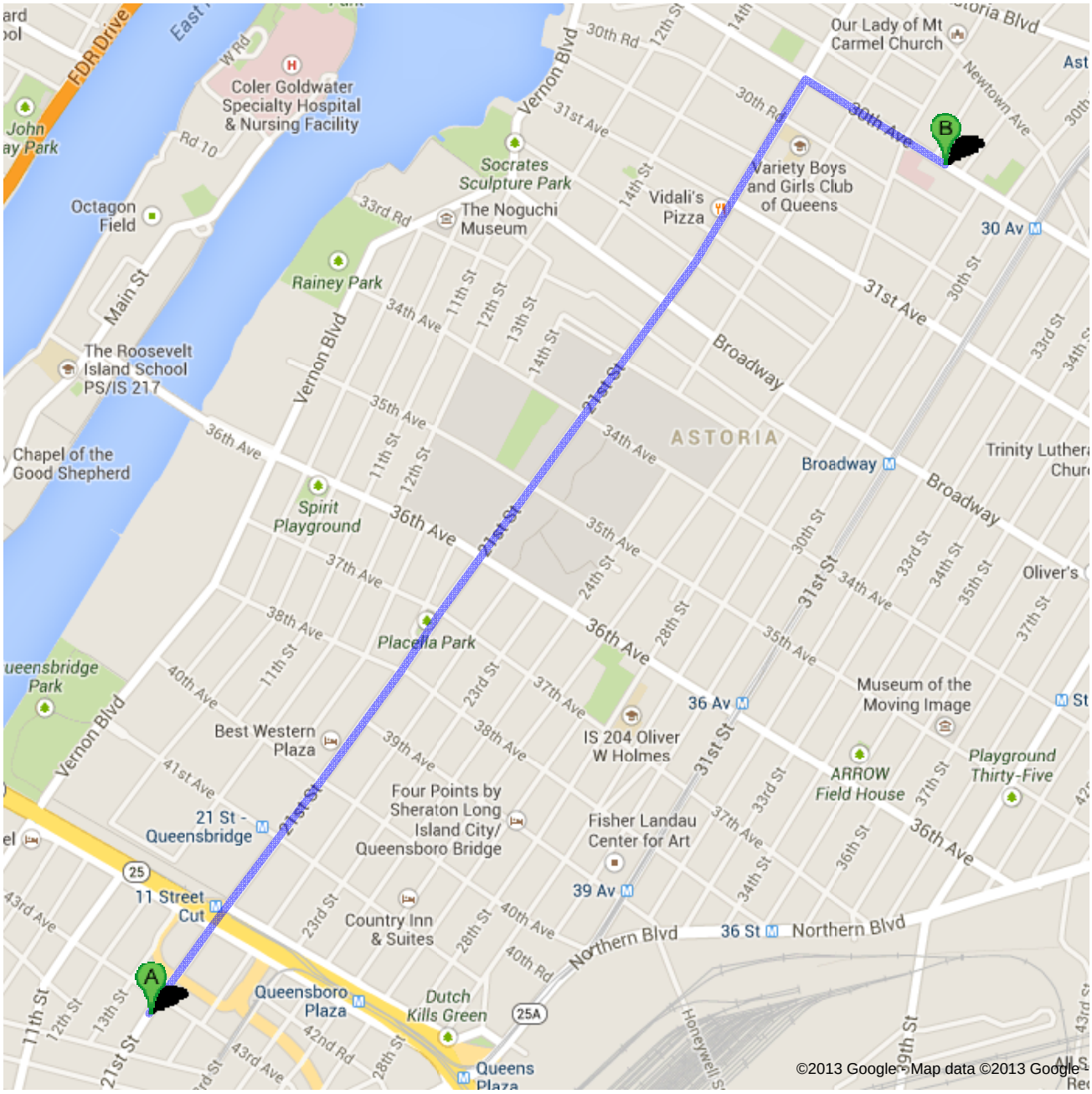
8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

ATTACHMENT B

Hospital Route Map/Directions

Google

Directions to Mount Sinai Hospital Queens
25-10 30th Ave, Long Island City, NY 11102
1.9 mi – about **6 mins**



A 43-01 21st St, Queens, NY 11101

1.	Head **northeast** on **21st St** toward **43rd Ave** About 5 mins	go 1.7 mi total 1.7 mi
2.	Turn right onto **30th Ave** Destination will be on the right About 59 secs	go 0.2 mi total 1.9 mi

B **Mount Sinai Hospital Queens**
25-10 30th Ave, Long Island City, NY 11102

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.

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

HAZARDOUS WASTE ACTIVITIES
HEALTH and SAFETY CHECKLIST and BRIEFING

Project: _____

Project Manager: _____

On Site Health & Safety Officer: _____

The Project Manager or on Site Health and Safety Officer will signify the completion of the following items by initializing and dating each item.

	Initial	Date
❒ Site health and safety plan prepared and approved by health and safety manager		
All employees who will be on Site		
❒ Have received initial (24 or 40 hr.) training		
❒ Have received annual 8 hr refresher training		
❒ Have reviewed the Site health and safety plan and received pre-job briefing		
❒ Have received respiratory protective equipment training including SCBA if required		
❒ Have received negative pressure respirator fit test		
❒ Have had a medical exam within the past 12 months		
❒ A pre-entry briefing has been conducted by myself on (/ /)		
❒ I deferred the pre-entry briefing responsibility to the HSO		

Each employee conducting field work shall sign this form after the pre-entry briefing is completed and prior to commencing work on Site. A copy of this signed form shall be kept at the Site, and the original sent to the office, for inclusion into the project file.

Site Personnel Sign-off:

❒ I have received a copy of the Site-Specific Health and Safety Plan.

❒ I have read the Plan and will comply with the provisions contained therein.

❒ I have attended a pre-entry briefing outlining the specific health and safety provisions on this Site.

Name: _____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

REPORT OF ACCIDENT INJURY

Project: _____ Date of Occurrence: _____

Location: (be specific) _____

_____

Type of Occurrence: (check all that apply)

- ❒ Fire
- ❒ Vehicle Accident
- ❒ Equipment Failure
- ❒ Disabling Injury
- ❒ Property Damage
- ❒ Chemical Exposure
- ❒ Explosion
- ❒ Other Injury
- ❒ Other (explain) _____

Injuries:

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

Witnesses to Accident/Injury:

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

Name of Injured: _____ Company: _____

What was being done at the time of the accident/injury?

_____

_____

_____

Nature of the Accident/Injury:

_____

_____

_____

REPORT OF ACCIDENT INJURY
(continued)

What caused the Accident/Injury? _____

_____

_____

_____

_____

What corrective action will be taken to prevent recurrence? _____

_____

_____

_____

_____

Signatures:

Health and Safety Officer _____ Date: _____

Project Manager _____ Date: _____

Reviewer _____Date: _____

Comments by Reviewer: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

MEDICAL DATA SHEET

This brief Medical Data Sheet will be completed by all personnel working on-Site and will be kept on Site during operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to the hospital facilities is required:

Site: _____

Name:_____ Home Telephone: _____

Address:_____

_____

Age: _____ Height: _____ Weight: _____

Person to Contact in Case of Emergency:

_____Phone No. _____

Alternate Person to Contact in Case of Emergency:

_____Phone No. _____

Drug or other Allergies:

_____

_____

Particular Sensitivities: _____

Do You Wear Contacts? YES NO

Provide a List of Previous Illnesses:

_____

_____

_____

_____

_____

Provide a List of Previous Exposures to Hazardous Chemicals: _____

_____

_____

_____

_____

What Medications are you presently using? _____

_____

Do you have any Medical Restriction? _____

_____

_____

Name, Address, and Phone Number of Personal Physician:

Name: _____ Telephone: _____

Address: _____

ON SITE SAFETY BRIEFING

Each employee conducting field work shall sign this form after the pre-entry briefing is completed and prior to commencing work on Site. A copy of this signed form shall be kept at the Site, and the original sent to the office, for inclusion into the project file.

Site Personnel Sign-off:

❒ I have received a copy of the Site-Specific Health and Safety Plan.

❒ I have read the Plan and will comply with the provisions contained therein.

❒ I have attended a pre-entry briefing outlining the specific health and safety provisions on this Site.

Name: _____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

CORE Environmental, Inc. Project Manager

❒ A pre-entry briefing has been conducted by myself on _____

❒ I deferred the pre-entry briefing responsibility to the Health and Safety Officer.

Name: _____ Date: _____

APPENDIX B

Quality Assurance Project Plan

CORE ENVIRONMENTAL CONSULTANTS

QUALITY ASSURANCE PROJECT PLAN
Wills Building
43-01 21st Street
Long Island City, New York 11101
Site No. C241143

Prepared for:

Rockrose Development Corporation
15 East 26th Street, 7th Floor
New York, New York 10010

Prepared by:

46-11 54th Ave
Maspeth, New York 11378

July 7, 2015

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLES

FORMS

ATTACHMENT

1.0 INTRODUCTION

CORE has prepared this Quality Assurance Project Plan (QAPP) to accompany the Remedial Work Plan (RWP). This QAPP presents the policies, organization, objectives, functional activities, and specific quality assurance and quality control activities to ensure the validity of data generated during the remedial action at the Site. The purpose of this QAPP is to ensure that all technical data generated are accurate and representative. The objectives for meeting these requirements include:

- Identification of qualifications and responsibilities for key project staff;
- Proper sample management in field and laboratory environments; and
- Assurance that data are complete, accurate, and acceptable.

Quality assurance (QA) is a management system for ensuring that all information, data, and decisions resulting from investigation and environmental monitoring programs are technically sound and properly documented. Quality control (QC) is the functional mechanism through which quality assurance is achieved. Quality control programs, for example, define the frequency and methods of checks, audits, and reviews necessary to identify problems and dictate corrective actions to resolve these problems, ensuring high quality data. As such, a quality assurance and quality control (QA/QC) program pertains to all data collection, evaluation, and review activities that are part of the remedial program.

All QA/QC procedures will be in accordance with applicable professional technical standards, government regulations and guidelines, and specific project goals and requirements. This QAPP has been prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (USEPA) Region II guidance documents.

Laboratory analysis of all project samples will be performed by an independent laboratory with the experience and certifications appropriate for the analyses performed. All analyses will be performed by laboratories accredited pursuant to the New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) for the category of parameters to be analyzed. The specific environmental laboratory or laboratories to be used will be determined as the project proceeds and monitoring activities are scheduled.

Duplicates, replicates, and matrix spike/matrix spike duplicate (MS/MSD) samples will be used to identify the quality of the analytical data. Field audits may be conducted to verify that proper sampling techniques and Chain-of Custody procedures are followed. Field data compilation, tabulation, and analysis will be checked for accuracy. Calculations and other post-field tasks will be reviewed by senior project personnel. Equipment used to take field measurements will be maintained and calibrated in accordance with established procedures. Records of calibration and maintenance will

be kept by assigned personnel. Field testing and data acquisition will be performed following strict guidelines as described herein.

Document control procedures will be used to coordinate the distribution, coding, storage, retrieval, and review of all data collected during each task.

A Data Usability Summary Report (DUSR) will be prepared for analytical results from each investigation activity. The DUSR will be prepared by an independent consultant in accordance with NYSDEC's "*Guidance for the Development of Data Usability Summary Reports*," revised 1997 and NYSDEC's DER-10 "*Technical Guidance for Site Investigation and Remediation*," May 2010 (DER-10).

2.0 PROJECT DESCRIPTION

This QAPP pertains to the completion of field activities and subsequent laboratory and data analysis associated with the Wills Building Site located at 43-01 21st Street, Long Island City, New York. A sub-slab depressurization system is currently in operation at the Site to address impacts to indoor air quality as a result of soil vapor migration.

The primary objectives of the remedial action are to:

- Degrade and treat the source area to reduce volatile organic compound (VOC) impacts to groundwater;
- Prevent off-Site migration of VOC impacts;
- Protect occupants of existing building from vapor intrusion into occupied areas of the on-site building; and
- Protect occupants of existing building and the public from direct contact with impacted soil and groundwater.

2.1 SITE DESCRIPTION

The Site is located at 43-01 21st Street in Long Island City, Queens, New York. The Wills Building is currently a mixed-use commercial and manufacturing space. The Site is located in an area zoned M1-4 by the New York City Department of City Planning, indicating that it can be used for manufacturing and commercial uses. The Site, presently owned by Rockrose Development Corporation (Rockrose), is bound by various commercial and industrial properties to the south, 21st Street to the west, 43rd Avenue to the north, and 22nd Street to the east. The East River is located approximately one-half mile northwest of the Site.

The Site is comprised of a large parcel occupying the entire block length between 21st and 22nd Streets. The parcel is approximately 261 feet along 43rd Avenue by 190 feet along the 21st Street frontage, and is identified as Block 441, Lot 16 by the New York City Department of Finance. The Site is currently occupied by one 124,000 square foot, three-story building originally constructed in approximately 1926. The property is relatively flat, with an approximate ground elevation 19 feet above mean sea level (msl). General topography in the area of the Site slopes slightly to the West.

2.2 REMEDIAL SCOPE

The scope of the project includes the installation and operation of an air sparge and soil vapor extraction system. This QAPP will provide guidance on field collection of samples, analysis procedures, and QA/QC tasks to be performed as part of the project.

2.3 REMEDIAL OBJECTIVES

The primary objectives of the remedial action are to:

- Degrade and treat the source area to reduce VOC impacts to groundwater;
- Prevent off-Site migration of VOC impacts;
- Operate a sub-slab depressurization system (SSDS) to protect building occupants from off-gasses;
- Installation and/or maintenance of a Site cover to protect the public from direct contact with impacted media; and
- Institutional controls (ICs), including:
    - Existing New York City statute that prevents the installation of a groundwater drinking well where potable water is supplied, and
    - A NYSDEC Environmental Easement to ensure that Site ICs and engineering controls (ECs) remain in place.

2.4 QUALITY ASSURANCE OBJECTIVES

The goals of the QAPP are to document the framework needed to ensure that:

- The measurements performed will adequately support the project objectives regarding data collection and hypothesis testing;
- Data collected are of the highest quality that can be reasonably expected;
- The quality of the data is known;
- The data and its quality are adequately documented; and
- The data are adequately preserved and rendered in available form.

2.5 DATA QUALITY OBJECTIVES

Data quality objective (DQO) criteria define the uncertainty in a data set and are expressed in terms of accuracy, comparability, completeness, precision, and representativeness.

- **Accuracy** - Accuracy is the degree of agreement of a measurement (or average of measurements) with an accepted reference or "true" value and is a measure of bias in the system.
- **Completeness** - Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions.

- **Comparability** - Comparability expresses the confidence with which one data set can be compared to another
- **Precision** - Precision is the degree of mutual agreement among individual measurements of a given parameter.
- **Representativeness** - Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

3.0 DATA COLLECTION AND QUALITY ASSURANCE ROLES

This QAPP provides for designated qualified personnel to review products and provide guidance on QA matters. The document also outlines the approach that will be followed in order to ensure that data of sufficient quality are obtained. The various QA functions of the project positions are explained in the following subsections.

Senior Project Manager

The Senior Project Manager will have responsibility for ensuring that the project meets the objectives and quality standards as presented in the RWP and this QAPP. He/she will be responsible for implementing the project, and will have the authority to commit the resources necessary to meet project objectives and requirements. The project manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. He/she will act as the major point of contact and control for matters related to the project. In addition, he/she will be responsible for technical quality control and project oversight.

Team Leaders

The Senior Project Manager will be supported by team leaders who will be responsible for leading and coordinating the day-to-day activities of the various resources under their supervision. The team leaders will be highly experienced environmental professionals who will report directly to the Senior Project Manager.

Technical Staff

The technical staff (field support members) for this project will be drawn from CORE's workforce. The technical team staff will be used to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team members will be experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

QA Officer

The Project QA Officer will be responsible for maintaining QA for the project.

4.0 QUALITY CONTROL ACTIVITIES

All measurements will be made to ensure that analytical results are representative of the media and conditions measured. Unless otherwise specified, all data will be calculated and reported in units consistent with other organizations who report similar data to maintain comparability.

4.1 GOALS

The QA/QC goal will focus on controlling measurement error within the limits established and will ultimately provide a database for estimating the actual uncertainty in the data collected.

Target values for detection limit, percent spike recovery and percent "true" value of known check standards, and relative percent difference (RPD) of duplicates/replicates are provided in the referenced analytical procedures. It should be noted that target values are not always attainable. Instances may arise where high sample concentrations, non-homogeneity of samples, or matrix interferences preclude achievement of target detection limits or other quality control criteria. In such instances, the laboratory will report reasons for deviations from these detection limits or noncompliance with quality control criteria.

4.2 FIELD QUALITY CONTROL SAMPLES

Field quality control samples will consist of trip blanks, field blanks, field duplicates, matrix spikes, and matrix spike duplicates, as shown in Table 1.

4.2.1 Field Duplicates

Field quality control samples will be collected to verify reproducibility of the sampling and analytical methods. Field duplicates will be obtained at a rate of 1 per 20 original field samples, as outlined in Table 1.

4.2.2 Trip Blanks

Trip blanks will be used to assess whether groundwater has been exposed to volatile constituents during sample storage and transport. Trip blanks will consist of a volatile organics analysis (VOA) vial pre-filled by the laboratory with analyte-free water. The trip blanks will remain unopened throughout the sampling event and will be analyzed for VOCs. Trip blanks will be collected as outlined in Table 1.

4.2.3 Matrix Spike/Matrix Spike Duplicates

MS/MSD samples will be obtained to determine if the matrix is interfering with sample analysis. MS/MSDs will be collected at a rate of 1 per 20 original field samples, or as required to meet DQOs, as outlined in Table 1.

4.2.4 Rinseate/Equipment Blanks

Rinseate blanks will be used to assess decontamination procedures for non-dedicated equipment. Rinse blanks will be collected as outlined in Table 1.

4.3 LABORATORY QUALITY CONTROL CHECKS

Internal laboratory quality control checks will be used to monitor data integrity. These checks include method (equipment) blanks, spike blanks, internal standards, surrogate samples, calibration standards, and reference standards.

5.0 CALIBRATION PROCEDURES AND FREQUENCY

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references.

5.1 FIELD INSTRUMENTS

A calibration program will be implemented to ensure that routine calibration is performed on all field instruments. Field team members familiar with field calibration and operation of the equipment will maintain proficiency and perform the prescribed calibration procedures outlined in the Operation and Field Manuals accompanying the respective instruments. Calibration records for each field instrument used on the project will be maintained on-site during field activities and a copy will be kept in the project files.

5.1.1 Portable Total Organic Vapor Monitor

Any vapor monitor used will undergo routine maintenance and calibration prior to shipment to the project site. Daily calibration and instrument checks will be performed by a trained team member at the start of each day. Daily calibrations will be performed according to the manufacturer's specifications and are to include the following:

- Battery check: If the equipment fails the battery check, recharge the battery.
- Gas standard: The gauge should display an accurate reading when a standard gas is used.
- Cleaning: If proper calibration cannot be achieved, the instrument ports must be cleaned.

5.1.2 pH and Specific Conductance

The following steps should be observed by personnel engaged in groundwater sampling for pH and specific conductance:

- The operation of instrumentation should be checked prior to each day’s sampling and calibrated if necessary. Fresh standard buffer solution (pH 4, pH 7 and pH 10) will be used if it is determined that calibration is required.
- The specific conductance meter should be calibrated prior to each sampling event using a standard solution of known specific conductance.

More frequent calibrations may be performed as necessary to maintain analytical integrity. Calibration records for each field instrument used on the project should be maintained and a copy kept in project files.

6.0 SAMPLING PROCEDURES

The sampling of various environmental media will be completed as part of the remedial action. Sample type and data use are presented in Table 2.

6.1 SAMPLING PROTOCOL

Contained within this section are various guidelines related to the sample collection activities which may be performed at the site. These guidelines will be used by the field personnel to ensure the samples are collected and field activities are performed in a consistent manner. Each guideline will allow the field teams to customize the Work Plan to meet the specific sampling requirements of each site. Guidelines contained in this section are:

- Soil Sampling
- Boring Using a Geoprobe®
- Boring With a Standard Drilling Rig
- Groundwater Sampling

The sample containers that will be used are identified in Table 3. The sample containers will be labeled in accordance with Section 7.1.1. Sample handling, packaging, and shipping procedures are presented in Section 7.3.

6.1.1 Soil Sampling

This section provides the guidelines and requirements for soil sampling. The objective of the guideline is to ensure a representative soil sample is collected at each designated sampling location to accurately define the concentration and determine whether the site soils have been impacted by site activities.

Soil samples may be collected using a hand auger. Listed below is the process for collecting soil samples:

1. A new pair of clean disposable nitrile gloves will be donned at each sampling location.
2. Prepare the sampling location by removing all concrete, stone sub-base, asphalt, vegetation, roots, etc., from the sampling point.
3. Advance a decontaminated hand auger to the desired sampling depth below ground surface.
4. Remove the hand auger from the boring and use a decontaminated stainless steel spoon to remove the sample from the auger bucket.

5. Carefully place the soil samples for volatile organic analysis directly in to the sample bottles ensuring that no head space exists.
6. Place the remaining sample into a decontaminated bowl (stainless steel or Pyrex). The borehole may need to be further advanced to obtain enough samples to fill all the sample containers.
7. Once enough samples are collected, homogenize the sample using the quartering method (see below). When the sample has been completely mixed, fill the remaining sample containers.
8. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 7.3.
9. QA/QC samples will be collected as specified in Section 4.2.
10. Backfill the boring with the soil removed from the hole and return the Site to its natural state.

The following should be considered when collecting a soil sample using a hand auger:

- When a vertical sampling interval has been established, one auger-bucket is used to advance the auger hole to the first desired sampling depth.
- If discrete grab samples are to be collected to characterize each depth, a new bucket must be placed on the end of the auger extension immediately prior to collecting the next sample.
- The top few inches of soil should be removed from the bucket to minimize the chances of cross-contamination of the sample from fall-in of material from the upper portions of the hole.

The cut and quartering technique is as follows:

- The sample will be thoroughly mixed in a bowl, and divided into quarters.
- A portion of the soil will be gathered from two of the quartered sections. This process will be repeated until the amount of soil needed to completely fill the sample containers has been obtained.
- It is pertinent that soil samples be mixed as thoroughly as possible to ensure the sample is representative of the interval sampled.

Soil sampling records will be kept in the field log book. The information recorded will include the general requirements presented in Section. 7.2. The following records will also be reported:

1. Name and location (including sample interval) of the soil sample and boring.
2. Depth to top of sample and soil description when applicable.
3. Type of equipment used during the soil sampling/boring.
4. Sample location.

Field quality control samples will be collected to verify reproducibility of the sampling and analytical methods. Field duplicates will be obtained at a rate of 1 per 20 original field samples, as outlined in Table 1.

6.1.2 Geoprobe® Borings

This section provides the guidelines and requirements for advancing soil borings using a Geoprobe® for the purpose of collecting soil samples and extracting groundwater samples.

The following procedure will be used to advance borings with a Geoprobe® rig and Macrocore® sampler to collect subsurface soil samples.

1. Determine and clear (for utilities) the boring locations through site personnel and the local underground facilities locating service. Surface materials such as concrete, asphalt, or vegetation may be removed from boring locations.
2. Geoprobe® rods will be advanced in 4-foot intervals. Each new 4-foot interval will be sampled using a single-use acetate Macrocore® sleeve liner.
3. Once the desired sampling depth has been reached, rods will be retraced and the Macrocore® sample liner will be retrieved from the sampling rod sleeve.
4. The acetate liner will be cut open by the drill rig operator or his/her assistant.
5. Small portions of soil will be collected along the length of the acetate liner and placed in VOC sample bottles. Sample bottles will be filled in such a manner as to minimize head space and ensure that a representative sample from the designated sampling depth is collected.
6. After the VOC sample is collected, the remaining sample will be placed in a decontaminated stainless steel bowl, homogenized using the quartering method (see Soil Sampling Section 5.1.1), and used to fill remaining sample containers.
7. Once the samples have been collected they will be packaged as specified in Section 7.3.
8. QA/QC samples will be collected as specified in Section 4.2.

9. Backfill the boring with the soil removed from the hole and return the site to its natural state. If the hole is not completely backfilled to ground surface with the soil removed from the hole, bentonite chips will be used to backfill the remaining space.

The following guidelines are to be used when advancing Geoprobe® borings and extracting groundwater samples in areas immediately surrounding the locations where site activities may have impacted groundwater resources:

1. Sampling locations are determined prior to site activities; however minor adjustments in the field may be needed. Prior to advancing the Geoprobe®, underground utilities in the area will be identified.
2. The Geoprobe® borings will be advanced to just below the water table, a predetermined maximum depth, or to refusal.
3. The outer sleeve will be retracted exposing the inner stainless steel screen.
4. Sample will be obtained using a peristaltic pump, tubing and check ball system or a mini bailer.
5. In areas with low groundwater yield, a temporary piezometer constructed out of pre-cleaned schedule 40 PVC (1-inch diameter) will be placed in the Geoprobe® borehole after down-hole tools have been removed.
6. If the boring yields sufficient water to allow for sample collection completion within one hour, a peristaltic pump, tubing and check ball system, or a bailer will be used for sample collection per section 6.1.4.
7. Groundwater will be removed under very low-flow conditions to minimize turbidity when filling pre-cleaned, pre-preserved, pre-labeled sample bottles, starting with the collection of the samples for VOC analyses.
8. There should be no bubbles in VOC samples.
9. Continue to fill remaining bottles.
10. If samples for metals analysis contain excessive silt, the samples may be allowed to settle. The less turbid sample will be decanted and sent to the laboratory for analysis.
11. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 7.3.
12. QA/QC samples will be collected as specified in Section 4.2.
13. Conductivity, pH, and temperature will be measured after sample collection. The measurements will be recorded in the field log book.

14. Once the sample collection process has been completed, the temporary casing will be removed and the borehole will be backfilled with soil removed from the hole. If the hole is not completely backfilled to ground surface with the soil removed from the hole, bentonite chips will be used to backfill the remaining space.

Geoprobe® records will be recorded in the field log book. The information recorded will include the general requirements presented in Section. 7.2. The following records will also be reported:

1. Name and location of the Geoprobe® sample and boring.
2. Date and time that the Geoprobe® boring/sampling was advanced.
3. Depth range across with sample was collected.
4. Name of the persons overseeing and company conducting the Geoprobe® borings.
5. Type of equipment used during the Geoprobe® boring and during construction of the temporary piezometers. Soil descriptions should be included when applicable.
6. Type of equipment used during sampling, number and type of containers used for sampling purposes, and analyses to be conducted.
7. Sample location.

Field quality control samples will be collected to verify reproducibility of the sampling and analytical methods. Field duplicates will be obtained at a rate of 1 per 20 original field samples, as outlined in Table 1.

6.1.3 Hollow Stem Auger Rig Borings

This section provides the guidelines and requirements for advancing soil borings with a standard hollow-stem auger (HSA) drilling rig for the purpose of extracting soil samples and installing groundwater monitoring wells.

The following procedure will be used to advance borings with an HSA rig and split spoon sampler to collect subsurface soil samples. Listed below is the procedure for collecting subsurface soil samples:

1. Determine and clear (for utilities) the boring locations through site personnel and the local underground facilities locating service. Surface materials such as concrete, asphalt, or vegetation may be removed from boring locations.
2. A minimum 2 ½ -inch diameter hollow stem auger will be used to advance the borehole to the desired subsurface depth.
3. Once the desired sampling depth has been reached, a decontaminated split spoon sampler will be used to retrieve the subsurface soil sample.

4. The split spoon sampler will be brought to the surface and opened for sample collection and lithological description.
5. Small portions of soil will be collected along the length of the split spoon and placed in VOC sample bottles. Sample bottles will be filled in such a manner as to minimize head space and ensure that a representative sample from the designated sampling depth is collected.
6. After the VOC sample is collected, the remaining sample will be placed in a decontaminated stainless steel bowl, homogenized using the quartering method (see Soil Sampling Section 6.1.1), and used to fill remaining sample containers.
7. Once the samples have been collected they will be packaged as specified in Section 7.3.
8. QA/QC samples will be collected as specified in Section 4.2.
9. Backfill the boring with the soil removed from the hole and return the site to its natural state. If the hole is not completely backfilled to ground surface with the soil removed from the hole, bentonite chips will be used to backfill the remaining space.

Standard drilling rig records and soil sampling records will be kept in the field log book. The information recorded will include the general requirements presented in Section 7.2. The following records will also be reported:

1. Name and location of the boring.
2. Date and time that the boring was advanced and sampling occurred.
3. Depth range across which sample was collected.
4. Names of on-site personnel and company conducting the borings.
5. Lithological description of subsurface soils for each boring location.
6. Length of split spoon sampler and amount of recovered sample.
7. Sample location.

Field quality control samples will be collected to verify reproducibility of the sampling and analytical methods. Field duplicates will be obtained at a rate of 1 per 20 original field samples, as outlined in Table 1.

6.1.4 Groundwater Sampling

This section provides the guidelines and requirements for collecting groundwater samples from monitoring wells. The purpose of the guideline is to ensure that the groundwater samples are

collected in such a manner to ensure that a representative sample is collected at each designated sampling location.

Prior to collection of groundwater samples, monitoring wells and water supply wells will be purged to remove stagnant water that is not considered indicative of aquifer conditions. Purge water disposal will be addressed on a site-specific basis. A new pair of clean disposable gloves will be donned at each sample location.

Procedures for monitoring well purging:

1. Place plastic around well head.
2. Unlock protective casing and remove well cap.
3. Immediately (after well cap removal) take an organic vapor reading down the well casing using a photoionization detector (PID) and record reading in the field logbook.
4. Measure water level distance from top of casing and sound the total depth as detailed below. Record in logbook. Check tip of water level indicator for silt or product residue. If either is observed, note in logbook.
    a. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.
    b. Confirm that the water surface has been contacted by repeatedly raising and lowering the indicator at least three times to ensure a consistent sounding level has been reached.
    c. Measure and record depth (nearest 0.01 feet) to the water surface from the top of casing in field logbook.
    d. Lower the indicator to the well bottom and record the total depth.
    e. Retrieve and decontaminate water level indicator.
5. Calculate volume to remove for purging.
6. Lower decontaminated purging device into well.
7. Begin to purge water from the well near the bottom.
8. Observe and record: odor, color, clarity, siltiness, and general water condition in logbook. Also record changes in the physical condition of the monitoring wells that could affect well integrity.
9. Temperature, pH, and specific conductivity of groundwater will be measured and recorded periodically during well purging. The sample may be collected after the water

has cleared sufficiently and temperature, pH, and conductivity have stabilized. Stabilization is defined as follows:

- Temperature ±1°C
- pH ±0.1
- Redox potential ±3% for 10 mv
- Turbidity/dissolved oxygen ±10 %
- Conductivity ±10 µmhos/cm^2

10. A total of at least 3 to 5 volumes of well water should be removed for purging to be considered complete. Wells with little or no recharge will be purged to near dryness. If a pump is used for well purging, it will be brought to the water surface prior to completion of purging activities to ensure complete removal of stagnant water.

Water supply wells which need to be sampled for constituents of concern and are equipped with an operable pump will also be purged of stagnant water. To do so, the total depth and diameter of the well should be known or accurately estimated, and it must be determined whether or not a storage tank exits. If a storage tank is present and is located before the sample port location, it must also be purged of stagnant water.

Listed below are the guidelines used for water supply well purging:

1. Locate a sample port or discharge location.
2. Determine volume to be removed based on total depth and diameter of the well and the storage capacity of the storage tank if it exists.
3. Activate the submersible pump in the well.
4. Begin to remove water from the well, and continue until it has been determined that the stagnant water has been removed based on discharge rate and well construction.
5. Observe and record: odor, color, clarity, siltiness and general water condition in logbook. Also record observed construction of the water supply well.
6. Temperature, pH, and, specific conductivity of the groundwater will be measured and recorded periodically during water supply well purging. The sample may be collected after the water has cleared sufficiently and the temperature, pH, and conductivity have stabilized. Stabilization is defined as follows:
    - Temperature ±1°C
    - pH ±0.1

- Redox potential ±3% for 10 mv
- Turbidity/dissolved oxygen ±10 %
- Conductivity ±10 µmhos/cm^2

7. If well construction information is not available, then the recommended purge time is 15 minutes for a high volume pump.

Monitoring wells which contain excess silt and have a low yield will be purged using low flow methodology. This method of purging and well sampling will be used to minimize the volume of purge water removed from the well and to reduce turbidity in the groundwater samples collected. The pumping device selected should operate at variable speeds to reduce aquifer stress and agitation.

Listed below are the guidelines used for purging a well using the low flow method:

1. Place plastic around well head.
2. Unlock protective casing and remove well cap.
3. Immediately (after well cap removal) take an organic vapor reading down the well casing using a photoionization detector and record reading in the field logbook.
4. Measure water level distance from top of casing and sound the total depth as detailed below. Record in logbook. Check tip of water level indicator for silt or product residue (if either are observed note in logbook).
    a. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.
    b. Confirm that the water surface has been contacted by repeatedly raising and lowering the indicator at least three times to ensure a consistent sounding level has been reached.
    c. Measure and record depth (nearest 0.01 feet) to the water surface from the top of casing in field logbook.
    d. Lower the indicator to the well bottom and record the total depth.
    e. Retrieve and decontaminate water level indicator.
5. Calculate volume to remove for purging.
6. Lower decontaminated low flow purging device into well within the screened area of the well producing the highest flow rate.

7. Begin pumping and measure the groundwater elevation to ensure that the aquifer is not being stressed. If significant drawdown occurs, reduce the pumping rate. Flow rates should range between 100 mL/ min and 1,000 mL/min.
8. Observe and record: odor, color, clarity, siltiness, and general water condition in logbook. Also record changes in the physical condition of the monitoring wells that could affect well integrity.
9. Temperature, pH, turbidity, dissolved oxygen, redox potential, and specific conductivity of the groundwater will be measured and recorded periodically during well purging. The sample may be collected after the water has cleared sufficiently, water quality indicators have stabilized after 3 successive measurements, and at least one well volume has been removed. Stabilization is defined as follows:
    - Temperature ±1°C
    - pH ±0.1
    - Redox potential ±3% for 10 mv
    - Turbidity/dissolved oxygen ±10 %
    - Conductivity ±10 µmhos/cm2
10. After the monitoring well is purged, do not turn off the pump or remove it from the well.

Groundwater sample collection from a monitoring well:

1. Purge the monitoring well as described earlier in section.
2. Establish that the well has properly recharged (80% of static water level has recovered). No more than 16 hours should lapse between purge completion and sample collection.
3. Carefully lower a decontaminated bailer (with a fresh nylon line attached for each well) down the monitoring well. Disposable bailers may also be used.
4. Continue to lower the sample collection device to the desired sampling depth.
5. Raise the bailer and carefully fill pre-cleaned, pre-preserved, pre-labeled sample bottles, VOC analysis first.
6. Make sure there are no bubbles in VOC samples.
7. Continue to fill remaining bottles.
8. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 7.3.
9. QA/QC samples will be collected as specified in Section 4.2.

10. Conductivity, pH, and temperature, will be measured after sample collection. The measurements will be recorded in the field log book.

Groundwater sample collection using the low flow method:

1. Purge the monitoring well as described earlier in section.
2. Use the pumping device already in place to collect the samples where turbidity can influence the analytical results (such as metals).
3. If a peristaltic pump/ vacuum jug assembly or stainless steel and Teflon bladder pump were used for purging, continue to collect the remaining samples using these devices.
4. If neither of the devices listed above were used, carefully remove the pump from the well and use a Teflon bailer to collect the remaining groundwater samples.
5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Section 7.3.
6. QA/QC samples will be collected as specified in Section 4.2.
7. Conductivity, pH, and temperature will be measured after sample collection. The measurements will be recorded in the field log book.

Records

Sample collection records will be kept on the appropriate forms, including the purge logs and sampling log forms. The information recorded is described on the forms. In addition, the following information will also be reported in the log book:

1. Observations of groundwater condition;
2. Field measurements;
3. Sample identification, date, and time; and
4. Sample analytical parameters

6.3 SAMPLE CONTAINERS

The volumes and containers required for the sampling activities are included in Table 3. Pre-washed sample containers will be provided by the laboratory. All bottles are to be prepared in accordance with USEPA bottle washing procedures.

6.4 DECONTAMINATION

Dedicated and/or disposable sampling equipment will be used to the extent possible to minimize decontamination requirements and the possibility of cross-contamination.

When the use of new/dedicated equipment at each sampling location is not feasible, such as the use of augers and a split spoon sampler, equipment will be decontaminated between sampling locations. The water level indicator will be decontaminated between locations by using the following decontamination procedures:

- Initial cleaning of any foreign matter with paper towels, if needed;
- Low phosphate detergent wash;
- De-ionized water rinse; and
- Air dry.

If a Geoprobe® is used to install monitoring wells, the Geoprobe®, Geoprobe® rods, and Macrocore® samplers utilized to install borings will be decontaminated with a bucket wash consisting of a low phosphate detergent wash followed by water rinse. The backhoe bucket, drill rig, augers, rods, split spoon samplers, and/or other related downhole equipment will be decontaminated using high pressure steam prior to initiating the excavation and well installation programs prior to the initiation of subsurface intrusive activities and between each boring location. Steam cleaning will be performed in a pre-designated on-site decontamination area. Throughout and after the cleaning processes, direct contact between the equipment and the ground surface will not be permitted. Decontamination waste water will be collected in 55-gallon drums. The drill rig and associated equipment will also be cleaned upon completion of the investigation and prior to departure from the Site using the following methods:

- Initial cleaning of all foreign matter; and
- Wash down with high pressure, high temperature sprays to remove and/or volatilize organic contamination.

6.5 LEVELS OF PROTECTION/SITE SAFETY

All sampling will be conducted under a documented Health and Safety Plan. On the basis of air monitoring, the level of protection may be downgraded or upgraded at the discretion of the Site Safety Officer. Crew members will stand upwind of open boreholes or wellheads during the collection of samples, when possible. All work will initially be conducted in Level D (refer to Site Health and Safety Plan). Air purifying respirators (APRs) will be available if monitoring indicates an upgrade to Level C is appropriate.

7.0 SAMPLE CUSTODY

This section describes standard operating procedures for sample identification and chain-of custody to be used for all field activities. These procedures are in place to ensure that the quality of the samples is maintained during collection, transportation, storage, and analysis. All Chain-of-Custody requirements comply with standard operating procedures indicated in USEPA and NYSDEC sample-handling protocol.

Sample identification documents must be carefully prepared so that sample identification and Chain-of-Custody can be maintained and sample disposition controlled. Sample identification documents include:

- Field records;
- Sample labels;
- Custody seals; and
- Chain-of-Custody records.

7.1 CHAIN-OF-CUSTODY

The primary objective of the Chain-of-Custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses.

7.1.1 Sample Labels

Sample labels attached to, or affixed around, the sample container must be used to properly identify all samples collected in the field. To the extent possible, the sample labels are to be placed on the bottles so as not to obscure QA/QC lot numbers on bottles. Sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross reference with the field sampling records or sample logbook. For Chain-of-Custody purposes, all QC samples are subject to the same custodial procedures and documentation as original samples.

7.1.2 Custody Seals

Custody seals are pre-printed adhesive-backed seals, often with security slots, designed to break if the seals are disturbed. Sample shipping containers (coolers, cardboard boxes, etc.) are sealed to ensure security. Seals must be signed and dated before use. Upon receipt at the laboratory, the custodian must check (and certify by completing logbook entries) that seals on shipping containers are intact. Strapping tape should be placed over the seals to ensure the Chain-of-Custody remains intact and seals are not inadvertently destroyed during sample shipment.

7.1.3 Chain-Of-Custody Record

The Chain-of-Custody record must be fully completed, on duplicate, at a minimum, by the field technician who has been designated responsible for sample shipment. In addition, if samples are known to require rapid analysis turnaround time because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations), the person completing the Chain-of-Custody record should note these constraints in the "Remarks" section of the Custody record.

7.1.4 Field Custody Procedures

- As few persons as possible should handle samples.
- Sample bottles will be obtained pre-cleaned by the laboratory and shipped to sampling personnel in charge of the field activities.
- Coolers or boxes containing cleaned bottles will be sealed with a custody tape seal during transport to the field or while in storage prior to use.
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under Chain-of-Custody procedures.
- The sample collector will record sample data in a controlled field notebook and/or on appropriate field sampling records.
- The Site team leader will determine whether proper custody procedures were followed during fieldwork, and decide if additional samples are required.

7.2 DOCUMENTATION

7.2.1 Sample Identification

All containers of samples collected from the project will be identified using the following format on a label or tag fixed to the sample container Each sample will be labeled, chemically preserved (where required), and sealed immediately following collection. To minimize handling of sample containers, labels will be filled out prior to sample collection to the extent possible. The sample label will be filled out using waterproof ink and will be firmly affixed to the appropriate sample container. The following information will be contained on the sample label:

- Name or initials of sampler;
- Date and time of collection;
- Sample identification;
- Intended analysis; and

- Preservation method (if any).

7.3 SAMPLE HANDLING, PACKAGING, AND SHIPPING

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the potential hazardous nature of the samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulations, 49 CFR 171 through 177.

All Chain-of-Custody requirements must comply with standard operating procedures in the NYSDEC and USEPA sample handling protocols. Field personnel will make arrangements for samples to be transported to the laboratory. When custody is relinquished to a shipper, field personnel will ensure that the laboratory custodian or Project Manager is aware of the expected arrival time of the sample shipment and of any time constraints on sample analysis. All samples will be delivered to the laboratory in a timely manner to help ensure sample analysis holding times are met.

8.0 LABORATORY ANALYTICAL PROCEDURES

Specific analytical methods for constituents of interest in soil and groundwater are listed in Table 3. The laboratory will maintain, and have available for the appropriate operators, standard operating procedures relating to sample preparation and analysis according to the methods stipulated in Table 3.

9.0 DATA REDUCTION AND REPORTING

QA/QC requirements will be strictly adhered to during sampling and analytical work. All data generated will be reviewed by comparing and interpreting results from chromatograms (responses, stability of retention times), accuracy (mean percent recovery of spiked samples), and precision (reproducibility of results). Refer to Section 10 for a discussion of QA/QC protocol.

Data storage and documentation will be maintained using logbooks and data sheets that will be kept on file. Analytical QC will be documented and included in the analytical testing report. A central file will be maintained for the sampling and analytical effort after the final laboratory report is issued.

All calculations and data manipulations are included in the appropriate methodology references. Control charts and calibration curves will be used to review the data and identify outlying results. Prior to the submission of the report to the client, all data will be evaluated for precision, accuracy, and completeness.

Laboratory reports will be reviewed by the laboratory supervisor, the QA Officer, Laboratory Manager and/or Director, and the project manager. Analytical reports will contain a data tabulation including results and supporting QC information will be provided. Raw data will be available for later inspection, if required, and maintained in the project file.

All data will be reported to NYSDEC in electronic format in accordance with DER-10 and the NYSDEC's Environmental Data Submission requirements.

9.1 DATA USABILITY SUMMARY REPORTS

Upon completion of a project sampling effort, analytical and QC data will be included in a Data Usability Summary Report (DUSR) that summarizes the work and provides a data evaluation. A discussion of the usability of the results in the context of QA/QC procedures will be made, as well as a summation of the QA/QC activity. The DUSR will be performed in accordance with the DEC's "Guidance for the Development of Data Usability Summary Reports," revised 1997 and DER-10.

Serious analytical problems will be reported. Time and type of corrective action, if needed, will depend on the severity of the problem and relative overall project importance. Corrective actions may include altering procedures in the field, conducting an audit, or modifying laboratory protocol. All corrective action will be implemented after notification of the project representatives.

9.2 INTERNAL QUALITY CONTROL CHECKS

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of glassware and reagents. The procedures for internal quality control checks will be consistent with NYSDEC ASP protocols.

10.0 PERFORMANCE AND SYSTEM AUDITS

10.1 FIELD AUDITS

The Project QA Director may conduct episodic audits of the operations at the Site to ensure that work is being performed in accordance with the Work Plan and associated Standard Operating Practice (SOP). The audit will cover, but not necessarily be limited to, such areas as:

- Conformance to standard operating procedures;
- Completeness and accuracy of documentation;
- Chain-of-Custody procedures; and
- Construction specifications.

10.2 LABORATORY AUDITS

In addition to any audits required by the NYSDEC, the Project QA Director may choose to audit the laboratory. These additional audits may take the form of performance evaluation samples or on-site laboratory inspections. Performance evaluation samples may be either blind samples or samples of known origin to the laboratory. Reasonable notice will be provided if the audit is to include an on-site inspection.

11.0 PREVENTIVE MAINTENANCE

11.1 FIELD

Field personnel assigned to complete the work will be responsible for preventative maintenance of all field instruments. The field sampling personnel will protect the portable total organic vapor monitors, water quality meter, etc. by placing them in portable boxes and/or protective cases.

All field equipment will be subject to a routine maintenance program, prior to and after each use. The routine maintenance program for each piece of equipment will be in accordance with the manufacturer's operations and maintenance manual. All equipment will be cleaned and checked for integrity after each use. Necessary repairs will be performed immediately after any defects are observed, and before the equipment is used again. Equipment parts with a limited life (such as batteries, membranes, and some electronic components) will be periodically checked and replaced/recharged as necessary according to the manufacturer's specifications.

11.2 LABORATORY

The laboratory's preventative maintenance procedures can be provided as outlined in their Laboratory Quality Assurance Manual.

12.0 CORRECTIVE ACTIONS

Corrective actions can be initiated as a result of performance and system audits, laboratory and interfiled comparison studies, data validation, and/or a QA program audit. They may also be required as a result of a request from project representatives. All corrective action necessary to resolve analytical problems will be taken. Success or failure of corrective actions will be reported with an estimate of effect on data quality, if any.

Corrective actions may include altering procedures in the field, conducting subsequent audits, or modifying project protocol. Time and type of corrective action, if needed, will depend on the severity of the problem and relative overall project importance. The project manager is responsible for initiating corrective action and the team leader is responsible for its implementation in the correction of field non-conformance corrective actions.

13.0 REFERENCES

New York State Department of Environmental Conservation (NYSDEC), 2010. *DEC Program Policy. DER-10/Technical Guidance for Site Investigation and Remediation.*

NYSDEC, 2013. *Analytical Services Protocol.*

United States Environmental Protection Agency (USEPA), 2005. *Standard Methods for the Examination of Water and Wastewater.*

USEPA, 2008. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods/SW-846.*

TABLES

TABLE 2
SAMPLE SUMMARY

Media	Type	Matrix	Data Use
Soil	Pneumatic Soil Boring	Soil	Comparison to Part 375[2]
	HSA[1] Split Spoon		
	Pneumatic Soil Vapor Boring		
Vapor	VOCs[3]	Vapor	NYSDOH[4] Vapor Intrusion Guidelines
Groundwater	Monitoring Wells	Water	Comparison to Part 703.5[5]
	Pneumatic Boring Grab Sample		

Notes:

(1) Hollow-stem auger
(2) Title 6 of the New York Codes, Rules, and Regulations Part 375 (6 NYCRR 375) Soil Cleanup Objectives
(3) Volatile organic compounds
(4) New York State Department of Health
(5) 6 NYCRR 703.5 - *Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations, Water quality standards for taste-, color- and odor-producing, toxic and other deleterious substances*

TABLE 3
SAMPLE CONTAINERS AND PRESERVATION

Parameter	Method	Matrix	Container	Preservation[1]
TCL[3] VOCs[4]	SW-846[2] 8260B	Groundwater	Glass, 2 x 40 mL	HCl to pH<2
		Soil	Glass, 4 x 40 mL (Terracore)	USEPA 5030/5035
	USEPA[5] TO-15	Vapor	SUMMA Canister (6 L)	None
TCL SVOCs[6]	SW-846 8270C	Groundwater	Amber Glass, 1 x 1000 mL	None
		Soil	Glass Soil Jar, 1 x 8 oz	None
TCL Pesticides	SW-846 8081B	Groundwater	Amber Glass, 1 x 1000 mL	None
		Soil[7]	Glass Soil Jar, 1 x 8 oz	None
TCL Aroclors	SW-846 8082A	Groundwater	Amber Glass, 1 x 1000 mL	None
		Soil[7]	Glass Soil Jar, 1 x 8 oz	None
TAL[8] Metals	SW-846 6010C	Groundwater	Plastic, 1 x 250 mL	HNO_3
		Soil[7]	Glass Soil Jar, 1 x 8 oz	None
Cyanide	SW-846 9012B	Groundwater	Plastic, 1 x 250 mL	NaOH
		Soil[7]	Glass Soil Jar, 1 x 8 oz	None

Notes:

(1) All soil and groundwater samples will be maintained at 4ºC following collection
(2) USEPA *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
(3) Target Compound List
(4) Volatile organic compounds
(5) United States Environmental Protection Agency
(6) Semi-volatile organic compounds
(7) Sample can be analyzed from same jar containing soil for SVOC analysis
(8) Target Analyte List

CORE ENVIRONMENTAL CONSULTANTS

TABLE 1
SUMMARY OF QUALITY CONTROL CHECKS

Sample Type	Frequency	Justification
Field Duplicate	1 per 20 samples collected	Data shows precision of analytical scheme from sampling through analysis when compared with results of sample. This represents a blind QC sample to the laboratory. Collect an additional amount of sample.
Laboratory Duplicate	1 per 20 samples collected	Data shows precision of the analytical scheme within the laboratory. The difference between this precision and that of the field duplicate represents the precision of the analytical method.
LS/LSD[(1)]	1 per 20 samples collected	Data shows how well the analysis of interest can be performed, and recovered from the sample matrix. Such information is useful when reported value is near an action level, but the sample exhibits poor recovery.
MS/MSD[(2)]	1 per 20 samples collected	Data shows precision of analysis when compared with matrix spike duplicate and matrix effects from recovery of spiked analysis. Collect an additional amount for each analysis. Analyzed as a spike.
MS/MSD (inorganic)	1 per 20 samples collected	Data shows precision of laboratory analysis when compared with results of sample. Collect an additional amount of sample for each analysis. Analyzed as unspiked sample.
Field Blank/ Equipment Blank	As required by DQOs[(3)]	Data demonstrates that sampling equipment was clean prior to use. Pass a sample of reagent water through collection device. Submit for analysis of analytes of concern.
Trip Blank	One per cooler containing samples for VOC[(4)] analysis	Data demonstrates that sample was not contaminated with volatile organics by other samples in shipping container, laboratory or outside influences.
Background or Reference Sample	As required by DQOs	Data provides baseline information to evaluate environmental impact.
Split Samples	When required to meet DQOs	Compare the quality of laboratory procedures of the permittee with State contracted laboratory procedures. Collect an additional amount of sample for each analysis.

Notes:

(1) Laboratory Spike/Laboratory Spike Duplicate
(2) Matrix Spike/Matrix Spike Duplicate
(3) Data Quality Objectives
(4) Volatile Organic Compounds

CORE ENVIRONMENTAL CONSULTANTS

FORMS

Daily Observation Log

CORE ENVIRONMENTAL

Project Name:	**Date:**
Project Address:	**Weather:**
Field Activity:	

PERSONNEL: Name	COMPANY	TIME IN	TIME OUT

TIME	DESCRIPTION OF WORK PERFORMED

Daily Observation Log (contintuted)

CORE ENVIRONMENTAL

Page _____ of _____

Project Name:	Date:

TIME	DESCRIPTION OF WORK PERFORMED

CORE ENVIRONMENTAL CONSULTANTS
2312 Wehrle Drive
Williamsville, NY
14221
(716) 204-8054

TEST BORING LOG

BORING NO.

Project:
Client:
Contractor:

Project No.
GS Elev
WS Ref Elev
N-S Coord
E-W Coord
Start Date
Finish Date
Driller
Geologist

Groundwater Data (feet)				Equipment Data			
Date	Time	Depth	Elev		Casing	Sampler	Core
				Type	HSA	SS	HQ
				Diameter	4.25"	2.0"	3.5"
				Weight		140 #	
				Fall		30"	

Well Construction	Depth (feet)	Sample No.	Blows per 6"	N' Value	Recovery (%)	Graphic Log	Field Description	Remarks PID Reading (ppm) Direct Screen	Remarks PID Reading (ppm) Head Space
	5								
	10								
	15								
	20								
	25								
	30								

CORE ENVIRONMENTAL

WELL SAMPLING/DEVELOPMENT RECORD

Well ID: _____ **Initial Depth to Water:** _____

Sample ID: _____ **Duplicate ID:** _____ **Depth to Water After Sampling:** _____

Sample Depth: _____ **Total Depth to Well:** _____

Project Name: _____ **Well Diameter (in.)** _____

Project Address: _____ **1 Casing Volume (Gallons)** _____

Date: _____

Sampled By: _____ **Sample Time:** _____ **4 Casing Volumes (Gallons)** _____

Purge Method: _____

Sample Method: _____ **Total Casing Volumes Removed:** _____

Time	Rate (gal/min)	Cum. Vol. (gal)	Temp (°C)	pH (units)	Specific Electrical Conductivity (mS/cm)	Redox Potential mV	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Depth to Water (ft btoc)	Remarks (color and sediment)

pH CALIBRATION (choose two)			
Buffer Solution	pH 4.0	oH 7.0	pH 10.0
Field Temperature (°C)			
Instrument Reading			

SPECIFIC ELECTRICAL CONDUCTANCE - CALIBRATION			
KCL Solution (mS/cm)	4.49 at 25°C		
Field Temperature (°C)			
Instrument Reading			

REDOX CALIBRATION	DISSOLVED OXYGEN CALIBRATION
Standard Solution	Salinity %
Field Temperature (°C)	Altitude
Instrument Reading	Instrument Readin
Model or Unit No.	Model or Unit No.

Model or Unit No:

Well Diameter	Volume (gal/ft)
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

Model or Unit No:

Notes:

CORE ENVIRONMENTAL

WELL SAMPLING/DEVELOPMENT RECORD
(continued)

Well ID: ______________________ **Date:** ____________ **Project Name:** ______________________________ Page _____ of _____

Time	**Rate** (gal/min)	**Cum. Vol.** (gal)	**Temp** (°C)	**pH** (units)	**Specific Electrical Conductivity** (mS/cm)	**Redox Potential** mV	**Dissolved Oxygen** (mg/L)	**Turbidity** (NTU)	**Depth to Water** (ft btoc)	**Remarks** (color and sediment)

SAMPLE CONTROL LOG

CORE ENVIRONMENTAL

Project Name: _____ **Laboratory:** _____

Project Address: _____ **Page** _____ **of** _____

Sampling Date	Sampling Time	Sample ID	C.O.C. Number	Analyses Requested	Remarks (Duplicate, Blank info, etc.)	Date Sent to Lab
				See C.O.C.		

ATTACHMENT

ATTACHMENT A

Resumes

Alyssa Cruikshank
Environmental Scientist/ Geologist

Summary of Experience

Remedial Investigation/Feasibility Study Work Plan for the Former National Rubber Adhesives Site, Long Island City, NY – Hamil Stratten Properties, LLC:

Prepared a Remedial Investigation/ Feasibility Study (RIFS) Work Plan for the former National Rubber Adhesives Site in Long Island City, New York. Remedial Investigation activities are being performed to delineate the nature and extent of subsurface impacts potentially associated with historic site activities. In addition to determining the proper field and office activities necessary for the successful completion of the investigation, the Work Plan also included the preparation of Site-specific Quality Assurance Project Plan (QAPP), Health and Safety Plan (HASP), and Community Air Monitoring Plan (CAMP). Prepare Monthly Progress Reports for the Site to document progress of Remedial Investigation activities.

Brownfield Remedial Investigation and Remediation, Wills Building, Long Island City, NY – Wills Family Group Limited Partnership:

Environmental Scientist responsible for preparation of Scope of Work for Phase I Remedial Investigation, including the installation of soil boring and groundwater monitoring wells to delineate the nature and extent of known subsurface impacts. Prepared a Phase I Remedial Investigation Report (RIR) summarizing Site investigation activities, investigation results, and an analysis and interpretation of results. In addition, developed and prepared a Remedial Investigation Work Plan (RIWP) for additional Site investigation activities and an Interim Remedial Measure (IRM) Work Plan to address sub-slab vapor and indoor air quality issues in the on-Site building. Prepared a Citizen Participation Plan (CPP) in accordance with NYSDEC requirements. Assisted the client in completing application paperwork for admission to the New York State Brownfield Cleanup Program. Project involved consistent and continual contact with NYSDEC to achieve project goals.

Remedial Action Report and Quarterly Groundwater Monitoring Reports for Everest Scaffolding, Bronx, NY – Mendon Truck Leasing and Rental Corporation:

Prepared a Remedial Action Report (RAR) detailing field activities relating to the installation of injection wells and the injection of an oxidizing agent into the subsurface to address known petroleum-related impacts at the Site. Report detailed methods and results of the injection event. Prepare quarterly groundwater monitoring reports summarizing analytical data results and conclusions and recommendations for Site closure. The Site was granted spill closure by NYSDEC in July 2014.

Remedial Action Work Plan and Remedial Action Report for 26th Ward Water Pollution Control Plant, Brooklyn, NY – Franklin Company Contractors, New York City Department of Environmental Protection:

Environmental Scientist responsible for preparation of Remedial Action Work Plan (RAWP) for enhanced in situ aerobic bioremediation via injection of Oxygen Release Compound (ORC) to address petroleum impacts to soil and groundwater stemming from a No. 2 fuel oil tank overfill. Following completion of remedial actions, prepared a RAR for the Site which included

Experience

CORE: 1 Other: 9

Education

B.S., Environmental Science, Rensselaer Polytechnic Institute, 2004
M.S., Geology, Rensselaer Polytechnic Institute, 2005
M.A., Biological Sciences, State University of New York at Buffalo, 2012

Current Responsibilities

Ms. Cruikshank has over nine (9) years of experience in environmental consulting, including technical reporting, analytical data QA/QC and validation procedures, and extensive field experience in both soil and groundwater characterization. She is currently managing CORE's environmental fieldwork division that involves Phase I ESAs, Phase II ESIs, and Remedial Investigations.

detailed injection methods utilized during the injection event, a summary of analytical data obtained prior to and following the injection event, and conclusions and recommendations.

Phase II Limited Subsurface Investigation Work Plan for Gulf Service Station, Astoria, NY – Franklin Company Contractors:

At the request of NYSDEC, prepared a Phase II Limited Subsurface Investigation (LSI) Work Plan including soil boring installation and groundwater sample collection to delineate impacts related to a waste oil tank formerly located at the Site.

Phase II Limited Subsurface Investigation Report, for Professional Service Centers for the Handicapped – College Point, NY – Franklin Company Contractors:

Environmental Scientist responsible for preparation of Phase II Limited Subsurface Investigation (LSI) Report detailing field activities that included soil borings and groundwater sample collection. The report included a discussion of finding, analytical data summary tables, and conclusions. The Phase II was performed following a Phase I Environmental Site Assessment (ESA) for the property that indicated Recognized Environmental Conditions (RECs) related to the former uses of the Site and nearby properties.

Facility Reports and Plans, New York City, NY – Franklin Company Contractors, New York City Fire Department:

Environmental Scientist responsible for updating and finalizing Facility Spill Prevention, Control, and Countermeasures Plan (SPCC) for Petroleum Bulk Storage (PBS) and Spill Prevention Report (SPR) for Chemical Bulk Storage (CBS). The purpose of the SPR is to identify CBS deficiencies at the Site, if any, and to provide recommendations for corrective actions. The SPR and SPCC for this Facility were being issued as new documents for use by the New York City Fire Department (FDNY), the current Site owner/operator.

Facility Reports and Plans, New York City, NY - Franklin Company Contractors, New York City Department of Environmental Protection:

Responsible for updating Petroleum Bulk Storage Facility Reports and Spill Prevention, Control, and Countermeasures Plans at six New York City Department of Environmental Protection (NYCDEP) Water Pollution Control Plants under Contract 1198-PBS. The purpose of the PBS Facility Report is to identify PBS deficiencies at the Site, if any, and to provide recommendations for corrective actions. The program is part of DEP's on-going effort to inspect, test, maintain and determine the regulatory health of their PBS tanks, and ancillary equipment through testing, inspection, review, and modifications.

Lead Based Paint Inspection Services Contract, New York City, NY - NYC Housing Authority:

Report Manager responsible for the deliverables of the lead based paint inspections. Inspections are completed on housing units, common areas, and storage units in accordance with U.S. Housing and Urban Development protocols. Inspections included the use of X-Ray Fluorescence (XRF) analysis in each unit and often paint chip samples were collected and laboratory analyzed. The XRF analysis is conducted on site, using a portable LPA-1 Lead Paint Inspection System manufactured by Radiation Monitoring Devices, Inc. (RMD).

SENY Reporting for Poletti, 500MW, and Flynn Plants, Astoria, NY– New York Power Authority (NYPA):

CORE is providing State Pollution Discharge Elimination System (SPDES), Major Oil Storage Facility (MOSF), and Resource Conservation and Recovery Act (RCRA) Metals sampling services at the facilities as part of on-going environmental compliance programs. Technicians are completing sampling and laboratory analysis of groundwater, surface water and waste sampling services on a scheduled basis. Environmental Scientist responsible for preparing weekly reports of the NYPA Plant water inlet and outlet sample results.

Stormwater Pollution Prevention Plan (SWPPP) and Discharge Monitoring Reporting (DMR), Brooklyn, NY – Mendon Truck Leasing and Rental Corporation:

Environmental Scientist responsible for updating Site-specific SWPPP following a change to the State-dictated sampling frequency and schedule. Track and submit DMRs to the New York State Department of Environmental

Conservation's (NYSDEC) Bureau of Water Compliance to maintain compliance with Client's discharge permit.

Phase I Environmental Site Assessment, Williamsville, New York - SYMS Corporation:

Provided investigations and reporting for McKinley, Inc. for the SYMS building located in Williamsville, New York in Erie County. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. Completed FOIL/FOIA requests to all applicable government agencies.

Phase I Environmental Site Assessment, Buffalo, New York - Buffalo Metal Forming:

Provided investigations and reporting for Eberl Iron Works, Inc. for two properties owned by Buffalo Metal Forming located in Buffalo, New York in Erie County. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. Completed FOIL/FOIA requests to all applicable government agencies.

Phase I Environmental Site Assessment, Ellicottville, New York - Edelweiss Ski Lodge:

Provided investigations and reporting for the Edelweiss Ski Lodge properties located in Ellicottville, New York in Cattaraugus County. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. Completed FOIL/FOIA requests to all applicable government agencies.

Phase I Environmental Site Assessment, Queens, New York - Trattoria Neo:

Provided investigations and reporting for the Trattoria Neo restaurant located in Queens, New York in Queens County. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. Completed FOIL/FOIA requests to all applicable government agencies.

Phase I Environmental Site Assessment, Bronx, New York – Group Corporation:

Provided investigations and reporting for two adjacent properties on 179th Street and Bronx Park Avenue in Bronx, New York in Bronx County. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. Completed FOIL/FOIA requests to all applicable government agencies.

Phase I Environmental Site Assessments, 21 S. Ryan Street and 245 Dearborn Street, Buffalo, New York – Buffalo Urban Renewal Agency:

Provided ASTM and United States Environmental Protection Agency (USEPA) compliant Phase I Environmental Site Assessments (ESAs) for two properties in Buffalo, New York. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. Completed FOIL/FOIA requests to all applicable government agencies. The Phase I ESA for the property at 21 S. Ryan Street identified possible groundwater impacts and soil vapor intrusion issues from an upgradient dry cleaning facility that was a known point source of impacts to the subsurface. The Phase I ESA resulted in a Phase II Environmental Site Investigation (ESI) to evaluate the possibility that these impacts had migrated to the target property.

AMEC E&I – Amherst, NY and Newport Beach, CA:

Project Manager responsible for scheduling, budgeting, invoicing, and direct client interaction. Involved in technical report writing for Feasibility Studies, Quarterly Groundwater Monitoring Reports, Remedial Investigation Reports, and Work Plans.

Site Characterization at the Former Papermate Facility, Santa Monica, CA – The Gillette Company:
On-Site geologist responsible for oversight of drilling activities to determine vertical and horizontal extent of VOC and other impacts to the subsurface. Responsible for soil and groundwater sample collection. Performed construction oversight of installation and sampling of continuous multichannel tubing (CMT) and traditional groundwater wells. Interpreted and reported lithologic and hydrogeologic data collected during Site assessments, developed cross-sections, and compiled and performed QA/QC and data validation of laboratory analytical data.

MGP Remedial Investigation for the West Station Plant, Rochester, NY – Rochester Gas and Electric Corporation:
Field Investigator for the Manufactured Gas Plant Site, including soil and rock core collection and monitoring well installation. Assisted with preparation of associated Work Plans, Remedial Investigation Report, Supplemental Remedial Investigation Reports, and Feasibility Study.

Site Investigation for Property Redevelopment, New Philadelphia, OH – GE Water & Process Technology:
On-Site geologist responsible for overseeing and monitoring drilling activities to determine potential vertical and horizontal extent of impacts to the subsurface prior to property redevelopment. Responsible for lithologic logging of all soils and soil sample collection. Performed oversight of construction, installation, and sampling groundwater wells.

RCRA Corrective Action Activities for the FMC Middleport Facility, Middleport, NY – FMC Corporation:
Community Relations Liaison for an industrial client and associated environmental project, handling community complaints, preparing newsletters, updating various client-sponsored websites, coordinating stakeholder meetings, and relaying information between the client and the community.

Environmental Restoration Specialist – Edwards Air Force Base, CA – CH2MHill:
Performed quarterly groundwater sampling and prepared quarterly and annual groundwater monitoring reports for various long-term-monitoring Sites, including a CERCLA listed Site. Prepared reports in accordance with regulatory guidelines, including CERCLA, California EPA and applicable Regional Water Quality Control Boards.

Groundwater & Environmental Services, Inc. – Westford, MA:
Project Manager and field team leader responsible for field investigations, basic management of Site-related activities including arranging field schedules, preparing characterization reports, closure reports, and remedial action plans, as well as interfacing with clients and regulatory agencies. Performed additional project management duties such as technical report writing and budget/project management.

Site Investigations and Management at Multiple Locations, Massachusetts - ExxonMobil Corporation:
Field duties included Site characterization for petroleum impacts to soil, groundwater, and surface water by performing investigative drilling using hollow stem auger, direct push, cone penetrometer (CPT), and air-rotary hammer methods, lithologic logging of borings, soil and groundwater sample collection, and monitoring well installation.

Construction Oversight and Tank-Top Upgrade, Concord, MA - ExxonMobil Corporation:
Field Investigator responsible for construction oversight of contractors during operations to perform gasoline service station tank-top upgrades and underground storage tank (UST) removals.

ASTM Phase I Reporting at Multiple Locations, Rhode Island – Shell Oil Company:
Case manager responsible for performing several ASTM Phase I Site investigations for property divestment purposes, including historical records review.

Ronald Tramposch
Senior Project Manager

Summary of Experience

Fuel System Installation, Port Authority of NY-NJ:

Senior Project Manager responsible for oversight for the development of site plans and details for the installation of two (2) Petroleum Bulk Storage dispensing systems for Franklin Company Contractors at the Red Hook Container Terminal in the Bronx, NY in Nassau County. Designs included the placement of tanks, fuel dispensers, and related monitoring equipment as per the relevant New York City Codes & regulations (NEPA 30). Development of a Fire Suppression system was also included in the design.

Fuel System Upgrades, FDNY Engine Company 63, Brooklyn, NY – Galante Architecture:

Project Manager responsible for oversight during the development site plans and details for the relocation of Petroleum Bulk Storage service lines for Galante Architecture at the Engine Company 63 in Brooklyn, NY. Designs include the relocation of fill and suction lines, fuel dispenser, and utilities as per relevant New York City Codes & regulations (NEPA 30).

Health & Safety Plan, Syosset, NY – The LIRO Group:

Project Manager responsible for oversight during the development of a General Health & Safety Plan for The LIRO Group located in Syosset, NY. The plan provided guidelines for safety of LIRO employees and contractors and covered topics such as safety training, emergency action plans, job hazard analysis, means of egress, hazard communication, materials handling, and protective equipment. Also developed in the plan were examples of safety inspection checklists, noise & dust mitigation plans, a protection of traffic plan, a lockout/tagout program, and a confined space program.

Excavated Materials Disposal Plan Review, New York City – NYC School Construction Authority:

Project Manager responsible for oversight during the review of excavated materials disposal plans for accuracy to the design specifications for numerous NYC public schools. The project includes confirming analytical results, waste transporter permits, disposal facility permits, and contractor sampling plans for conformance to local NYC codes and regulations.

Asbestos, Lead and PCB Survey and Report, Buffalo Public Schools, PS 95, Buffalo, NY:

Project Manager in charge of planning, coordinating and managing the resources necessary to perform an asbestos and lead inspection of several areas within Buffalo Public School 95 for renovation work to replace several air handling units. The work included the collection and analysis of numerous bulk samples of suspected asbestos containing materials as well as the investigation of potential lead based paint surfaces. The asbestos and lead survey report prepared for this work included a summary of the materials sampled and analyzed as well as estimates of construction cost for the abatement of suspect materials.

Asbestos, Lead, and Comprehensive Environmental Consultant Services Contract, NY – NYCT MTA:

Program Manager responsible for two consecutive indefinite quantity contracts.

Experience

CORE: 10 Other: 20

Education

M.S., Environmental Science, University of New Haven, 1988
B.S., Geology, State University of New York at Buffalo, 1982

Certifications

USEPA Environmental Impact Assessment Training
OSHA Confined Space Safety Training
40 Hour OSHA Waste Site Worker Protection Training
8 Hour OSHA Supervisory Training
NYS DOL Asbestos Supervisor
NYS DOL Asbestos Inspector
NYCDEP Asbestos Investigator
NYCT Track Safety Certification

Current Responsibilities

Mr. Tramposch is a Senior Project Manager with 30 years of experience in remedial investigations, feasibility studies, underground storage tank management programs, and remedial system design. He specializes in management of large work-order based environmental investigation and remediation projects. He has managed hazardous materials projects involving lead, metals, PCBs, hazardous waste, and asbestos, with many of these assignments occurring simultaneously. He also has experience in environmental assessment, planning, supervision, and interpretation of hydrogeologic and geotechnical investigations, and report preparation for various sites including active and inactive hazardous waste sites. Mr. Tramposch is currently directing an indefinite delivery order contract for asbestos, lead, and comprehensive environmental services for New York City Transit.

Responsible for the overall management of the project ensuring all required resources were provided to meet project schedules and budgets. Additional responsibilities include the development and implementation of project quality control and assurance measures. Services included asbestos investigations and reports, development of abatement work plans, cost estimating, project coordination, and interfacing with site representatives, and project management with oversight of the abatement contractors. Project sites included operating substations, subway stations, office buildings, mechanical rooms, rail yards, bus depots, tunnels, bridges, and various other structures throughout many of NYCT's over 300 facilities throughout New York City.

Asbestos Services, Five Boroughs, NY - NYC School Construction Authority:

Project Manager responsible for oversight of the air sampling and project monitoring. He managed the surveys that included collection of bulk samples throughout the campus that included operating office buildings, mechanical rooms, and various other structures.

Asbestos Abatement Project Monitoring, Beebe Road Waterline, Wilson, NY:

Project Manager responsible for the removal and disposal of ACM waterline pipe in association with the reconstruction of Beebe Road in Wilson, NY. Mr. Tramposch was responsible for overseeing project monitors during project monitoring and air sampling in accordance with New York State Department of Transportation Standard Specification Section 210 – Removal and Disposal of Asbestos Containing Material. Mr. Tramposch oversaw the completion of a Closure Report, which included copies of daily project records, sample analytical results and waste manifests.

Asbestos Abatement Monitoring and Testing, Emery Park, Erie County Department of Public Works:

As Program Manager for our Hazardous Materials Term Agreement with Erie County for Asbestos Abatement Monitoring and Testing, Mr. Tramposch directed the collection of samples of suspect materials at Emery Park in the Richardson Lodge and Shelter, and the Stohres Lodge. Suspect materials were analyzed for asbestos using a New York State Department of Health ELAP certified laboratory and a report of Asbestos Abatement monitoring and testing was prepared.

Remedial Investigation/Feasibility Study Work Plan for the Former National Rubber Adhesives Site, Long Island City, NY – Hamil Stratten Properties, LLC:

Project Manager responsible for oversight of a Remedial Investigation/ Feasibility Study (RIFS) Work Plan for the former National Rubber Adhesives Site in Long Island City, New York. Remedial Investigation activities are being performed to delineate the nature and extent of subsurface impacts potentially associated with historic site activities. In addition to determining the proper field and office activities necessary for the successful completion of the investigation, the Work Plan also included the preparation of Site-specific Quality Assurance Project Plan (QAPP), Health and Safety Plan (HASP), and Community Air Monitoring Plan (CAMP).

Phase I Remedial Investigation Report, Remedial Investigation Work Plan, and Interim Remedial Measure Work Plan for the Wills Building, Long Island City, NY – Wills Family Group Limited Partnership:

Project Manager responsible for oversight of a Scope of Work for Phase I Remedial Investigation including the installation of soil boring and groundwater monitoring wells to delineate the nature and extent of known subsurface impacts. Oversaw the preparation of a Remedial Investigation Report (RIR) that detailed a description of Site investigation activities, investigation results, and an analysis and interpretation of results. In addition, oversaw the development of a Remedial Investigation Work Plan for additional Site investigation activities and an Interim Remedial Measure Work Plan to address sub-slab vapor and indoor air quality issues in the on-Site building.

Phase I Environmental Site Assessment, Eberl Iron Works, Buffalo, NY:

Oversaw the completion of a Phase I ESA for Eberl Iron Works for a building located on Sycamore Street in Buffalo, NY. The Phase I ESA included historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site.

SEQR Determination and Documentation Services, NOCO Energy Corp, Tonawanda, NY:
Senior Project Manager responsible for the completion of the State Environmental Quality Review (SEQR) component for NOCO for a proposed Emergency Power System at their Terminal located in Tonawanda, New York. The property was classified as a major oil storage facility (MOSF) with a capacity of over 400,000 gallons. Mr. Tramposch was responsible for preparing the SEQR evaluation, determination, documentation and municipal permitting, as well as the materials included as part of grant evaluations for NY State Dormitory Authority and Federal Emergency Management Agency (FEMA) funds.

SUNY Buffalo, Asbestos Survey & Design Services, O'Brian Hall:
Senior Project Manager responsible for the completion of an inspection for suspect asbestos-containing materials at O'Brian Hall, located on SUNY Buffalo's North Campus. The inspection included all accessible interior spaces, building envelopes, and roof areas. Collected bulk samples for laboratory analysis at suspect locations. Completed an asbestos survey report along with asbestos abatement design specifications for the removal.

SUNY Buffalo, Asbestos Project & Air Monitoring Services, Cary Hall:
Project Manager responsible for oversight during the project monitoring services at Cary Hall, located on SUNY Buffalo's North Campus. Supervised CORE's project monitors completing oversight during asbestos abatement that included floor tile and mastic, cove base, sinks, and a fume hood containing transite panels. Oversaw the completion of an Asbestos Final Project report that detailed the asbestos abatement.

Phase II Environmental Site Investigation (ESI) for 91 Sawyer Avenue, Niagara Blower Company, Tonawanda, NY:
Project Manager responsible for completion of Phase II Environmental Site Investigation (ESI) to investigate Recognized Environmental Conditions (REC's) identified in Draft Phase I Environmental Assessment (ESA). A Phase II Environmental Site Investigation was conducted and consisted of the advancement of fourteen soil borings, collection of soil samples from each boring for laboratory analysis, and the sampling and laboratory analysis of groundwater samples collected from monitoring wells at four locations (both permanent and temporary wells).

Lead Based Paint Inspection Services Contract, New York City, NY - NYC Housing Authority:
Project Manager responsible for project oversight of all lead based paint inspections. Inspections were completed on housing units, common areas, and storage units in accordance with U.S. Housing and Urban Development protocols. Inspections included the use of X-Ray Fluorescence (XRF) analysis in each unit and often paint chip samples were collected and laboratory analyzed. The XRF analysis is conducted on site, using a portable LPA-1 Lead Paint Inspection System manufactured by Radiation Monitoring Devices, Inc. (RMD).

Mother Clara Hale Bus Depot Replacement, New York City, NY Franklin Company Contractors / NYCT MTA:
Project Manager responsible for overseeing an experienced scientist to initially direct the contractor in segregating excavated soils according to total organic vapor (TOV) content with a photo-ionization detector. The work was completed in 20' x 20' cells. The soil was stabilized by open pit mixing with a fly ash and grout mix that was previously pilot tested. The stabilization was verified by wet sampling from specific intervals. Responsible for the review of all project deliverables.

Petroleum Monitoring Reporting Services Contract, New York City, NY NYC Housing Authority:
Project Manager responsible for project oversight of the Quarterly Petroleum Remediation Monitoring Reports at 27 Housing Development Sites that have groundwater contamination resulting from petroleum releases from fuel oil tanks. The purpose of the report is to summarize petroleum remediation activities performed on site, describe the current status, and provide an analysis of current remediation system effectiveness with further recommendation.

Site Investigation and Remediation, Lewiston, NY - NYPA:

Completed the project management for a site remediation and investigation project at a vacant site impacted with No. 2 fuel oil. The site had formerly contained a building and operated as a construction staging area for the Niagara Power Project. Included In house completion of manual product recovery from monitoring wells, a geophysical survey with anomalies located utilizing a Global Positioning System (GPS), a drilling investigation that included rock coring and monitoring well installation and soil and groundwater screening and sampling. All waste streams were characterized for treatment and/or disposal and a comprehensive report was completed.

UST Management Program, NY – NY City Transit (NYCT) Metropolitan Transportation Agency:

Project Manager responsible for this program involving site assessments, remedial investigation, feasibility studies, remedial design, and remedial action oversight services for the New York City Transit Underground Storage Tank (UST) Management Program. Activities include tank tightness testing, remedial investigations and remediation recommendations, design overview and technical inspection for tank replacement and installation. The USTs were located in all five boroughs of New York City, encompassing 350 tanks at 27 facilities. They ranged in size from 200 gallons to 35,000 gallons, were generally single walled, and were up to 52 years in age. The tanks contained petroleum products such as gasoline, diesel fuel, lube oil, fuel oil, and waste oil. A comprehensive database and GIS system was developed for UST management.

Remediation System Services, New York City, NY - Franklin Co.:

Project Manager for providing remediation system operation and maintenance, monitoring and reporting services at 14 sites in the five boroughs of New York City. Developed and implemented site specific investigations to evaluate the extent and migration of contamination in soil and groundwater. In-depth evaluations of soil and groundwater contamination along with pilot study data and recommendations for remediation were completed. Core personnel prepared the design drawings and specifications for the selected remedial approach. Manager for providing construction monitoring and inspection services during system installation, startup and initial troubleshooting.

Facility Reports, Plans and Drawings, New York City, NY - Franklin Company Contractors, NYC Department of Environmental Protection:

Project Manager responsible for overseeing the preparation of Petroleum Bulk Storage (PBS) Facility Reports, As-Built Drawings of tanks and Spill Prevention, Control, and Countermeasures Plans (SPCC) at 24 New York City Department of Environmental Protection (DEP) Water Pollution Control Plants and Pumping Stations under Contract 1198-PBS. The purpose of the PBS Facility Report is to identify PBS deficiencies at the site, if any, and provide recommendations for corrective actions. The program is part of DEP's on-going effort to inspect, test, maintain and determine the regulatory health of their PBS tanks, and ancillary equipment through testing, inspection, review, and modifications. As-built drawings were produced from record drawings and field inspections in order to satisfy the requirements of New York State PBS regulations. The drawings and plans were reviewed and approved by the Project Manager prior to submission to the client the NYC DEP.

Waste Auditor:

Performed the compliance auditing of eight (8) hazardous waste management facilities and Waste Accumulation Areas (WAAs) for compliance with EPA and NYSDEC policies. Waste included: hazardous, radioactive (high and low level), and mixed.

JFK IA Terminal 5 Redevelopment, Queens, NY - Turner Construction Corp.:

Project Manager for completing the field monitoring and oversight of the JFK International Airport Terminal 5 Redevelopment Project. The project area, approximately 67 acres, required work area air monitoring throughout the excavation program. As the project air monitoring consultant, Core was responsible for conducting NYSDOL and OSHA compliance monitoring. Core performed continuous air monitoring during excavation of the hydrant fueling lines. A photo-ionization detector (PID) and an explosimeter were used to document site conditions for worker Health and Safety monitoring. Air monitoring equipment was calibrated daily and all data including meteorological data (e.g., temperature range, wind speed, wind direction, etc.) was recorded. He supervised the

Asbestos Project Air monitoring consultant during abatement and completed the QA/QC of daily reports.

Warehouse Demolition/ Remediation, JFK IA, Queens, NY - JetBlue Airways:

Principal in Charge for the site investigation and design for the demolition of four large warehouse and maintenance facilities at JFK International Airport. He provided field support and prepared site investigation reports for the remediation of hazardous materials and asbestos. He supervised the preparation of drawings and specifications for the removal of asbestos, USTs, drummed wastes (PCBs and CFCs).

JetBlue Airways, JFK IA, Queens, NY:

Project Manager for completing a Spill Prevention Controls and Countermeasures Plan at John J. Kennedy International Airport Building 74 Ground Service Equipment (GSE) Maintenance Building. For JetBlue, he managed the preparation of a SPCC Plan, in writing, and in accordance with 40 CFR Part 112.7, and any other applicable section of Part 112 – Oil Pollution Prevention (40 CFR Part 112.8). Petroleum Bulk Storage at Building 74 GSE the facility is in one (1) aboveground storage tank (AST) and numerous 55-gallon capacity drums.

Logan International Airport, Boston, MA - JetBlue Airways:

Project Manager for completing the SWPPP at the Logan Station after Massachusetts switched to a multi sector general permit. Completed the project Quality Assurance and Quality Control (QA/QC) review for site specific SWPPPs for an expanding airline at international airports. Tasks included confirmation of site drainage, outfalls, permits and airport Best Management Practices (BMPs) as well as the overall review of all report submittals, which included reports, inspection forms, drawings, figures, BMPs, flow charts, and spill report procedures.

Habitat Restoration Project at Calvert Vaux Park (formerly Dreier-Offerman Park), Brooklyn, NY:

This project included the construction of aquatic and coastal upland habitats, wetland restoration, and trail construction. The project also involved the removal of 3.2 acres of contaminated soil. Mr. Tramposch was the Program Manager responsible for air monitoring services in relation to the removal of contaminated soil. Core monitored upwind and downwind areas of excavation work to ensure that dust concentrations did not exceed New York State Department of Environmental Conservation (NYSDEC) regulations [TAGM 4031]. Mr. Tramposch also completed the Site Specific Health and Safety Plan for environmental monitoring and weekly SPDES inspections. All Qualified Inspectors have received four (4) hours of training endorsed by the NYSDEC from a Soil and Water Conservation District and on-the-job training to follow the appropriate New York State standards, specifications, permits and manuals as part of the job.

Phase II ESAs, Queens, NY, Countrywide Commercial Real Estate:

Project Manager responsible for Phase II (ESAs) for the properties to investigate the concerns determined during the Phase I activities. Core completed soil borings and temporary monitoring well installations to evaluate site soils and groundwater samples from the sites. ESA reports were prepared presenting the approach, methods, results, and interpretations of the data as well as recommendations, conclusions and an opinion on further action.

Incinerator/Garage Demolition, NY - NYCDOS:

Project Director which included a detailed site investigation for asbestos / hazardous materials. and a structural evaluation in preparation of demolition design documents and specifications. Responsible for coordinating field work and for preparing drawing and specifications for asbestos, lead paint, mercury containing equipment, PCB-bearing equipment, residual ash, USTs, contaminated soil/groundwater and metals contaminated building components.

Varick Avenue Redevelopment, NY - NYCDOS:

Principal in Charge for the subsurface environmental investigation for large property being redeveloped for use by NYCDOS. Investigation included over 80 soil borings for delineation of contamination. His investigation work saved the owner from extensive costs and his RI/Site Remediation Plan was cited for excellence by the Chief of NYSDEC's Regional Hazardous Waste Program.

UST Program, NY – Dormitory Authority of the State of NY (DASNY):
Project Manager for the Authority's Program to upgrade, replace, add/or close 28 underground storage tanks at various City of New York Campuses in order to comply with Federal, State, and Local regulations regarding storage of petroleum products. The project included heating oil and emergency generator underground storage tanks ranging in size from 280 to 48,000 gallons.

New York Bus Service, NY:
Project Manager responsible for the design of a 1,000 cfm multi phase extraction system for the removal and treatment of free product, soil vapor and groundwater contamination. Negotiated a Stipulation Agreement with NYSDEC to allow discharge of treated groundwater to the Hutchinson River.

UST Program, NJ - NJ Department of Treasury:
Project Manager responsible for the statewide underground storage tank program consisting of 281 facilities with approximately 1,369 tanks. Project included pre-design investigations, site assessments, tank tightness testing, and soil borings. Responsible for preparation of conceptual design documents and construction staging plans for the upgrade, replacement, and closure at each facility. Project included a motor fuel consolidation study consisting of 229 sites and 458 fuel tanks.

UST Program, NY – NYC Department of Design and Construction (DDC):
Project Manager for this program, which included the design, construction inspection, and environmental investigation of 225 facilities for the Department of Design and Construction. He was responsible for preparing construction plans and specifications for the installation of 250 tanks.

Stormwater Pollution Prevention Plans, Multiple Cites, U.S. and U.S. Territories - JetBlue Airways:
Project Manager for completing SWPPPs at 48 Locations in the U.S. and U.S. Territories. Completed the project Quality Assurance and Quality Control (QA/QC) review for site specific SWPPPs for an expanding airline at international airports. Tasks included confirmation of site drainage, outfalls, permits and airport BMPs as well as the overall review of all report submittals, which included reports, inspection forms, drawings, figures, BMPs, flow charts, and spill report procedures.

Asbestos and Lead Paint Consulting Services - PA of NY&NJ:
Principal for asbestos air and project monitoring services at various PA facilities. Project included surveying, bulk sampling, reporting, tracking of materials/ quantities, compliance monitoring, daily record-keeping of all contractor activities, and reporting.

Mendon Truck Leasing, NY:
Project Manager responsible for the investigation of a petroleum spill and the pilot testing of a 600 cfm multi phase extraction system for the removal and treatment of free product, soil vapor and groundwater contamination. The system designed utilizes a medium vacuum liquid ring pump manifolded to 14 recovery wells to recover the free product, groundwater, and soil vapor. Additional duties included system operation, maintenance, and compliance monitoring/reporting.

Stuyvesant Cove Park, NY:
Principal-in-Charge for the investigation, remediation, and redevelopment of a 20-acre brownfields site in Manhattan. This former industrial site was contaminated with petroleum products, PCBs, and metals. He provided an accelerated site investigation and remedial design within six months of the work assignment. His leadership provided design-build services and remedial system construction, operation, and maintenance.

Asbestos and Lead Monitoring and Design Services Contract, New York City, NY – NYCT MTA:
Senior Project Manager responsible for the indefinite quantity contract (CM-1320). Responsible for the general day to day management of the project ensuring resources are available to meet project demands, schedules and budgets. Responsibilities include the implementation of project quality control and assurance measures including

corrective actions. Services provided include lead inspections, lead based paint removal project oversight, waste determination and manifest tracking. Asbestos services include surveys, abatement designs and work plans, cost estimating, project coordination, project and air monitoring, project reporting and oversight of the abatement contractors.

U.S. Air Force - Loring Air Force Base, ME:

Design Task Manager for $1.4 million study for free product recovery at the base fire training area. Design elements include 300 gal/min groundwater treatment facility, blast fractured trench for product recovery, PLC remote monitoring and groundwater and plume modeling.

Asbestos Consulting Services, Bronx, Brooklyn, Queens and Staten Island, NY - Restored Homes HDFC:

Project Manager responsible for assigning personnel, quality assurance and project deliverables. Core reviewed third-party lead-based paint (LBP) inspection reports, dust wipe analysis and determined the existence and presence of ACMs through surveys specific to areas scheduled for renovation. Also identified ACM, LBP and lead dust to determine what actions are necessary to treat, remediate, abate, enclose, encapsulate, remove or otherwise control such contaminants. Core also provided all design services necessary for the treatment, removal or abatement of ACMs and LBP.

Lead and Asbestos Services, Five Boroughs, NY - Mendon Truck Leasing:

Project Manager responsible for the completion of the project to ensure scope of work is executed and the contract documents are adhered to and all appropriate standards are followed. Project included inspection services for lead and asbestos at buildings throughout New York City in support of facility design and future abatement, encapsulation and construction activities. Complete lead and asbestos investigative surveys, inspections, sampling and abatement design. Project reporting with chain of custodies, laboratory analysis and photographs was completed. Core also completed data management with a project information database. Project involves inspection services for lead and asbestos at buildings throughout New York City in support of facility design and future abatement, encapsulation and construction activities of 26 buildings and properties.

Kirkman Boulevard Site, NJ:

Task Manager for the investigation of the ACIA hazardous waste site in Atlantic City, New Jersey. The property had a long history of manufactured gas plant (MGP) use and the investigations were conducted in support of redevelopment of the property into a rail terminal and convention center. Responsible for monitoring well construction, soil drilling, data interpretation, and report preparation. The report included plans for managing contaminated soil and groundwater as well plans for long-term monitoring at the site.

Karlsberger Architecture, P.C. - Various Sites:

Principal-in-Charge for site investigations and property evaluations for building design and construction specifications at various development sites in New York City. The investigations included reviews of site historical information from Sanborn maps and state/federal database searches as well as subsurface investigations to characterize soil and groundwater quality. Mr. Tramposch identified one of the properties as the former Brooklyn Union Gas Flatbush Works manufactured gas plant (MGP) and MGP contaminants were identified.

GM Plant Decommissioning, Clark, NJ:

Task Manager for a site previously used as an automobile assembly plant in Clark, New Jersey. Responsible for delineation of contamination and interpretation of hydrogeologic, geologic, and geotechnical data; and supervision of shallow and deep monitoring well construction. Evaluated 25 underground storage tanks for compliance with NJDEP/USEPA requirements. The project also included determination of soil remediation or reuse options and the development of remedial plans in accordance with NJDEP requirements.

GM Plant Decommissioning Study, Trenton, NJ:

Project Manager for a NJDEP ISRA plant closure investigation which included a complete facility assessment with environmental sampling to identify potential environmental concerns. Project scope involved the

investigation of PCB transformers, wastewater treatment equipment, RCRA storage areas, waste treatment tanks, USTs, ASTs, process equipment and potential asbestos-containing materials throughout the plant. Soil and groundwater contaminant levels were compared to NJDEP standards to determine cleanup requirements for site soil and groundwater.

Federal Deposit Insurance Corporation (FDIC), MA:

Project Engineer responsible for performing environmental assessments of several properties to identify environmental concerns relating to property transfer. Assessments involved site walkover inspections and file reviews for the identification of asbestos containing materials as well as lead based paint.

USAF Plattsburgh AFB, NY:

Task Leader responsible for oversight of field work including groundwater, soil, and sediments sampling; developing geologic interpretations; and assisting in report preparation for several assignments of this Indefinite Delivery Type Contract for the U.S. Air Force.

Sheila Ransbottom, PE
Vice President of Engineering Services

Summary of Experience

Lead and Asbestos Monitoring and Design Services Contract, NY – NYC Transit Authority MTA (March 2014 to Present):

Professional Engineer responsible for overall management of the survey and design drawings and reports. Services include QA/QC and review of all design documents. Ms. Ransbottom is the engineer on staff responsible for stamping all drawings. Project sites include operating substations, subway stations, office buildings, mechanical rooms, rail yards, bus depots, tunnels, bridges, manholes and other structures.

New York Power Authority, City of Buffalo Energy Master Plan (Wendel Energy Services), Buffalo, NY (Jan. 2014 – June 2014):

CORE acted as subconsultant to Wendel Energy Services to provide information regarding an Energy Master Plan for the City of Buffalo. The Master Plan will plan and coordinate strategies to improve energy efficiency that will support economic growth, create jobs, and serve the residents of New York State. Ms. Ransbottom was Project Manager responsible for the oversight of data collection, analysis, and development of recommendations for improved coordination and planning efforts between governmental departments, non-governmental agencies, and utility companies. She reviewed energy purchasing processes and strategies, analysis of future energy requirements, and recommendations for energy procurement strategies.

Various Asbestos Design Certifications, Various Firms, Buffalo, NY (Jan. 2014 to Present):

Professional Engineer responsible for oversight and approval of asbestos investigations and reports, and development of abatement work plans for various Dormitory Authority of the State of NY (DASNY), State University Construction Fund (SUCF) and NY State Office of General Services (OGS) building projects. CORE is typically a subconsultant to an architect or engineering firm for this work. Ms. Ransbottom has completed certifications for various local firms including Sienna Environmental Technologies, Trautman Associates, Mach Architecture, and Architectural Resources. Examples of projects include design certifications for various SUNY school buildings (including Albany, Buffalo, Fredonia, Oswego, Plattsburgh, and Purchase) and for various local primary and secondary schools. Ms. Ransbottom has also completed design certification for the NYS Office for People with Developmental Disabilities (OPWDD) Fire Safety Improvements & Associated Asbestos & Hazardous Materials Abatement Program.

Phase I Environmental Site Assessment, Wills Building, Long Island City, NY, Rockrose Development Corp. (October 2014):

Project Manager responsible for completion of Phase I Environmental Site Assessment (ESA) at the Wills Building in New York City. Phase I ESA was performed to identify recognized environmental conditions (RECs), historical recognized environmental conditions (HRECs), controlled recognized environmental conditions (CRECs), and/or potential environmental concerns (PECs). The Phase I ESA identified RECs and a PEC in connection with the target property, and multiple RECs, CRECs, and PECs in connection with adjacent/nearby properties.

Experience

CORE: 1 Other: 19

Education

B.S. Civil Engineering, University of Pittsburgh, 1993

Professional Registration

New York State Licensed Professional Engineer

Certifications

NYSDOL Asbestos Project Designer

Current Responsibilities

Ms. Ransbottom has 20 years professional experience in Civil / Site / Transportation engineering. Ms. Ransbottom has extensive experience working with various state agencies (NYSDOT, NYS Thruway, NYSDEC, NYPA) and several local counties and municipalities. She is experienced in managing and coordinating the planning, design, and construction phases of a variety of project types including transportation and roadway projects, civil/site projects and various studies (corridor, traffic, feasibility, environmental).

Brownfield Remedial Investigation and Remediation, Wills Building, Long Island City, NY, Wills Family Group Limited Partnership (June 2014 to Present):

Professional Engineer responsible for review and approval of Phase I Remedial Investigation (including installation of soil boring and groundwater monitoring wells), Remedial Investigation Work Plan (RIWP) for additional Site investigation activities and an Interim Remedial Measure (IRM) Work Plan to address sub-slab vapor and indoor air quality issues in the on-Site building. Responsible for review of application paperwork for admission to the New York State Brownfield Cleanup Program. Also responsible for review of design plans for installation of a sub-slab depressurization system.

Stormwater Pollution Prevention Programs, Zaepfel Development Corp., Williamsville, NY (Jan. 2014 to April 2014):

Professional Engineer responsible for the oversight and QA/QC for SWPPP inspections of the Remmington Woods Apartments and the PHH Office Building construction projects in Williamsville, NY, Erie County. Monthly inspections, inspection reports, and monthly, quarterly, and yearly summaries of inspections for both properties were required.

Fuel System Installation, Port Authority of NY-NJ, Red Hook Container Terminal, Bronx, NY (Jan. 2014 to Present):

Project Manager responsible for the development of site plans and details for the installation of a Petroleum Bulk Storage dispensing system at the Red Hook Container Terminal in Bronx, NY. Designs include the placement of tanks, fuel dispensers, and related monitoring equipment as per the relevant New York City Codes & regulations (NEPA 30). Development of a Fire Suppression system is also included in the design.

Fuel System Installation, 362 Kingsland Ave, Brooklyn, NY, Mendon Trucking and Leasing (May 2014 to Present):

Professional Engineer responsible for review and approval of site plans and details for the installation of a Petroleum Bulk Storage dispensing system at Mendon Trucking & Leasing in Brooklyn, NY. Designs include the placement of tanks, fuel dispensers, employee kiosk, a light pole, and associated monitoring equipment as per relevant New York City Codes & regulations (NEPA 30).

Oil/Water Separation Engineering Report, 360 Kingsland Ave, Brooklyn, NY, ESF Transport Inc. (April 2014 to May 2014):

Professional Engineer responsible for completion of Engineering report for ESF Transport located in Brooklyn, NY. The report detailed and provided cost estimates for three (3) alternatives to remediate oil/water contamination leaving the facility through the municipal storm water system. Engineering analysis of local hydrology and unique conditions of the site were performed and used to develop alternatives that gave flexibility to the client while conforming to the SPDES permit.

Health & Safety Plan, The LIRO Group, Syosset, NY (Jan. 2014):

Project Manager responsible for the development of a General Health & Safety Plan for The LIRO Group located in Syosset, NY. The plan provides guidelines for safety of LIRO employees and contractors and covers topics such as safety training, emergency action plans, job hazard analysis, means of egress, hazard communication, materials handling, and protective equipment. The plan includes examples of safety inspection checklists, noise & dust mitigation plans, maintenance and protection of traffic plan, lockout/tagout program, and confined space program.

Phase I Environmental Site Assessments, 21 S. Ryan Street and 245 Dearborn Street, Buffalo, NY – Buffalo Urban Renewal Agency (September 2014):

Project Manager responsible for completion of Phase I Environmental Site Assessments (ESAs) for two properties in Buffalo, NY. Phase I ESA for the property at 21 S. Ryan Street identified possible groundwater impacts and soil vapor intrusion issues from an upgradient dry cleaning facility that was a known point source of impacts to the subsurface. The Phase I ESA resulted in a Phase II Environmental Site Investigation (ESI) to

evaluate the possibility that these impacts had migrated to the target property.

NYC School Construction Authority (SCA) Environmental Consulting Survey, Design, Project/Air Monitoring, and Sample Analysis Services to Industrial and Environmental Hygiene Division (Contract No. C000012710) (September 2014 to Present):

Professional Engineer responsible for review and approval of asbestos surveys, design, abatement monitoring, and final reports. Surveys include collection of bulk samples throughout campuses including operating office buildings, mechanical rooms, and various other structures.

NYC School Construction Authority (SCA) Industrial & Environmental Hygiene Consulting Services in Connection with Hazardous Materials (Contract No. C000013006) (March 2014 to Present):

Professional Engineer responsible for oversight and QA/QC regarding reviews of Excavated Material Disposal Plans (EMDP) submitted by contractors for various NYC Schools projects. The EMDP's are reviewed against Earthwork specifications and templates. Reviews include the EMDP, as well as Site plans, Sample Characterization plans, Health and Safety Plans, and sample analytics.

Diesel Exhaust Fluid Dispensing System, Ryder Truck Rental Inc. (Feb. 2014):

Professional Engineer responsible for reviewing and approving site plans & details for the installation of a 1000 gallon enclosed aboveground diesel exhaust fluid (DEF) dispensing system for Ryder Truck Rental Inc. at the Farmingdale, NY facility in Suffolk County. Ms. Ransbottom oversaw engineering and administrative support to Ryder to expedite the tank registration process with the Town of Babylon and Suffolk County.

Asbestos, Lead and PCB Abatement Design, Buffalo Public Schools, PS 95, Buffalo, NY (Jan. 2014 to October 2014):

Professional Engineer responsible for completing Hazardous Materials Abatement design drawings and specifications to document locations and methods of removals for abatement contractor bidding purposes. Design followed inspection and survey of several areas within Buffalo Public School 95 for renovation work to replace several air handling units.

Construction Inspection, Westmont Ridge Development project, Ellicottville, NY (2013):

Ms. Ransbottom performed construction inspection for the $22 million, multi-phase Westmont Ridge Development project at Holimont Ski Resort. The project included construction of several roadways and utilities to ultimately serve a total build out of 94 ski in/ski out residential properties and 72 condominiums. Ms. Ransbottom coordinated directly with the contractors (Northrup Construction and Coldsprings Construction) on a daily basis to ensure the project was built to the design plans and specifications. In addition to new roadway construction, the project included new water and sewer lines, storm drainage and large culverts, and retention ponds.

NYS Department of Transportation (DOT), Reconstruction of Main Street, Village of East Aurora, NY (2004 to 2007):

Project Manager for this project to reconstruct approximately 2 km of US 20A/NY16/NY78, Main Street, between the Traffic circle and the East Village Line. The project included Right of Way mapping, grading and drainage design, utility coordination, traffic signage/markings, street lighting, landscaping, pavement design, and maintenance of traffic. Also included design of a roundabout to replace the existing traffic circle and evaluate design options for additional roundabouts in the project area. A coordinated traffic signal system was designed in order to improve traffic flow through the corridor. Context Sensitive Design principles were used to develop a design to meet transportation needs as well as the needs of the community. Project also included a video survey of the existing drainage system and obtaining of oblique aerial photographs from a helicopter. This project included considerable public involvement and Public Meetings. Ms. Ransbottom developed and maintained both a project newsletter and project website to provide information regarding this high profile project. She was the lynchpin between the numerous stakeholders, including the Village Reconstruction Task Force, the driving force behind the project. She met with the Village Task Force every two weeks for the four-year duration of the design. Ms.

Ransbottom's commitment to communication and organization between the task force and all other stakeholders, such as SHPO, NYSDOT, and NYSDEC, kept the project on schedule and moving smoothly.

City of Buffalo Department of Public Works, Reconstruction of Main Street, Buffalo, NY (2000 to 2002):

Project Manager/Senior Transportation Engineer for this locally administered, federally aided project to reconstruct Main Street from Bailey Avenue (US62) to the Scajaquada Expressway (NY198). Ms. Ransbottom was involved in the project from preliminary design to beginning of construction. Preliminary design included preparation of Design Report, highway capacity analyses, accident investigations, subsurface testing, bridge inspections, development projections, utility research, historical investigations, and bike route analyses. Final design included pavement replacement, widening and intersection re-alignment, drainage improvements, utility relocations, new traffic signals, bridge rehabilitation, maintenance of traffic plan, street signage/markings, and street lighting. The project required coordination with numerous federal, state, local, and private agencies, groups, and utilities. This project required numerous public meetings to keep the public informed of project progress. As project manager, Ms. Ransbottom went door to door to meet and coordinate with business owners. Since their businesses would be affected the most by the reconstruction of Main Street, she made sure the design included accommodations for temporary parking and maintaining pedestrian traffic during construction.

City of Buffalo Department of Public Works, Reconstruction of Elmwood Avenue in Buffalo NY:

Project Manager for this project to reconstruct nearly 1 mile of roadway along Elmwood and Forest Avenues. Project included preparation of Design Report, many design alternatives (including roundabouts), separating storm sewer from combined storm/sanitary system, accident analyses, capacity analyses, soil and pavement evaluation, utility coordination, traffic signage, street lighting, landscaping, and maintenance and protection of traffic. The design utilized Context sensitive design solutions and included a coordinated traffic signal system and City gateway features. The project area included Buffalo State College, Buffalo Psychiatric Center, Albright Knox Art Gallery, Buffalo Olmsted Parks and the Elmwood commercial strip. Ms. Ransbottom was responsible for coordinating with and obtaining agreement between several groups including the State Historic Preservation Office (SHPO), the City of Buffalo, NYSDOT, and a very active community task force. Her innovative design options were the key to getting consensus on the design of the project. She provided design alternatives that included safe and efficient operation for vehicles, bicycles, and pedestrians in this unique City neighborhood.

Greater Buffalo Niagara Regional Transportation Council (GBNTRC), Traffic Signal Optimization Project (2011 to 2012):

Project Manager for this $400k project to develop and implement cost effective traffic signal timing and coordination plans for 6 major corridors in the Buffalo area (142 signals) to reduce travel times and emissions. The project provided significant traffic flow improvements to the corridors with yearly benefits of over $1M in reduced travel time, stops, and gas consumption. City of Buffalo corridors included Clinton St. and Elmwood Ave. Traffic volume counts and geometric data were inventoried to develop coordination timings for each of the systems using the latest Synchro software. The resulting Synchro traffic models were used to manage and maintain the Owner's traffic network and provide a database for volumes, lane geometry, signal timing and phasing, and system coordination and offsets. Ms. Ransbottom also coordinated with the City of Buffalo Signal Dept. to assist with implementing new timings and phasings manually in the signal controllers.

City of Buffalo Department of Public Works, Curb and Sidewalk Project, Buffalo, NY:

Project Manager responsible for this $400,000 Locally Administered Federally Funded stimulus project for the City of Buffalo. Because it was a stimulus (ARA) project, it had a fast-paced design schedule (only 9 weeks). Project included curb and sidewalk replacement and curb ramp reconstruction to ADA standards on eight City streets. The project was closely coordinated with a separate project to mill/overlay the same eight City streets. Ms. Ransbottom's ability to provide a meticulous paperwork trail from design through construction assisted the City through two successful FHWA stimulus audits.

City of Buffalo Department of Public Works, Seneca Street Streetscape, Buffalo, NY:

Project Manager responsible for this $1 million Locally Administered Federal Funded project in the City of Buffalo. This was a streetscape project on Seneca Street from Hayden Street to Indian Church Road (approx. 1 mile), and included mill and overlay of the pavement, curb and sidewalk replacement, ADA compliant curb ramps, and traffic signal improvements at two intersections. This project also incorporated performing a traffic signal coordination / optimization study for the entire length of Seneca St. from Michigan Avenue to the City Line.

Greater Buffalo Niagara Regional Transportation Council (GBNTRC), Feasibility Study for Accommodating Motor Vehicles within the Pedestrian Mall on Main Street, Buffalo, NY:

Project Engineer responsible for compiling this study in conjunction with the City of Buffalo, NFTA, GBNRTC and Buffalo Place. Ms. Ransbottom attended numerous meetings with the project team in an effort to develop the feasibility study, which ultimately moved this important project in the City forward. The study included a matrix of numerous feasible options, photo simulations, and costs associated with all options.

Erie County Department of Environment and Planning, Black Rock Canal Park Feasibility Study, Buffalo, NY (2010):

Project Manager for this project as subconsultant to a Landscape Architect. Responsibilities included topographic and boundary surveys of a series of connected Erie County-owned waterfront parks. The study was to determine possible future development in the parks. Project included inspection of the Black Rock Canal park interlocked steel sheet-pile cantilevered retaining wall approximately 2200' in length. The inspection was conducted above water using a boat and walking along the top. Also prepared sketches and preliminary costs for a cantilevered walkway for a new pedestrian bridge over Cornelius Creek.

Erie County Department of Public Works, Maple Road Reconstruction Project (Flint Road to Niagara Falls Blvd), Amherst, NY:

Project Manager for this project as subconsultant to Prime consultant. Project included widening of shoulders along Maple Road, adding turning lanes to assist capacity issues, improved drainage systems, and replacement of guide rails. Project also included reconstruction of North Bailey Avenue between Maple and Romney Road including left turning lanes to alleviate traffic conditions and replacement of existing drainage system. Responsibilities included traffic analyses and capacity analyses in coordination with replacement of all traffic signals along Maple and North Bailey, a new signal at the intersection of Bowmart and North Bailey, and new sidewalks with handicap ramps and pedestrian signals.

Cattaraugus County Department of Public Works, St. Bonaventure University Access Improvements Project, Allegany, NY (2008 to 2010):

Project Manager for this $2M project that included several improvements at St. Bonaventure University (a private campus). Improvements included the design of a new multi-use trail, reconstruction, and realignment of several campus roadways; construction of a new campus access road; redesign of an existing 5-way intersection; stormwater treatment (bioretention), amenities and signage; and a new public safety/restroom building. Project included topographic survey/mapping, ROW mapping, Environmental Assessment, civil/site and structural design of the new building, and construction support/inspection. Ms. Ransbottom effectively coordinated and resolved environmental issues associated with wetland impacts, contaminated soils, floodplain encroachment, utility relocations, and impacts to historically sensitive areas.

Cattaraugus Country Department of Public Works, Replacement of Little Valley Bridge #15 - North Ninth Street over Little Valley Creek:

This project replaced a deficient 30 ft. span highway bridge and an adjacent trail bridge over the Little Valley Creek. Both structures were replaced with a two-cell reinforced precast concrete box structure. The channel is on a curved and skewed alignment that required a structure design, which was curved through the site. Wingwalls were also precast, and the trail was extended over the upstream side of the bridge. As Project Engineer, Ms. Ransbottom was responsible for highway design, MPT, and design report preparation.

Village of East Aurora, NY, Landscaping and Scenic Beautification Project, East Aurora, NY:

Project Manager for this $1M Transportation Enhancement Program (TEP) project in the Village. The project was locally administrated and federally funded. Project included new directional signage within the Central Business District, new Village boundary signs, and improvements to alleyways in downtown area with new signage, landscaping, and lighting. Project also included extensive restoration of pedestrian pathways and parking areas on the National Historic Landmark Roycroft campus. This project was designed in close coordination with another of Ms. Ransbottom's projects to install drainage on the Roycroft campus, which previously had no storm drainage system. The National Historic Landmark status necessitated extensive coordination with the State Historic Preservation Office (SHPO). Ms. Ransbottom coordinated the Environmental Assessment for both projects on the campus, which included a month-long Phase III Archaeological Data Recovery phase.

Roycroft Campus Corporation (RCC), Roycroft Campus Drainage Project:

Project Manager for drainage improvements on the Roycroft Campus, a recognized National Historic Landmark, which lacked storm water collection and flooded frequently. Mrs. Ransbottom also guided the Campus through extensive reviews by the State Historic Preservation Office.

City of Tonawanda NY, Delaware Street Rehabilitation:

Transportation Engineer responsible for writing Draft Expanded Project Proposal (EPP) for the select reconstruction and general rehabilitation of Route 384, Delaware Street, a locally administered, federally aided project. Provided pavement evaluation, horizontal and vertical alignment analysis, drainage analysis, replacement of sidewalks, driveway aprons and curbs, intersection improvements, right-of-way analysis, traffic volumes, non-standard features, safety considerations and alternative lane configurations. Analyzed traffic counts, signal phasing and existing conditions at all signalized intersections and used Highway Capacity Manual methodology and Highway Capacity Software to determine a LOS at these intersections and examine the need for improvements. Coordinated presentations to and feedback from the client.

New York State Department of Transportation (NYSDOT), Hamburg, NY:

Project Engineer responsible for the Route 75 reconstruction and widening included pavement widening design, pavement full-depth reconstruction design, intersection design, closed drainage system design, curb design, sidewalk design, waterline design and tabulation, performed vertical geometric design calculations, and horizontal geometry calculations to determine proposed curb locations.

NYSDOT, Towns of Clarence and Newstead, NY:

Project Engineer responsible for the reconstruction of Route 5 (Main Street). The project included writing pre-draft and Draft Design Report/Environmental Assessment for project involving rehabilitation, widening, intersection design, closed-drainage system design, traffic operations analysis, reconstruction through an historic business district, installation of new traffic control devices (signs and signals), left and center turn lane analyses, curb and sidewalk design, and replacement of two box culverts. Performed horizontal and vertical geometric design, driveway analysis, preliminary Right-of-way analysis, and coordination with utility owners.

NYSDOT, Town of Newfane, NY:

Project Engineer responsible for minor widening, intersection improvements, open and closed drainage system analyses, and traffic analysis of signalized intersections for the Route 78 rehabilitation and reconstruction, Lockport-Olcott Road. Wrote Design Reports that included descriptions of existing speeds and delay, traffic volumes, Level of Service (LOS), non-standard features and safety considerations. Performed horizontal and vertical geometric design, super elevation design, intersection design, left turn lane analysis, driveway design, curb and sidewalk design, preliminary Right-of-way analysis, tree analysis, pavement reconstruction and widening design and design of drainage systems. Prepared public hearing materials, including script, slides, and brochure; coordinated preparation of take-line meeting materials such as colored plans and cross sections; prepared and reviewed individual take maps. Assisted in development of Right-of-Way plan. Wrote Final Design Report that included responses to comments generated at public hearing. Prepared 40% and ADP submittals, including

estimates.

NYSDOT, Route 240 Reconstruction, Harlem Road, Amherst, NY:
Project Engineer responsible for writing Draft and Final Design Report. The report included descriptions of existing speeds, traffic volumes, and level of service and safety considerations, preparing responses to general and individual comments generated at the public hearing. Also included was a left turn lane analysis, assistance with pavement full-depth reconstruction design, center turn lane evaluation, intersection design, curb and sidewalk design, horizontal and vertical geometric design, assistance with design of right-of-way plan, and preparation of individual ROW acquisition maps.

NY State Thruway Authority, New E-ZPass Only Toll Lanes at Five Buffalo area Locations (2004 to 2005):
Project Manager for this project involving new E-ZPass Only toll lanes at five Buffalo area interchanges - Pembroke (#48A), Depew (#49), Silver Creek (#58), Dunkirk (#59) and North Grand Island Bridge (#89). The project included data collection and research, topographic survey and mapping, Environmental Assessment, preliminary and detailed design, geotechnical work, electrical design, structural design, and construction administration. This project was part of a Thruway term agreement that included four other projects in the Buffalo area coordinated and managed by Ms. Ransbottom.

Town of Wheatfield, NY, Drainage Study:
Civil Engineer responsible for analyzing existing drainage systems when problems arose and proposing alternative solutions, using HEC-2 computer software to analyze impact of existing and proposed cross culverts and bridges on Sawyer Creek, and reviewing subdivision site plans including drainage design, contour design, detention ponds and roadway horizontal and vertical geometry.

Chautauqua County Industrial Development Agency (CCIDA), Dunkirk and Fredonia NY:
Project Engineer responsible for researching and evaluating financial and operational information regarding sewer operations, assisted in preparation of a report regarding development of a master sewer district for Northern Chautauqua County, and met with City and Village officials and County agencies.

Town of Hamburg, NY, Master Plan Update:
Civil Engineer responsible for updating information regarding transportation, infrastructure, land characteristics and environmental restrictions within the Town, using information to write Town Master Plan, and meeting with various Town committees and officials and state and county transportation agencies.

New York Air National Guard, Niagara Falls, NY:
Project Engineer responsibilities for this term contract/Kirsch Drive reconstruction included the redesign of roadway on Air National Guard base that included horizontal and vertical geometric design, pavement full-depth reconstruction design, and coordinating design with existing utilities. Performed NYANG Type "A" services including design evaluation of several alternative roadway designs and preparation of report, and performed NYANG Type "B" services including design and evaluation of proposed project, technical specifications, horizontal alignment data, maintenance, and protection of traffic, cross-section design, and cost estimates.

Little Ausable River Trail, Peru, NY:
Project Manager for this $800,000 Rails-to-Trails conversion project in Town of Peru. The project included design of a picturesque trail along the Little Ausable River between two of the Town's most popular historic parks. Ms. Ransbottom worked closely with the Town to ensure proper procedures for the Transportation Enhancement Program (TEP) were followed and assisted in dealing with the NYSDOT regarding the trail crossing a state highway. The project included design of a 180 ft. long steel and timber pedestrian bridge and extensive coordination with the NY State Historic Preservation Office including completion of a Phase IA and IB Cultural Resource investigation.

Benjamin Barrey
Environmental Engineer

Summary of Experience

Remedial System Design for the Wills Building, Long Island City, NY – Wills Family Group Limited Partnership:

Environmental Engineer responsible for design of an active sub-slab depressurization system (SSDS) as an Interim Remedial Measure (IRM) to address and mitigate known impacted indoor air quality (IAQ) as a result of vapor intrusion. Used data acquired during execution of a pilot test to determine construction parameters for the SSDS. Assisted in preparation of a Design Analysis Report submitted to New York State Department of Environmental Conservation (NYSDEC) for approval. Performed all required CADD drawings and specifications for the SSDS, and assisted with obtaining the required building permits from NYC.

Lead and Asbestos Monitoring and Design Services Contract, NY – NYCT MTA:

CADD Manager responsible for completing all survey and design drawings for the Indefinite Quantity Asbestos and Lead Monitoring and Design Services for miscellaneous construction projects contract. Mr. Barrey is responsible for the completion of ACM sample location drawings, ACM quantity drawings, and abatement drawings. Project sites include operating substations, subway stations, office buildings, mechanical rooms, rail yards, bus depots, tunnels, bridges, manholes, and other structures.

Asbestos Services, Five Boroughs, New York City, NY – New York City School Construction Authority:

CADD Manager responsible for the completion of all design drawings for asbestos, lead and PCB projects for the Asbestos, Lead, Mold, and PCB Environmental Services Contract. Mr. Barrey prepares ACM and PCB drawings based on information given from the field inspections.

Phase I Environmental Site Assessment, SYMS Corp:

Project Engineer responsible for investigating and reporting for McKinley, Inc. for the SYMS building located in Williamsville, NY in Erie County. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. In addition, interviews with the owner & occupants were performed as well.

Phase I Environmental Site Assessment, Eberl Ironworks:

Project Engineer responsible for investigating and reporting for Eberl Ironworks for the Buffalo Metal Fabrication building located in Buffalo, NY in Erie County. Executed historical records reviews including but not limited to environmental records, proprietary records, topographical maps, Sanborn maps, aerial photography, and City Directories to assess the current and past environmental conditions at the site. In addition, interviews with the owner & occupants were performed as well.

New York Power Authority City of Buffalo Master Plan, Wendel Energy Services, Buffalo, NY:

Project Engineer responsible for the Energy Planning & Coordination

Experience

CORE: 1 Other: 4

Education

B.S., Environmental Engineering, State University of New York at Buffalo, 2013

Certifications

NYSDEC Erosion and Sediment Control Certificate

Current Responsibilities

Mr. Barrey has five (5) years of experience in Environmental Engineering included remediation design, tank design and permitting. He is experienced with CADD and has produced drawings for various projects including asbestos/lead abatement design, above and underground storage tank design, and various civil engineering designs. Mr. Barrey has experience with hazardous waste remediation, environmental assessments, groundwater modeling, and wastewater treatment.

Section of the Master Plan. Tasks included collecting Citywide and third party stakeholder data regarding energy procurement practices in Buffalo, NY in Erie County. Mr. Barrey also performed an analysis of current market rates along with forecasted rates out to 2030 which when compared to City of Buffalo data pinpointed areas of improvement. This information was used to provide recommendations to the City of Buffalo on how the procurement of energy could be made more cost effective and made attempts to leverage the large group of stakeholders to improve markets rates.

Habitat Restoration Project at Calvert Vaux Park (formerly Dreier-Offerman Park), Brooklyn, NY:

This project included the construction of aquatic and coastal upland habitats, wetland restoration, and trail construction. The project also involved the removal of 3.2 acres of contaminated soil. NYSDEC Erosion and Sediment Control Inspector responsible for coordination of and reporting on weekly Stormwater Pollution Prevention Plan (SWPPP) inspections for monitoring, recording and reporting on the condition of soil erosion and sedimentation practices that were employed to comply with the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities (GP-0-10-001).

Fuel System Installation, Port Authority of NY-NJ:

Project Engineer responsible for developing site plans & details for the installation of two (2) Petroleum Bulk Storage dispensing systems for Franklin Company Contractors at the Red Hook Container Terminal in the Bronx, NY in Nassau County. Designs included the placement of tanks, fuel dispensers, and related monitoring equipment as per the relevant New York City Codes & regulations (NEPA 30). Development of a Fire Suppression system was also included in the design.

Fuel System Installation, 362 Kingsland Ave, Brooklyn, NY, Mendon Trucking and Leasing:

Project engineer responsible for developing site plans & details for the installation of a Petroleum Bulk Storage dispensing system at Mendon Trucking & Leasing in Brooklyn, NY. Designs include the placement of tanks, fuel dispensers, employee kiosk, a light pole, and associated monitoring equipment as per relevant New York City Codes & regulations (NEPA 30).

Fuel System Upgrades, EC 63:

Project engineer responsible for developing site plans & details for the relocation of Petroleum Bulk Storage service lines for Galante Architecture at the Engine Company 63 in Brooklyn, NY. Designs include the relocation of fill and suction lines, fuel dispenser, and utilities as per relevant New York City Codes & regulations (NEPA 30).

Oil/Water Separation Engineering Report, 360 Kingsland Ave, Brooklyn, NY, ESF Transport Inc.:

Project Engineer responsible for developing an Engineering report for ESF Transport located in Brooklyn, NY. The report provided insights into the costs associated with three (3) different alternatives to remediating oil/water contamination leaving the facility through the municipal storm water system. Engineering analysis of local hydrology and unique conditions of the site were performed and used to develop alternatives that gave flexibility to the client while conforming to the SPDES permit.

Health & Safety Plan, The LIRO Group:

Project Engineer responsible for developing a General Health & Safety Plan for The LIRO Group located in Syosset, NY. The plan provided guidelines for safety of LIRO employees and contractors and covered topics such as safety training, emergency action plans, job hazard analysis, means of egress, hazard communication, materials handling, and protective equipment. Also developed in the plan were examples of safety inspection checklists, noise & dust mitigation plans, a protection of traffic plan, a lockout/tagout program, and a confined space program.

Excavated Materials Disposal Plan Review, NYCSCA:

Junior Engineer responsible for reviewing excavated materials disposal plans for accuracy to the design specifications for numerous NYC public schools. The project includes confirming analytical results, waste

transporter permits, disposal facility permits, and contractor sampling plans for conformance to local NYC codes and regulations.

Diesel Exhaust Fluid Dispensing System, Ryder Truck Rental Inc.:

Project Engineer responsible for developing site plans & details for the installation of a 1000 gallon enclosed aboveground diesel exhaust fluid (DEF) dispensing system for Ryder Truck Rental Inc. at the Farmingdale, NY facility in Suffolk County. Mr. Barrey provided engineering and administrative support to Ryder to expedite the tank registration process with the Town of Babylon and Suffolk County.

Backflow Prevention Device Design, Zaepfel Development Corp.:

Provided engineering services for the design and installation of a Backflow Prevention Device for Zaepfel Development Corporation's Remmington Woods Apartments in Williamsville, NY in Erie County. The project included analyzing historical hydrologic data, municipal water distribution data, current hydrant flow data collection, and drafting designs in AutoCAD.

Stormwater Pollution Prevention Programs, Zaepfel Development Corp.:

NYSDEC Erosion and Sediment Control Inspector responsible for the routine inspection of the Remmington Woods Apartments and the PHH Office Building in Williamsville, NY in Erie County. Preformed weekly inspections, developed inspection reports, and provided monthly, quarterly, and yearly summaries of inspections for both properties.

Computer Aided Drafting & Design, Franklin Company Contractors:

Computer aided drafter & designer responsible for performing all CADD work for the Franklin Company contractors. Mr. Barrey has completed a wide range of designs for the company including but not limited to As-Builts, petroleum tank installations, excavation plans, site maps, maintenance of traffic plans, and equipment details.

Phase II Environmental Site Assessment, Wills Building:

Computer aided drafter & designer responsible for performing all CADD work for the Phase II remedial investigation at the National Rubber site located in Brooklyn, NY. The work included the creation of site maps for existing wells, proposed exploratory wells, and a sub-slab depressurization system.

Remedial Investigation, Buffalo Color Corporation, Buffalo, NY:

Remedial Project Manager (University of Buffalo) for the Remedial Investigation/Feasibility Study (RI/FS) at the Buffalo Color Corporation in the City of Buffalo, along the Buffalo River. Mr. Barrey managed a team effort to create a remedial design to re-develop the land for commercial and light industrial zoning uses. Responsibilities included reviewing the Phase I and Phase II assessments that had been performed for the site.

Wastewater Plant Design, Buffalo:

Project Engineer responsible for developing all stages in the design of a wastewater treatment plant. Utilized the knowledge of chemical and treatment processes to meet remedial goals of the wastewater.

Drinking Water Distribution System Design, Buffalo:

Project Engineer responsible for developing a drinking water distribution network to supply clean water to a community in northern California. Mr. Barrey incorporated the use of network design software (EPANET) to aid in the sizing and placement of the new distribution system in order to project future supply needs of the growing community.

Environmental Impact Statement Review, Buffalo:

Project Engineer responsible for the review of a final impact statement for a proposed redevelopment of a federal military ammunitions testing facility. Responsible for reviewing the state and federal guidelines for air, noise, soil and water pollution along with key factors such as public acceptance, ecological footprint, economic impacts and effects on endangered species.

Life Cycle Analysis, Buffalo:

Engineer responsible for an in depth look at energy, materials and costs required to create and install a rooftop solar array located in Buffalo and to compare it to the energy generated by the current system. Mr. Barrey was responsible for developing detailed cost analyses, and transportation and energy matrices to determine a benefit to cost ratio for different rooftop photovoltaic systems.

Volunteer at Buffalo Niagara Riverkeeper:

Mr. Barrey was involved in an Outreach program in which the community is engaged at tabling events and speaking engagements to develop awareness of the Riverkeeper mission. He was also involved in a River Stewardship program in which water quality testing, research and cleanups are performed.

Town of Amherst, NY Parks Department:

Mr. Barrey was a manager in the Town Park's Department where he supervised several seasonal employees and maintained public grounds by pesticide application, watering, excavation, berm installation, tree/shrub planting, debris removal, and several drainage installations.

Teresa Tramposch
Vice President

Summary of Experience

Habitat Restoration Work at Calvert Vaux Park (formerly Dreier-Offerman Park), Brooklyn, NY:

Principal responsible for providing air monitoring services to monitor upwind and downwind areas of excavation work to ensure that dust concentrations in air did not exceed New York State Department of Environmental Conservation (NYSDEC) regulations [TAGM 4031]. CORE provided professional/civil engineering services to perform site inspections required to conform to the requirements in the NYSDEC Pollution Discharge for Construction Activities, General Permit GP-0-08-001.

Phase I Environmental Site Assessments (ESA) - Queens, NY:

Completed the project Quality Assurance and Quality Control (QA/QC) review for ESAs completed for two (2) self storage facilities. The ESAs were prepared in accordance with ASTM E 1527-05 and EPA All Appropriate Inquiry standards. The confirmation of the recognized environmental conditions (RECs) and overall review of all reports submittals was completed. A scope of work for Phase II ESI activities was provided as part of the ESAs.

Garrison Avenue Soil Remediation System, Brooklyn, NY:

Project Principal for the remediation system installation and operation of a 350 scfm soil vapor extraction system for the Mendon Truck Leasing Garrison Avenue facility. Coordinated numerous sub-contractors for the installation of 350 feet of buried piping and as well as nine (9) vapor extraction wells. Close monitoring of project costs and contractors invoice were required.

Franklin Company Contractors, NYCT MTA Mother Clara Hale Bus Depot Replacement, New York City, NY:

Principal in Charge of the project oversight of Core's scientist to initially direct the contractor in segregating excavated soils according to total organic vapor (TOV) content with a photo-ionization detector. The work was completed in 20' x 20' cells. The soil was stabilized by open pit mixing with a fly ash and grout mix that was previously pilot tested. The stabilization was verified by wet sampling from specific intervals. Responsible for the review of all project deliverables.

Health and Safety Plan, Lewiston, NY:

Completed the program Quality Assurance and Quality Control (QA/QC) review for a site specific Health and Safety Plan (HASP) for a site remediation and investigation project at a vacant site impacted with No. 2 fuel oil. The site had formerly contained a building and operated as a construction staging area for the Niagara Power Project. The site is adjoined by a contaminated landfill site that has the potential to impact the target site. Project required confirmation of site specific contaminants of concern, exposure levels, personnel protection equipment (PPE), air monitoring, site controls, decontamination and emergency procedures.

Franklin Company Contractors, NYC Department of Environmental Protection, Facility Reports, Plans and Drawings, New York City, NY:

Principal in Charge of the project oversight for the preparation of Petroleum Bulk Storage (PBS) Facility Reports, As-Built Drawings of tanks and Spill

Experience

CORE: 10 Other: 20

Education

B.S., Biochemistry and Nutrition, Cornell University, 1982
M.S., Biochemistry and Nutrition, Texas Woman's University, 1983

Certifications

Certified Environmental Inspector (CEI)
NYSDOL Asbestos Project Designer
EPA, IAQ Mold Remediation in Schools and Commercial Buildings

Current Responsibilities

Ms. Tramposch has over 30 years of professional management experience. In 2004, Ms. Tramposch formed CORE Environmental Consultants, a consulting company specializing in environmental services including site assessments, site inspections and site remediation. Ms. Tramposch's distinguished career includes teaching at the college level and numerous managerial positions prior to her current involvement in the environmental industry. Past and present responsibilities have prepared her for a role as President and Financial Officer of a growing corporation.

Prevention, Control, and Countermeasures Plans (SPCC) at 24 New York City Department of Environmental Protection (DEP) Water Pollution Control Plants and Pumping Stations under Contract 1198-PBS. The purpose of the PBS Facility Report is to identify PBS deficiencies at the site, if any, and provide recommendations for corrective actions.

NYCT Asbestos and Lead Monitoring and Design Services Contract, New York City, NY:

Project Principal responsible for the indefinite quantity contract (CM-1320) and for the assurance that the contract documents adhered to all appropriate standards. Project involves inspection services for lead and asbestos throughout New York City in support of facility design and future abatement, encapsulation and construction activities. Services include lead and asbestos investigations and reports, development of abatement work plans, cost estimating, project coordination and interfacing with site representatives, and project management with oversight of the abatement contractors. Project sites included operating substations, subway stations, office buildings, mechanical rooms, rail yards, bus depots, tunnels, bridges, and various other structures throughout many of NYC Transits 300 facilities located throughout the five boroughs of New York City.

NYC School Construction Authority, Asbestos Services, Five Boroughs, NY:

Principal in Charge of the project oversight of the air sampling and project monitoring at New York City Schools. The project included surveys, to include the collection of bulk samples as well as project monitoring during asbestos abatement.

Remediation System Operation and Reporting, Five Boroughs of NY:

Project Principal responsible for office support to Franklin Company Contractors providing remediation system monitoring and reporting related to fourteen soil and groundwater remediation systems in the City of New York. Responsibilities include daily remote monitoring of remediation systems utilizing SCADA software, weekly report preparation, and preparation of monthly system status reports.

NYC Housing Authority, Lead Based Paint Inspection Services Contract, New York City, NY:

Principal in Charge of the project oversight of all lead based paint inspections. Inspections are completed on housing units, common areas, and storage units in accordance with U.S. Housing and Urban Development protocols. Inspections included the use of X-Ray Fluorescence (XRF) analysis in each unit and often paint chip samples were collected and laboratory analyzed. The XRF analysis is conducted on site, using a portable LPA-1 Lead Paint Inspection System manufactured by Radiation Monitoring Devices, Inc. (RMD).

Mendon Truck Leasing Lead and Asbestos Services, Five Boroughs, NY:

Project Principal responsible for the preparation of the contract documents and assurance that the contract documents adhered to all appropriate standards. Project involves inspection services for lead and asbestos at buildings throughout New York City in support of facility design and future abatement, encapsulation and construction activities.

Restored Homes HDFC Asbestos Consulting Services, Bronx, Brooklyn, Queens and Staten Island, NY:

Project Principal for the contract to complete comprehensive asbestos containing material (ACM) surveys and assessments at 280 1-3 family vacant homes being rehabilitated. Responsibilities include the development and supervision of project quality control and assurance measures for efforts to provide comprehensive asbestos inspections and assessments, abatement or removal design.

Manuel Duran
Project Manager

Summary of Experience

Tank Sampling, Terminal 5, JFK Airport, Jamaica, NY – JetBlue Airways:
Field Technician responsible for completing soil sampling for propylene glycol from numerous tanks at Terminal 5 located in the JFK Airport.

Phase I Remedial Investigation Report, Remedial Investigation Work Plan, and Interim Remedial Measure Work Plan for the Wills Building, Long Island City, NY – Wills Family Group Limited Partnership:
Field Technician responsible for water sampling for this apartment complex located in Long Island City during the Phase I Remedial Investigation to delineate the nature and extent of known subsurface impacts in the soil. Mr. Duran was responsible for collecting sample from monitoring wells along with checking the water levels for each well.

Lead and Asbestos Monitoring and Design Services Contract, NY – NYCT MTA:
Project Manager responsible for the management of personnel and the completion of air sampling and monitoring completed during the execution of the indefinite quantity contracts (CM-1320 & CM-1515). Responsibilities include the development and implementation air monitoring programs at all types of work areas and environments. Responsibilities include lead and asbestos investigations and reports, development of abatement work plans, cost estimation, project coordination, meetings with site representatives, and project management with oversight of the abatement contractors. Additional responsibilities includes project monitoring for lead abatement activities including contractor oversight. Project sites include operating substations, subway stations, office buildings, mechanical rooms, rail yards, bus depots, tunnels, bridges, manholes and other structures.

OHSA Air Monitoring, Noise Monitoring, and Soil Sampling, High Line Park Bridge, Manhattan, NY – Ahern Painting Contractors:
Project Manager responsible for the lead based paint abatement ongoing at High Line Park in Manhattan, NY. Responsible for the completion of OSHA Compliance Letters that detail the containment area air monitoring performed by CORE personnel. Also responsible for completing air monitoring during abatement in compliance with the noise mitigation efforts to reduce noise induced from abatement activities.

OSHA Worker Compliance Services, NYCT MTA Canal Street Station, 7th Avenue Line, Manhattan, NY – Belt Painting Contractors:
OSHA Air Monitor responsible for the completion of a lead air monitoring negative exposure assessment for employees completing lead disturbance activities at the Canal Street Station in Manhattan, NY. Responsible for collecting samples from the employees to determine if they had exceeded the OSHA Permissible Exposure Limit set forth by OSHA 29 CFR 1926.62.

OHSA Air Monitoring and Soil Sampling, Bayonne Bridge, NJ & NJ – Ahern Painting Contractors:
Project Manager responsible for the lead based paint abatement ongoing at Bayonne Bridge in Staten Island, NY and Bayonne, NJ. Responsible for the completion of OSHA Compliance Letters that detail the air monitoring

Experience

CORE: 5 Other: 5

Education

A.A.S., Accounting, Nassau Community College, 2000

Certifications

NYSDOL Asbestos Inspector
USEPA Lead Inspector and Risk Assessor
SSPC C-5 Supervisor/Competent Person
MTA NYCT Track Safety Certification
OSHA 10 hour Construction Safety & Health Certificate
OHSA 40 hour HAZWOPER
NYC DOB 4-HR Supported Scaffold User Certificate
NYSDEC Erosion and Sediment Control Certified

Current Responsibilities

Mr. Duran has ten (10) years of experience managing people and projects. He has a large background in lead and asbestos investigations, air monitoring, and construction management. He is experienced with all types of abatement work areas and has performed the oversight of hundreds of work areas throughout the New York metropolitan area as well as New Jersey. Additionally, Mr. Duran has performed Phase I and Phase II Investigations, well logging, sampling, geologic mapping, stratigraphic and structural analysis. Mr. Duran is currently managing our New York City Transit Authority Asbestos and Lead Contract.

exposure assessments and containment area air monitoring performed by CORE personnel. Also responsible for completing soil and paint chip samples to determine if the lead based paint abatement has contaminated the soil surrounding the bridge.

OHSA Air Monitoring, Throngs Neck Bridge, Bronx, NY – Ahern Painting Contractors:

Project Manager responsible for the lead based paint abatement ongoing at Throngs Neck Bridge in Bronx, NY. Responsible for oversight on air monitoring exposure assessment and ambient area air monitoring during the paint removal. Mr. Duran is also responsible for completing reports complying with various agencies after CORE personnel performs on-site monitoring or assessments.

Line Structure Overcoat Painting, Flushing Line, from 103rd Street to the Main Street, Queens, NY – NYCT MTA:

Project involves the removal of lead paint from the elevated steel structured of the Flushing Line (A Division, IRT), 103rd Street to the Main Street Portal including the Corona Yard Leads. Work procedures include manual wet scraping, needle scaling, and power tool cleaning. All work areas are contained in SSPC 3P containment. Responsible for ensuring the contractor complies with all NYCT lead removal specifications, OSHA worker protection procedures are carried out by the contractor, storage and tracking of lead waste perform air monitoring, tracking of lead wastes, and maintain ensure contractor follows OHSA requirements for lead removal work.

OSHA Lead Worker Monitoring, Seven MTA Stations, New York City, NY:

Completed the OSHA Lead Worker Monitoring as part of the lead abatement at seven (7) New York City Transit Authority Stations. The contract (R-50554) is for the lead paint removal and painting of subway stations in all areas of public and non-public use at the following seven (7) stations in the Boroughs of Manhattan, Brooklyn and the Bronx. The purpose of OSHA monitoring to ensure that all project personnel in each job category are properly protected with the appropriate PPE by monitoring the direct exposure that they receive to the airborne lead. Personal pumps are fitted on each employee for an entire shift.

Line Structure Overcoat Painting, White Plains Road Line, Bronx Park East to 241st, Bronx, NY – NYCT MTA:

Project involves the removal of lead paint from over 4,000,000 square feet of the elevated subway line. Specific removal methods include manual wet scraping and power tools with HEPA-vacuum attachments, rivet busting and hot work. All work is being performed utilizing a SSPC Class 3P containment system consisting of tarpaulins hanging from the work area both horizontally and vertically. Responsible for on-site field inspection during lead disturbance activities ensuring the contractor maintained proper containment around each work area, proper worker protection procedures under OSHA are carried out by the contractor, preparing weekly field inspection reports, and ensuring lead wastes are properly stored in compliance with NYSDEC and USEPA regulations.

Asbestos Services, Five Boroughs, New York City, NY – New York City School Construction Authority:

Asbestos Inspector and Lead Risk Assessor responsible for surveying and collecting samples at various public schools in the New York City Area. Responsibilities include the completion of inspections, forms, assessments, air sampling, logs, chain of custodies, and project data summaries. Utilizes an x-ray fluorescence (XRF) gun during lead inspections to survey schools for lead based paint. Other responsibilities include completing Final Design Reports after asbestos or lead surveys that detail the removal activities necessary.

Public School 91, Brooklyn, NY – New York City School Construction Authority:

Project Monitor responsible for on-site management during the removal of VAT and Associated Mastic in various rooms in the school. Mr. Duran was responsible for conducting walkthroughs, surveys, inspections, gathering samples and quantifying materials in various rooms.

Lead Based Paint Inspection Services Contract, New York City, NY - New York City Housing Authority:

Project Manager responsible for the inspections completed on housing units, common areas, and storage units

in accordance with U.S. Housing and Urban Development protocols. The inspections included the use of X-Ray Fluorescence (XRF) gun in each unit and the collection of paint chip samples. Responsibilities included scheduling a certified lead inspector along with report completion detailing the results of the lead based paint inspection.

Calvert Vaux Park, Brooklyn, Construction of Aquatic & Coastal Upland Habitat, Brooklyn, NY – Galvin Brothers:

Project Manager responsible for oversight of the project that included the performance of weekly SWPPP inspections to monitor, record and report on the condition of the soil erosion and sedimentation practices. The SWPPP inspections were to guarantee that the site was complying with the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities (GP-0-10-001). Project involves removal of 3.2 acres of contaminated soil.

SENY Samplings and Analysis for Poletti/500mw/Flynn/SCPP Plants, Astoria, NY– New York Power Authority (NYPA):

SPDES Sampling Manager responsible for on-site collection, analysis and management of periodic storm water discharge samples, monitoring well samples, and waste fuel samples required by various NYSDEC SPDES permit requirements.

Phase II Environmental Site Investigation (ESI), Queens, NY - Olympic Flame:

Assisted with Phase II ESI activities at the gas station where a truck accident caused a gasoline release from a fuel dispenser. Responsible for the completion of the work plan, soil screening and sampling, well development and sampling. Applied the site health and safety plan and completed the oversight of the field crews.

Foster Avenue, Phase II Environmental Site Investigation (ESI), Bronx, NY - Mendon Realty:

Assisted with the Phase II ESI at the commercial property were a spill occurred. Responsibilities included preparing subcontracts and performing oversight for monitoring well drilling, geoprobe activities, and excavation services other field activities and compilation of field data for reporting.

Garrison Avenue, Phase II Environmental Site Investigation (ESI), Brooklyn, NY - Mendon Realty:

Assisted with soil borings and temporary monitoring well installations to evaluate site soils and groundwater samples from the sites. A report was prepared presenting the approach, methods, results, and interpretations of the data as well as recommendations, conclusions and an opinion on further action.

775 Tiffany Street, Bronx, Phase II Environmental Site Investigation (ESI), Brooklyn, NY - Kimcomatt Realty Corp.:

Assisted with soil borings and temporary monitoring well installations to evaluate site soils and groundwater samples from the sites. Responsibilities included performing oversight for monitoring well drilling, geoprobe activities, and soil and groundwater sampling services as well as other field activities.

Dennis Sanchez
Project Manager

CORE ENVIRONMENTAL CONSULTANTS

Summary of Experience

Lead and Asbestos Monitoring and Design Services Contract (CM-1320 and CM-1515), NY – NYCT MTA:

Report Manager responsible for assisting in the completion of survey and design reports for various subway stations as part of the Indefinite Quantity Asbestos and Lead Monitoring and Design Services contract. Mr. Sanchez is responsible for completing the ES/EN-tables included in the design drawings, detailing the work areas and any asbestos or lead that has been located.

Asbestos and Lead Services – NYCT Pelham Subway, Bronx, NY:

Lead Inspector and Asbestos Project Monitor responsible for monitoring in compliance with NYCT environmental rules for lead and asbestos (12N, 12L) during abatement. Ensured compliance with NYCT Safety rules (1s) including but not limited to respiratory protection, fall protection, confined space entry, safe use of power tools and overall maintenance of a safe work environment. Provided oversight and ensure regulatory compliance during super structure lead abatement projects. Other responsibilities included monitoring the upkeep of Hazardous Waste Storage Areas for EPA/NYCT-12L compliance and monitoring Contractors and workers during abatement activities. Performed daily air samples, monitored the quality of air in the work and public areas, conducted final visual inspections prior to clearance/re-occupancy of wok areas, and submitted daily reports noting all safety related occurrences, exposure levels and Contractor corrective actions.

Asbestos Services – NYU Langone Medical Center, Long Island City, NY:

Asbestos Project Monitor on site responsible for monitoring contracts and workers during the asbestos abatement project. Performed daily air samples, monitored the quality of air in the work and public areas, conducted final visual inspections prior to clearance/re-occupancy of wok areas, and submitted daily reports noting all safety related occurrences, exposure levels and Contractor corrective actions.

SENY Samplings and Analysis at South East Power Plants, NY– New York Power Authority (NYPA):

Field Technician responsible for collecting weekly, monthly, and quarterly water inlet and outlet sampling at the NYPA Charles Poletti/ 500 MW Richard M. Flynn Power plant and the Small Clean Power Plants sites (SCPP), located in Astoria, Long Island City, Bronx, Brooklyn, Staten Island, Holtsville and West Brentwood, NY. Responsibilities include: Performing groundwater and stormwater sampling, RCRA/metals sampling, preparing sampling logs and chain-of-custody documents, and the review of data and project reporting.

Experience

CORE: 1 Other: 8

Education

Diploma, General Studies, Mount Saint Michael Academy, 2003

Certifications

NYSDOL Asbestos Project Monitor and Air Technician
NYSDOL Asbestos Inspector
SSPC C-3 Supervisor/Competent Person
OSHA 10 Hours
NYC DOB 4-HR Supported Scaffold User Certificate
NYCT Track Safety Certification
OSHA Confined Space Entry Training

Current Responsibilities

Mr. Sanchez has over eight (8) years of experience performing multiple asbestos and lead inspections and has had significant experience overseeing abatement on NYCT projects. Mr. Sanchez is very familiar with all city, state and regulatory requirements for asbestos and lead projects.

Steven Granati
Field Technician

CORE ENVIRONMENTAL CONSULTANTS

Summary of Experience

Public School 48, Brooklyn, NY- NYC School Construction Authority:
Project Monitor responsible for on-site management during the roof replacement project. Mr. Granati was responsible for air monitoring as well ensuring compliance by the asbestos abatement contractor during all phases of the ACM roof removal, including project setup, foam removal method, proper bag out procedures, and final breakdown.

Public School 174, Brooklyn, NY- NYC School Construction Authority:
Project Monitor responsible for on-site management during the removal of VAT and Associated Mastic within the school. Mr. Granati was responsible for air monitoring as well ensuring compliance by the asbestos abatement contractor during all phases of the VAT and Associated Mastic removal, including project setup, the removal method, proper bag out procedures, and final breakdown.

Intermediate School 259, Brooklyn, NY- NYC School Construction Authority:
Project Monitor responsible for on-site management during the removal of VAT and Associated Mastic within the school. Mr. Granati was responsible for air monitoring as well ensuring compliance by the asbestos abatement contractor during all phases of the VAT and Associated Mastic removal, including project setup, the removal method, proper bag out procedures, and final breakdown.

Public School 32, Brooklyn, NY- NYC School Construction Authority:
Project Monitor responsible for on-site management during the core drilling of various flooring materials using NYCDEP tent procedures. Mr. Granati was responsible for air monitoring as well ensuring compliance by the asbestos abatement contractor during all phases of the drilling, including project setup, wet method drilling, proper bag out procedures, and final breakdown.

Public School 150, Brooklyn, NY- NYC School Construction Authority:
Project Monitor responsible for on-site management during the emergency repair of wall/ceiling plaster. Mr. Granati was responsible for air monitoring as well as ensuring compliance by the asbestos abatement contractor during all phases of the ACM plaster removal, including project setup, wet removal method, proper bag out procedures, and final breakdown.

Dyckman Street Station, Manhattan, NY- MTA NYCT:
Project Monitor responsible for on-site management during the removal of various asbestos containing materials at the station. Mr. Granati was responsible for air sampling as well as ensuring proper safety compliance by the asbestos abatement contractor during all phases of the ACM removal including project setup, wet removal method, proper cleaning procedures, and proper waste storage and identification.

Asbestos Monitoring, Maspeth Warehouse, Queens, NY- MTA NYCT:
Project Monitor for the NYCT property Maspeth Warehouse conducting air samples and inspections at the lower roof asbestos removal. Responsibilities include checking the NYSDOL licenses of the abatement contractor,

Experience

CORE: 3 Other: 1

Education

Diploma, General Studies, FDR High School, 1998

Certifications

NYSDOL Asbestos Project Monitor
NYSDOL Air Sampling Technician
RMD LPA-1 Certified Lead Paint Inspector
SSPC C-3 Lead Training
MTA Track Safety Training
OSHA 10 hour Construction Safety and Health
OSHA 40 hour HAZWOPER

Current Responsibilities

Mr. Granati is a Project Monitor with field experience in asbestos, lead monitoring and environmental services. As a field representative, he has proven his ability to perform on-site project management services during environmental remediation projects involving asbestos and lead, as well as all required environmental sampling.

conducting safety meetings, running air samples and checking the work areas to ensure protocol is being followed.

Asbestos Monitoring, 149th Street Grand Concourse, Bronx, NY:

Project Monitor for the NYCT property 149th Street Grand Concourse conducting air samples and inspections during the entire platform upgrade. Responsibilities include checking the NYSDOL licenses of the abatement contractor, conducting safety meetings, running air samples and checking the work areas to ensure protocol is being followed.

Asbestos Monitoring, 370 Jay Street, Brooklyn, NY:

Project Monitor for the NYCT property 370 Jay Street conducting air samples and inspections during the upgrades at the thirteen story building with two sub-level basements. Responsibilities include checking the NYSDOL licenses of the abatement contractor, conducting safety meetings, running air samples and checking the work areas to ensure protocol is being followed.

Poletti Power Plant, Astoria, NY–Franklin Contracting:

Lead Inspector responsible for on-site OSHA air monitoring during the demolition of oil tank structures containing lead-based paint. Mr. Granati was given the task of performing both personal and ambient air sampling during all phases of the demolition project.

SENY Samplings and Analysis for Poletti/500mw/Flynn/SCPP Plants, Astoria, NY– New York Power Authority (NYPA):

Lead Sampling Technician responsible for on-site collection, analysis and management of periodic storm water discharge samples, monitoring well samples, and waste fuel samples required by various NYSDEC SPDES permit requirements.

Calvert Vaux Park, Brooklyn, Construction of Aquatic & Coastal Upland Habitat, Brooklyn, NY – Galvin Brothers:

Project involves removal of 3.2 Acres of contaminated soil. Project Manager responsible for oversight of the project including the performance of weekly SWPPP inspections to monitor, record and report on the condition of the soil erosion and sedimentation practices being employed to comply with the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities (GP-0-10-001).

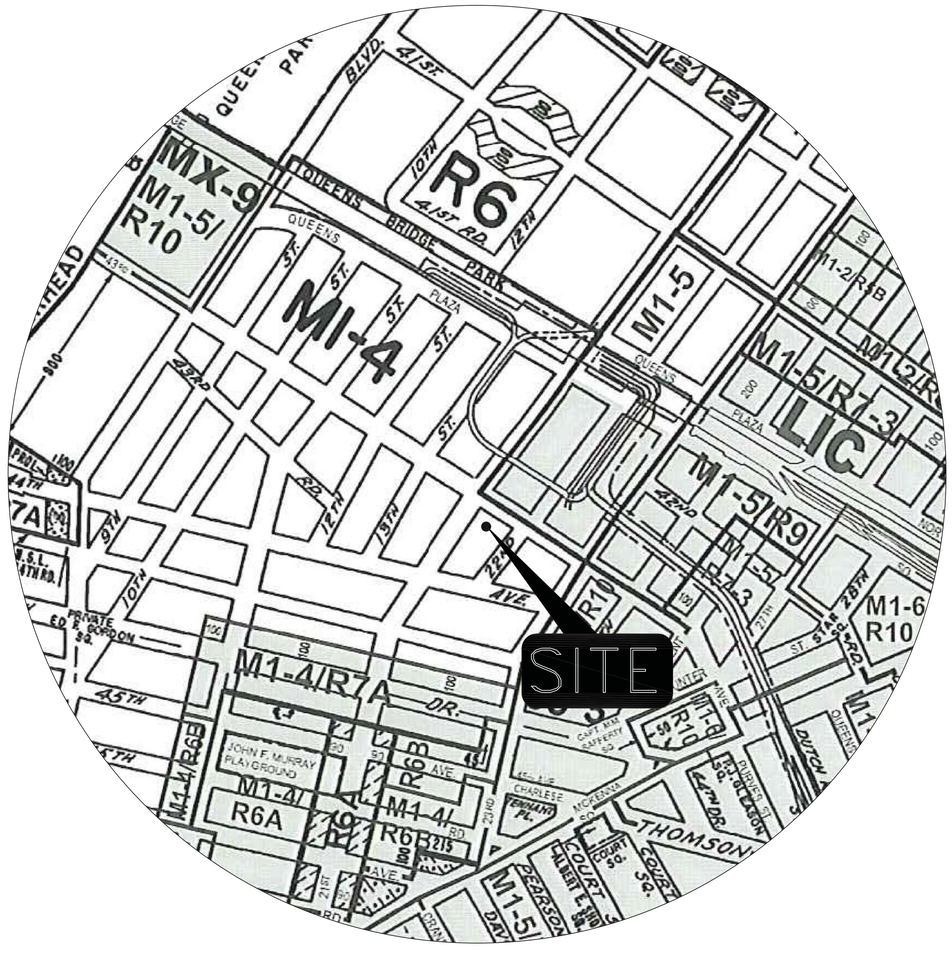
APPENDIX C

Remedial System Design Drawings

CORE ENVIRONMENTAL CONSULTANTS

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES REMEDIAL WORK PLAN

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103



ZONING MAP
THE NEW YORK CITY PLANNING COMMISSION

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

R – RESIDENTIAL DISTRICT
C – COMMERCIAL DISTRICT
M – MANUFACTURING DISTRICT
SPECIAL PURPOSE DISTRICT
The letter(s) within the shaded area designates the special purpose district as described in the text of the Zoning Resolution.
AREA(S) REZONED

Effective Date(s) of Rezoning:
07-24-2014 C 140275 ZMQ

Special Requirements:
For a list of lots subject to CEQR environmental requirements, see APPENDIX C.
For a list of lots subject to "D" restrictive declarations, see APPENDIX D.
For Inclusionary Housing designated areas on this map, see APPENDIX F.

MAP KEY

8c	9a	9c
8d	**9b**	9d
12c	13a	13c

N

ZONING MAP **9b**

APRIL 2015

PREPARED FOR:

ROCKROSE

ROCKROSE DEVELOPMENT CORPORATION
15 E 26TH STREET
NEW YORK, NY 10010
P: 212-847-3700

PREPARED BY:

CORE ENVIRONMENTAL CONSULTANTS

CORE ENVIRONMENTAL CONSULTANTS
46-11 54TH AVENUE
MASPETH, NY 11378
T: 718-762-0544

I, SHEILA RANSBOTTOM, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THESE REMEDIAL WORK PLAN (AIR SPARGE SYSTEM) DESIGN PLANS WERE PREPARED IN ACCORDANCE WITH ALL APPLICABLE STATUTES AND REGULATIONS AND IN SUBSTANTIAL CONFORMANCE WITH THE DER TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION (DER-10) AND THAT ALL ACTIVITIES WERE PERFORMED IN FULL ACCORDANCE WITH THE NYSDEC-APPROVED WORK PLAN AND ANY NYSDEC-APPROVED MODIFICATIONS.

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
46-11 54TH AVENUE
MASPETH, N.Y. 11378
T: 718-762-0544
F: 718-762-0545
2312 WEHRLE DRIVE
BUFFALO, N.Y. 14221
T: 716-204-8054
F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

TITLE SHEET

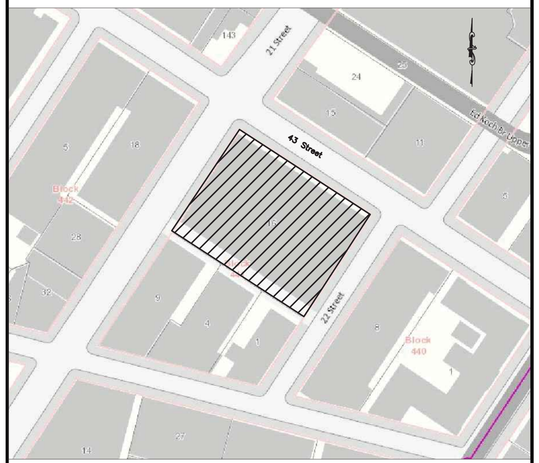
SEAL & SIGNATURE	DATE:	04/01/2015
STATE OF NEW YORK SHEILA A. RANSBOTTOM NO. 095855 LICENSED PROFESSIONAL ENGINEER	BIN No.:	4005198
	DRAWN BY:	BDB
	DESIGNED BY:	BDB
	CHECKED BY:	SAR, P.E.
	APPROVED BY:	SAR, P.E.
	DRAWING No.:	T-001.00
SCALE:	SHEET No.: 1	OF: 10
95% DRAWING	REVISED BY:	–

J:\Wills Building – Rockrose\Remedial Work Plan_2015\Air Sparging – SVE\Full Scale\Wills AS-SVE.dwg

LIST OF DRAWINGS

DWG. NO.	
T-001.00	TITLE SHEET
G-001.00	ABBREVIATIONS, NOTES, LEGEND AND INDEX OF DRAWINGS
H-001.00	EXISTING SITE PLAN – 1ST FLOOR
H-002.00	PCE ISO-CONCENTRATION MAP
H-003.00	REMEDIATION SYSTEMS SITE PLAN – 1ST FLOOR
H-004.00	ANTICIPATED RADIUS OF INFLUENCE PLAN
H-005.00	SVE PROCESS & INSTRUMENTATION DIAGRAM
H-006.00	AIR SPARGE PROCESS & INSTRUMENTATION DIAGRAM
H-007.00	MISCELLANEOUS DETAILS
E-001.00	TREATMENT ROOM EQUIPMENT LAYOUT PLAN & ELECTRICAL SCHEMATIC

KEY PLAN



BLOCK #: 441
LOT #: 16

BIN #: 4005198
ZONE: M1-4

SCOPE OF WORK

1. INSTALL SIX (6) VAPOR EXTRACTION WELLS AS SHOWN ON THE CONTRACT DRAWINGS.
2. INSTALL NEW ABOVEGROUND VAPOR EXTRACTION PIPING.
3. SAWCUT AND TRENCH TO FACILITATE INSTALLATION OF BELOW GRADE VAPOR EXTRACTION PIPING.
4. INSTALL SEVEN (7) AIR SPARGE WELLS AS SHOWN ON THE CONTRACT DRAWINGS.
5. INSTALL NEW ABOVEGROUND AIR SPARGE PIPING.
6. SAWCUT AND TRENCH TO FACILITATE INSTALLATION OF BELOW GRADE AIR SPARGE PIPING.
7. INSTALL ONE (1) MONITORING WELL AS SHOWN ON THE CONTRACT DRAWINGS.
8. INSTALL NEW TREATMENT EQUIPMENT & CONTROL SYSTEMS TIED INTO EXISTING ELECTRICAL SERVICE.
9. START-UP AND TEST TREATMENT SYSTEM IN ACCORDANCE WITH SPECIFICATIONS.

PROGRESS INSPECTIONS

1. AIR SEALING AND INSULATION – VISUAL (IA6), (IIA6)
2. AIR SEALING AND INSULATION – TESTING (IA7)

BUILDING DEPARTMENT NOTES

THE FOLLOWING SHALL APPLY THROUGHOUT:

1. WORK SHALL BE EXECUTED IN FULL COMPLIANCE WITH THE APPLICABLE PROVISIONS OF ALL LAWS, BY-LAWS, STATUTES, ORDINANCES, CODES, RULES, REGULATIONS AND LAWFUL ORDERS OF PUBLIC AUTHORITIES BEARING ON THE PERFORMANCE AND EXECUTION OF THE WORK. THIS APPLICATION IS FILED UNDER 2008 CODE FOR COMPLIANCE WITH CHAPTERS 1, 17 & 33 REGARDING ADMINISTRATION, INSPECTION AND SAFETY REQUIREMENTS.
2. ALL MATERIALS, ASSEMBLIES, FORMS, METHODS OF CONSTRUCTION AND SERVICE EQUIPMENT SHALL MEET THE FOLLOWING REQUIREMENTS:
   A. THEY SHALL HAVE BEEN ACCEPTED FOR THE USE UNDER THE PRESCRIBED TEST METHODS BY THE COMMISSIONER (OR)
   B. APPROVED BY THE OFFICE OF TECHNICAL CERTIFICATION AND RESEARCH (OTCR).
3. MATERIALS OR ASSEMBLIES REQUIRED TO HAVE A FIRE RESISTANCE RATING SHALL COMPLY WITH ONE OF THE FOLLOWING:
   A. THEY SHALL CONFORM WITH A.I.S.G. "FIRE RESISTANCE RATING", DATED 1985 (OR)
   B. THEY SHALL HAVE BEEN TESTED IN ACCORDANCE WITH ASTM E119, STANDARD METHODS OF FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS ACCEPTED BY THE COMMISSIONER (OR)
   C. THEY SHALL HAVE BEEN ACCEPTABLE PRIOR TO THE EFFECTIVE DATE OF THE CODE (OR)
   D. APPROVED BY OTCR.
4. THE CONTRACTOR'S LICENSED PROFESSIONAL IS RESPONSIBLE FOR FILING THE APPLICATION AND OBTAINING PERMITS FOR CONSTRUCTION EQUIPMENT OR PUBLIC PROTECTIVES REQUIRED TO ENSURE SAFETY OF OPERATION AND THE PUBLIC AS PER NYC 2008 BUILDING CODE, CHAPTER 33, SECTION BC 3307.
5. THE CONTRACTOR'S LICENSED PROFESSIONAL IS ALSO RESPONSIBLE FOR OBTAINING LETTER OF COMPLETION.
6. ALL WORK SHALL COMPLY WITH SECTION BC 1007 AND CHAPTER 11 "ACCESSIBILITY" OF THE NYC BUILDING CODE AND ICC A117.1 2003.
7. SINCE THE SCOPE OF WORK DOES NOT INVOLVE A BUILDING SYSTEM AS DEFINED IN THE NEW YORK CITY ENERGY CONSERVATION CODE, THIS SYSTEM IS EXEMPT FROM THE ENERGY CODE (EC).
8. ANY PENETRATIONS IN THE BUILDINGS THERMAL ENVELOPE SHALL BE SEALED ACCORDING TO THE NYC ENERGY CODE SECTION EC 502.4.
9. ALL NEW INTERIOR FINISHES SHALL BE CONSTRUCTED OF MATERIALS MEETING SECTION 27-529 FOR FLAME SPREAD RATINGS.
10. SPECIAL INSPECTIONS REQUIRED TO BE PERFORMED FOR ANY NEW ALTERATION PROJECT ARE IDENTIFIED BY THE APPLICANT ACCORDING TO THE SCOPE OF WORK AND LISTED AND DESCRIBED IN THE DRAWINGS IN ACCORDANCE WITH SECTION BC 109.9. WHERE AN INSPECTION OR TEST FAILS, THE CONSTRUCTION SHALL BE CORRECTED.

GENERAL NOTES

1. THE LOCATION OF EXISTING SUBSURFACE STRUCTURES AND UTILITIES SHALL BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION.
2. WELL LOCATIONS ARE APPROXIMATE. THE CONTRACTOR SHALL DETERMINE THE FINAL LOCATIONS IN THE FIELD AND THESE LOCATIONS SHALL BE APPROVED BY THE CONSTRUCTION MANAGER AND ENGINEER PRIOR TO WELL INSTALLATION.
3. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING FEATURES, UTILITIES, CATCH BASINS, STORM SEWERS, MONITORING WELLS AND ANY OTHER ON-SITE APPURTENANCES DURING CONSTRUCTION. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO THE COMMENCEMENT OF WORK AT NO ADDITIONAL COST TO THE OWNER.

LEGEND

GENERAL

- PROPOSED EXTRACTION WELL
- EXISTING EXTRACTION WELL
- PROPOSED AIR SPARGE WELL
- EXISTING VAPOR MONITORING POINT
- PROPOSED MONITORING WELL
- EXISTING SOIL BORING & TEMPORARY GROUNDWATER WELL
- EXISTING OVERBURDEN GROUNDWATER WELL (INSTALLED BY OTHERS)
- EXISTING OVERBURDEN GROUNDWATER WELL (INSTALLED BY CORE)
- EXISTING BEDROCK GROUNDWATER WELL (INSTALLED BY OTHERS)
- EXISTING BEDROCK GROUNDWATER WELL (INSTALLED BY CORE)
- 121C — SUITE/OFFICE NUMBER
- ELEVATOR
- DRAIN
- MANHOLE
- POWER CONDUIT
- SIGNAL CONDUIT
- ABOVE GRADE AIR SPARGE PIPING
- ABOVE GRADE SVE PIPING

ELECTRICAL

- SC 1 — SYSTEM CONTROL PANEL
- T_x — LINE VOLTAGE THERMOSTAT – EXPLOSION PROOF
- J_x — JUNCTION BOX (EXPLOSION PROOF)
- GFI — GROUND FAULT INTERRUPTED (GFI) PURPOSE RECEPTACLE (WEATHER TIGHT BOX)
- NO. 10 — HASH MARKS INDICATE QUANTITY OF WIRE, NUMBER INDICATES SIZE OF WIRE OTHER THAN NO. 12 AWG. ALL UNMARKED CONDUITS TO CONTAIN 2-NO. 12 AWG PLUS GROUND WIRE, UNLESS NOTED OTHERWISE
- EXP. M — EXPLOSION PROOF MOTOR AS NOTED
- S EP — SWITCH – EXPLOSION PROOF 120 VAC
- LS CA-40 — LEVEL SWITCH – EXPLOSION PROOF
- EP — LOCAL DISCONNECT – EXPLOSION PROOF
- EF-1 — EXHAUST FAN
- 2 AL — ALARM LIGHT
- SP — SAMPLE PORT

MECHANICAL

- Y STRAINER
- MANUALLY OPERATED BALL VALVE
- CHECK VALVE
- S — SOLENOID VALVE
- VACUUM RELIEF VALVE
- PRESSURE RELIEF VALVE
- F — AIR FILTER
- B-101 — AIR BLOWER
- P-101 — PROCESS PUMP
- BLOWER SILENCER
- HEAT EXCHANGER
- C-101 — 3 STAGE ROTARY COMPRESSOR
- VGAC-1 — 10 VAPOR PHASE GRANULAR ACTIVATED CARBON UNIT

ABBREVIATIONS

ATM	–	ATMOSPHERE
BGS	–	BELOW GROUND SURFACE
BTUH	–	BRITISH THERMAL UNITS PER HOUR
CD	–	CONDENSATE
CFM	–	CUBIC FEET PER MINUTE
CW	–	COLD WATER
DIA	–	DIAMETER
EXP	–	EXPLOSION PROOF
FH	–	FLEXIBLE HOSE
FP	–	FREE PRODUCT
GPM	–	GALLONS PER MINUTE
GW	–	GROUNDWATER
HP	–	HORSE POWER
LBS	–	POUNDS
NA	–	NOT APPLICABLE
N.O.	–	NORMALLY OPEN
N.C.	–	NORMALLY CLOSED
N.T.S.	–	NOT TO SCALE
PVC	–	POLYVINYLCHLORIDE
SC	–	SYSTEM CONTROL PANEL
S.P.	–	SAMPLE PORT
STL	–	STEEL PIPE
SV	–	SOIL VAPOR
SW	–	SEAL WATER
TDH	–	TOTAL DYNAMIC HEAD
TF	–	TOTAL FLUIDS
TW	–	TREATED WATER
TYP	–	TYPICAL
SVE	–	SOIL VAPOR EXTRACTION
SSDS.	–	SUB-SLAB DEPRESSURIZATION SYSTEM
VGAC	–	VAPOR PHASE GRANULAR ACTIVATED CARBON

I, SHEILA RANSBOTTOM, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THESE REMEDIAL WORK PLAN (AIR SPARGE SYSTEM) DESIGN PLANS WERE PREPARED IN ACCORDANCE WITH ALL APPLICABLE STATUTES AND REGULATIONS AND IN SUBSTANTIAL CONFORMANCE WITH THE DER TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION (DER-10) AND THAT ALL ACTIVITIES WERE PERFORMED IN FULL ACCORDANCE WITH THE NYSDEC-APPROVED WORK PLAN AND ANY NYSDEC-APPROVED MODIFICATIONS.

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
46-11 54TH AVENUE, MASPETH, N.Y. 11378, T: 718-762-0544, F: 718-762-0545
2312 WEHRLE DRIVE, BUFFALO, N.Y. 14221, T: 716-204-8054, F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

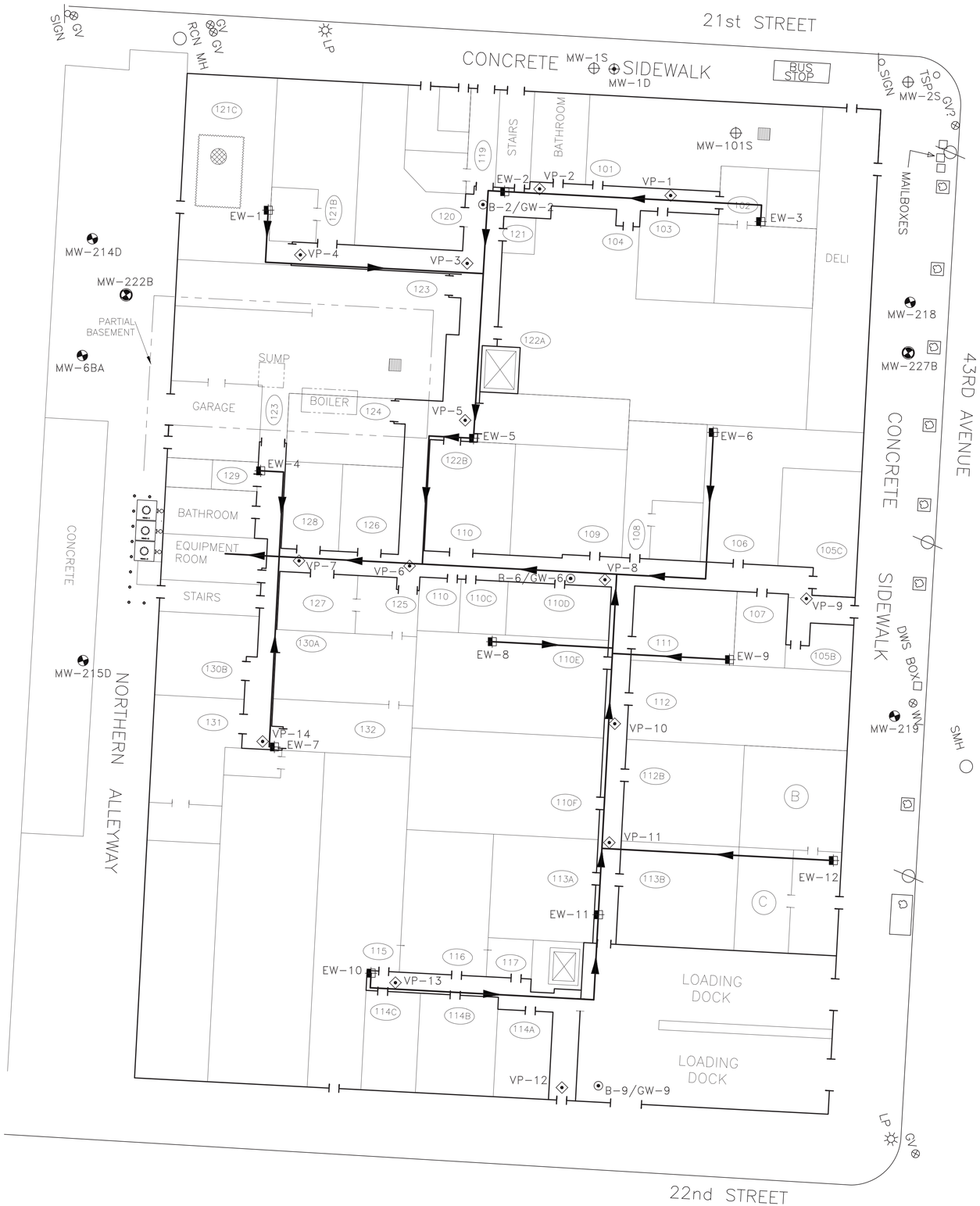
ABBREVIATIONS, NOTES, LEGEND & INDEX OF DRAWINGS

SEAL & SIGNATURE

STATE OF NEW YORK — SHEILA A. RANSBOTTOM — 090 — LICENSED PROFESSIONAL ENGINEER — NO. OF PAGES

DATE:	04/01/2015
BIN No.:	4005198
DRAWN BY:	BDB
DESIGNED BY:	BDB
CHECKED BY:	SAR, P.E.
APPROVED BY:	SAR, P.E.
DRAWING No.:	G-001.00
SCALE:	
SHEET No.:	2 OF: 10
95% DRAWING	REVISED BY: –

J:\Wills Building – Rockrose\Remedial Work Plan_2015\Air Sparging – SVE\Full Scale\Wills AS-SVE.dwg



LEGEND:

- (121C) SUITE/OFFICE NUMBER
- ELEVATOR
- FLOOR DRAIN (10"X10")
- MANHOLE (24")
- HOUSE SEWER TRAP VAULT (4'x8')
- BELOW GRADE STRUCTURE
- EXISTING EXTRACTION WELL
- EXISTING VAPOR MONITORING POINT
- EXISTING SOIL BORING & TEMPORARY MONITORING WELL
- EXISTING OVERBURDEN MONITORING WELL (INSTALLED BY OTHERS
- EXISTING OVERBURDEN MONITORING WELL (INSTALLED BY CORE)
- EXISTING BEDROCK MONITORING WELL (INSTALLED BY OTHERS
- EXISTING BEDROCK MONITORING WELL (INSTALLED BY CORE)

16FT 0 16FT
SCALE

I, SHEILA RANSBOTTOM, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THESE REMEDIAL WORK PLAN (AIR SPARGE SYSTEM) DESIGN PLANS WERE PREPARED IN ACCORDANCE WITH ALL APPLICABLE STATUTES AND REGULATIONS AND IN SUBSTANTIAL CONFORMANCE WITH THE DER TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION (DER-10) AND THAT ALL ACTIVITIES WERE PERFORMED IN FULL ACCORDANCE WITH THE NYSDEC-APPROVED WORK PLAN AND ANY NYSDEC-APPROVED MODIFICATIONS.

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
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F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

EXISTING SITE PLAN
1ST FLOOR

SEAL & SIGNATURE

STATE OF NEW YORK
SHEILA A. RANSBOTTOM
NO. 075921
LICENSED PROFESSIONAL ENGINEER

DATE:	04/01/2015
BIN No.:	4005198
DRAWN BY:	BDB
DESIGNED BY:	BDB
CHECKED BY:	SAR, P.E.
APPROVED BY:	SAR, P.E.
DRAWING No.:	H-001.00
SCALE: AS SHOWN	SHEET No.: 3 OF: 10
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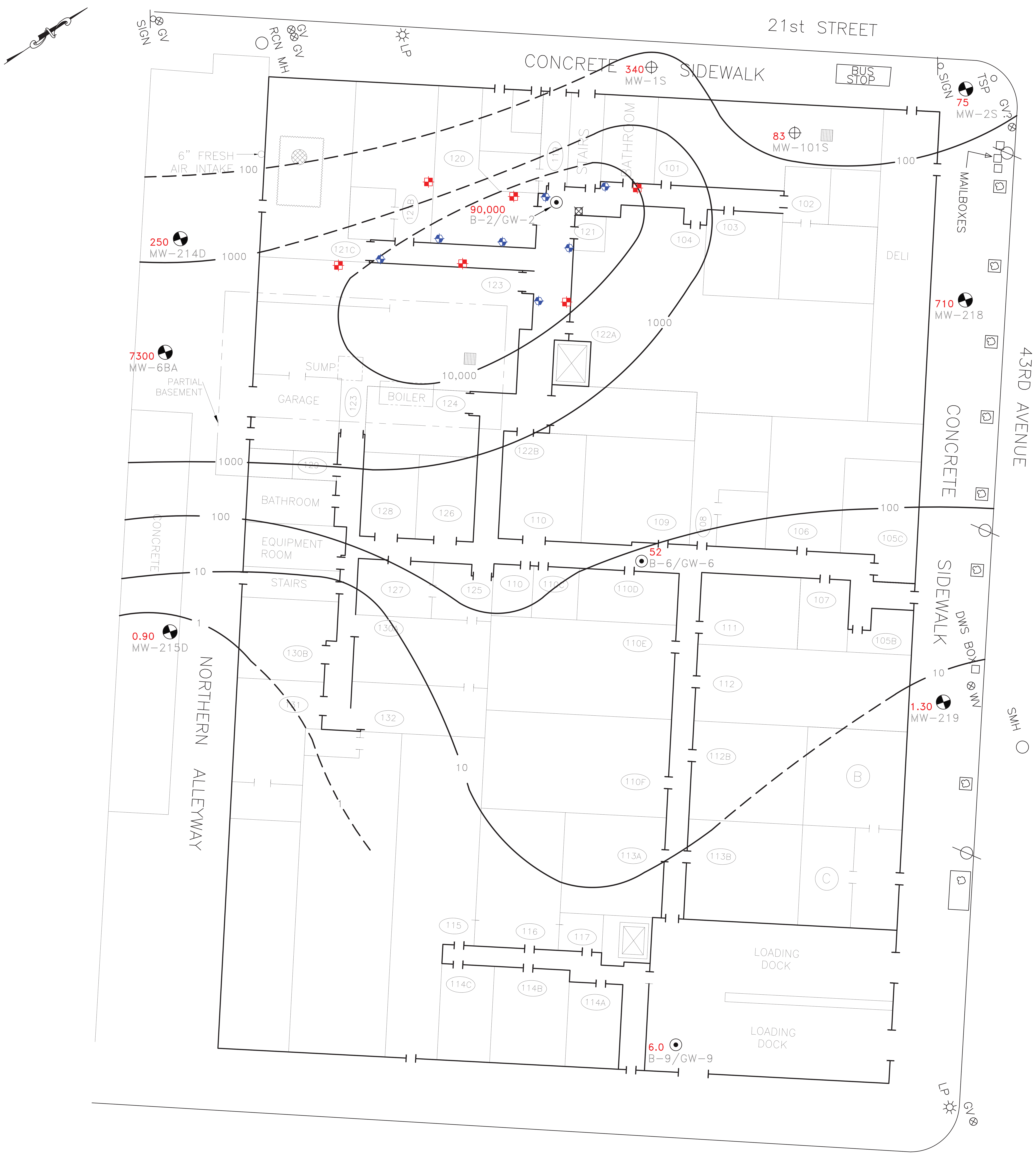

LEGEND:

Symbol	Description
(121C)	SUITE/OFFICE NUMBER
	ELEVATOR
	FLOOR DRAIN (10"X10")
	MANHOLE (24")
	HOUSE SEWER TRAP VAULT (4'x8')
— - —	BELOW GRADE STRUCTURE
MW-214D	EXISTING OVERBURDEN MONITORING WELL (BY OTHERS)
MW-1S	EXISTING CORE OVERBURDEN MONITORING WELL
B-2/GW-2	EXISTING SOIL BORING AND GROUNDWATER SAMPLE LOCATION
340 MW-1S	PCE CONCENTRATION (ppb)
-10-	PCE ISO-CONCENTRATION CONTOURS (ppb)
- - - -	INFERRED PCE ISO-CONCENTRATION CONTOURS
	PROPOSED SVE WELLS
	PROPOSED AIR SPARGE WELLS

16FT 0 16FT
SCALE

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CLIENT NAME

SEAL & SIGNATURE

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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

PCE ISO-CONCENTRATION MAP

SEAL & SIGNATURE	DATE:	04/01/2015
STATE OF NEW YORK · SHEILA A. RANSBOTTOM · NO. 076355 · LICENSED PROFESSIONAL ENGINEER	BIN No.:	4005198
	DRAWN BY:	BDB
	DESIGNED BY:	BDB
	CHECKED BY:	SAR, P.E.
	APPROVED BY:	SAR, P.E.
	DRAWING No.:	H-002.00
SCALE: AS SHOWN	SHEET No.: 4	OF: 10
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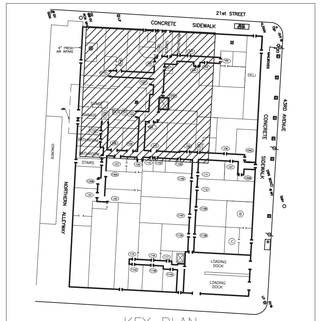
1 REMEDIATION SYSTEMS SITE PLAN – 1ST FLOOR



KEY PLAN

LEGEND:

- PROPOSED MONITORING WELL
- EXISTING EXTRACTION WELL
- PROPOSED EXTRACTION WELL
- PROPOSED AIR SPARGE WELL
- EXISTING SVE SYSTEM PIPING
- PROPOSED SVE SYSTEM PIPING
- PROPOSED AIR SPARGE SYSTEM PIPING
- 121C — SUITE/OFFICE NUMBER
- ELEVATOR
- DRAIN
- MANHOLE
- VGAC-1 — VAPOR PHASE GRANULAR ACTIVATED CARBON UNIT
- HOUSE SEWER TRAP VAULT (4'x8')
- BELOW GRADE STRUCTURE

NOTES:

1. EXISTING SUB-SLAB DEPRESSURIZATION SYSTEM TO REMAIN/BE MODIFIED TO INCLUDE ADDITIONAL SVE SYSTEM.
2. NEW PIPE TO BE FASTENED TO CEILING STRUCTURE BY EXISTING PIPE HANGERS OR NEWLY INSTALLED PIPE HANGERS WHERE REQUIRED.
3. SEE DRAWING H-007.00 FOR PIPE PENETRATION AND WELL INSTALLATION DETAILS.
4. NEW SVE SYSTEM PIPING SHALL TIE INTO EXISITNG SSDS SYSTEM PIPING.

8FT 0 8FT
SCALE

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CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

REMEDIATION SYSTEMS
SITE PLAN
1ST FLOOR

SEAL & SIGNATURE	DATE:	04/01/2015
	BIN No.:	4005198
	DRAWN BY:	BDB
	DESIGNED BY:	BDB
	CHECKED BY:	SAR, P.E.
	APPROVED BY:	SAR, P.E.
	DRAWING No.:	H-003.00
SCALE: AS SHOWN	SHEET No.: 5	OF: 10
95% DRAWING	REVISED BY:	–

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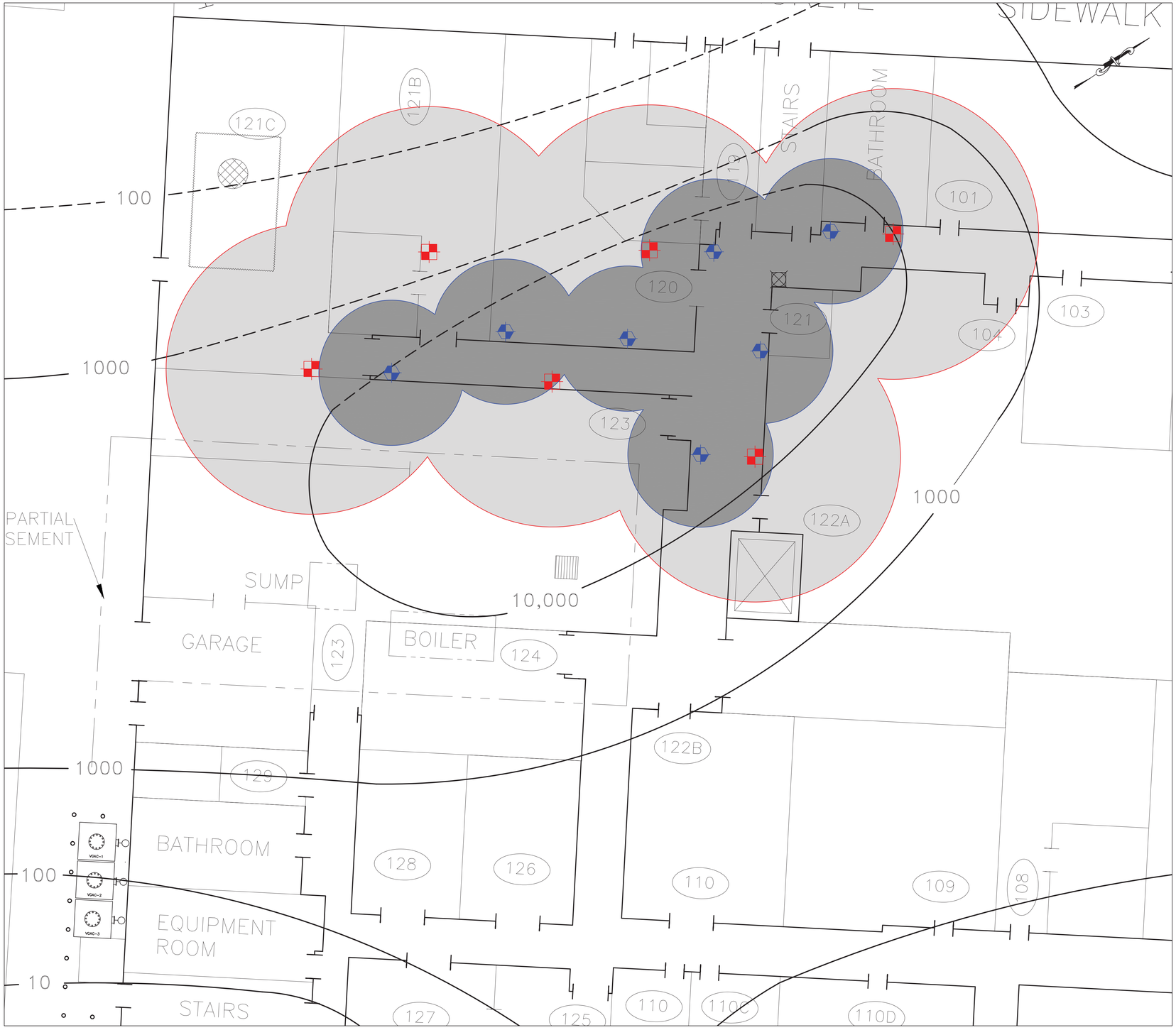
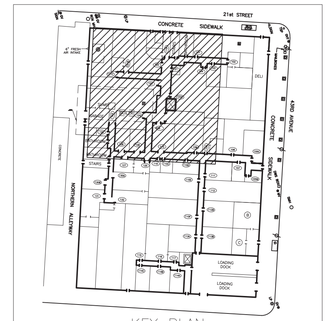


2 ANTICIPATED RADIUS OF INFLUENCE PLAN – 1ST FLOOR



KEY PLAN

LEGEND:

- AIR SPARGE WELL RADIUS OF INFLUENCE (10')
- SVE WELL RADIUS OF INFLUENCE (20')
- PROPOSED MONITORING WELL
- 121C SUITE/OFFICE NUMBER
- ELEVATOR
- DRAIN
- MANHOLE
- VGAC-1 VAPOR PHASE GRANULAR ACTIVATED CARBON UNIT
- 100 PCE ISO-CONCETRATION CONTOUR (ppb)
- INFERRED PCE ISO-CONCENTRATION CONTOUR
- HOUSE SEWER TRAP VAULT (4'x8')
- BELOW GRADE STRUCTURE

8FT 0 8FT
SCALE

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SEAL & SIGNATURE

NO.	REVISIONS	DATE

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T: 716-204-8054
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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

ANTICIPATED
RADIUS OF INFLUENCE
PLAN

SEAL & SIGNATURE	DATE:	04/01/2015
STATE OF NEW YORK · SHEILA A. RANSBOTTOM · NO. 076551 · LICENSED PROFESSIONAL ENGINEER	BIN No.:	4009158
	DRAWN BY:	BDB
	DESIGNED BY:	BDB
	CHECKED BY:	SAR, P.E.
	APPROVED BY:	SAR, P.E.
	DRAWING No.:	H-004.00
SCALE: AS SHOWN	SHEET No.: 6	OF: 10
95% DRAWING	REVISED BY:	–

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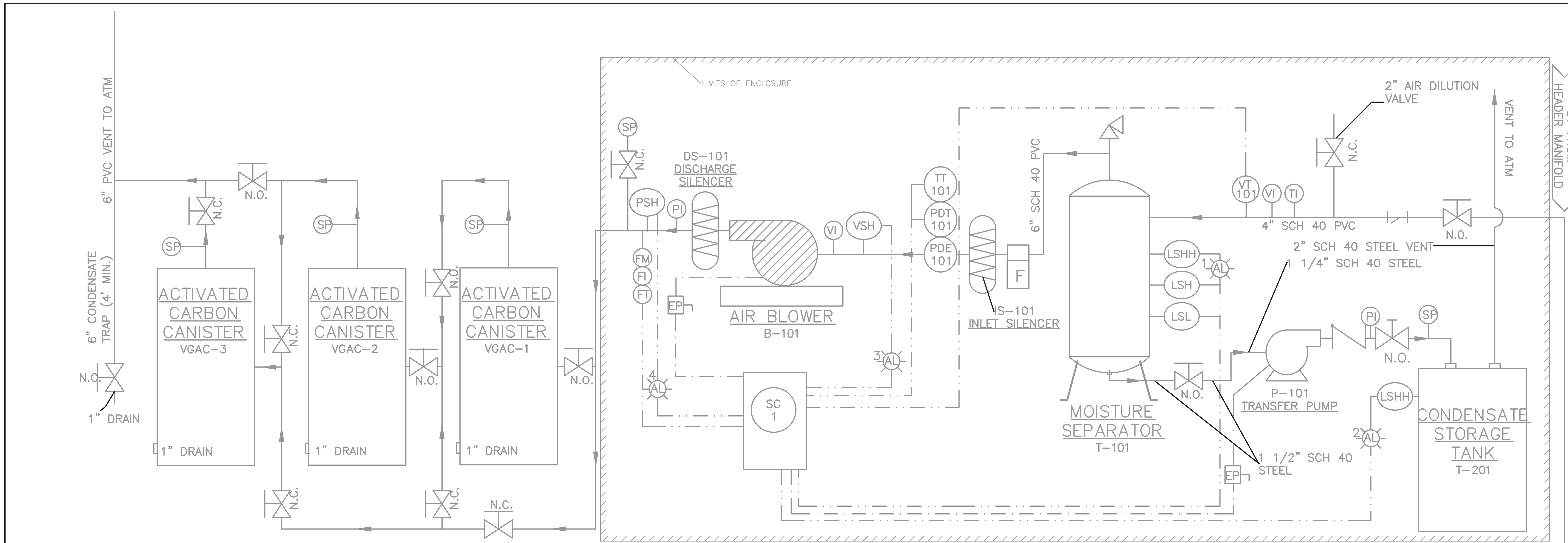

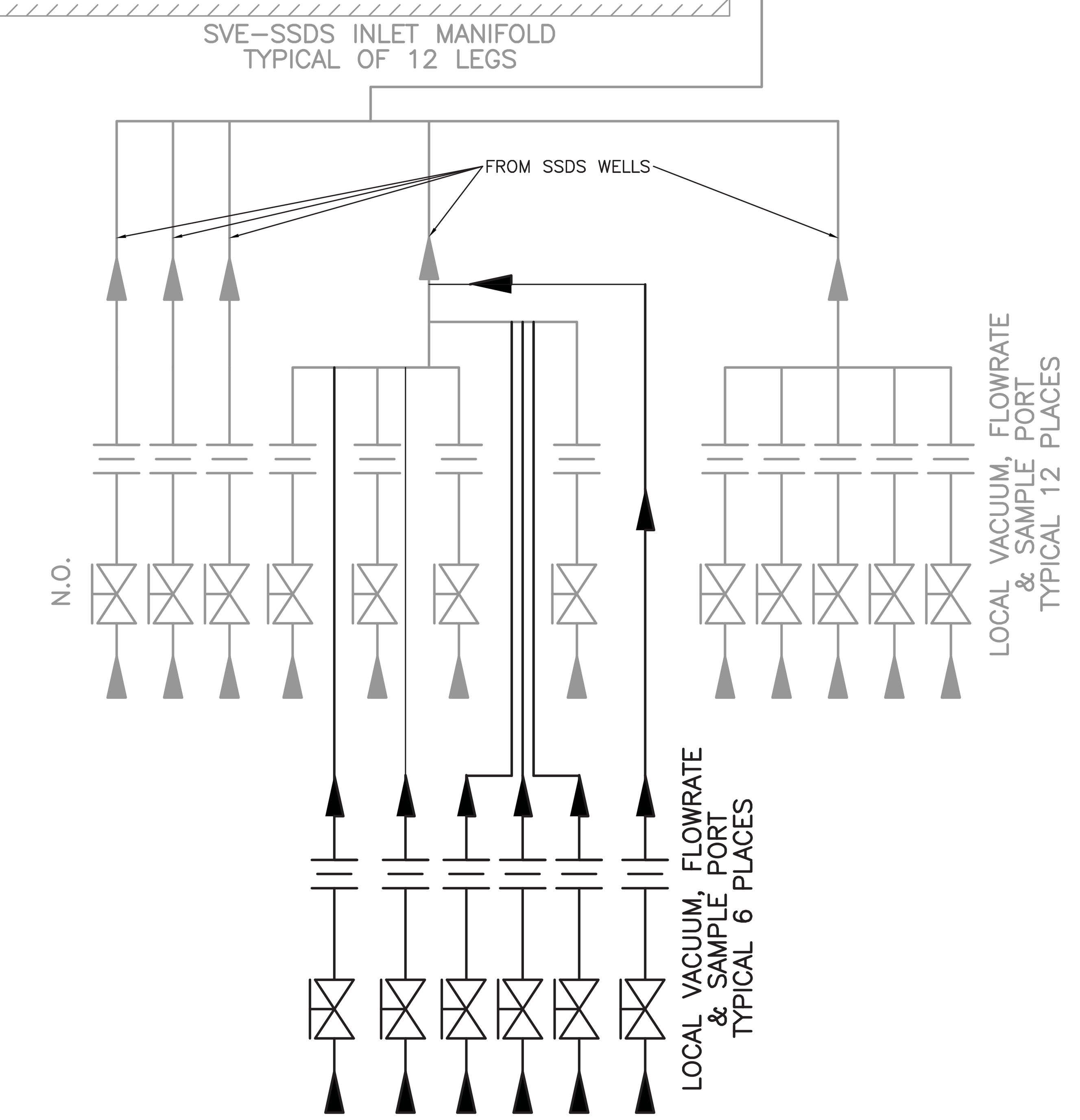

INTERLOCK SCHEDULE

DESIGNATION	FUNCTION
LSHH T-101	B-101 OFF, AL-1 ON
LSH T-101	B-101 OFF, P-101 ON
LSL T-101	B-101 ON, P-101 OFF
LSHH T-201	P-101 OFF, AL-2 ON
VSH B-101	B-101 OFF, AL-3 ON
PSH B-101	B-101 OFF, AL-4 ON
VARIOUS TRANSMITTERS	TELEMETRY ONLY

EQUIPMENT SCHEDULE

I.D.	DESCRIPTION	CAPACITY	MOTOR	MANUFACTURER/MODEL
VGAC-1	VAPOR PHASE CARBON ADSORBER	1500 CFM @ 65" WC 2000 LBS CARBON	NA	TETRASOLV VFV-2000
VGAC-2	VAPOR PHASE CARBON ADSORBER	1500 CFM @ 65" WC 2000 LBS CARBON	NA	TETRASOLV VFV-2000
VGAC-3	VAPOR PHASE CARBON ADSORBER	1500 CFM @ 65" WC 2000 LBS CARBON	NA	TETRASOLV VFV-2000
P-101	CENTIFUGAL TRANSFER PUMP	10 GPM @ 75 FT TDH	1 HP EXP.	WEG 25 HP
B-101	BLOWER	1000 SCFM @ 108" WC VACUUM (8"Hg)	25 HP EXP 1,700 RPM	ROOTS 615 URAI
T-101	MOISTURE SEPARATOR	120 GALLON LIQUID HOLDING CAPACITY	NA	ACS DEMISTER
T-201	CONDENSATE STORAGE TANK	275 GALLON	NA	GRANBY UL142 20420_
SC-1	SYSTEM CONTROL PANEL	230V/3/60	NA	EDS RESEARCH SERIES 2 PLUS TYPE A1 MASTER PLC
IS-101	INLET SILENCER	30-40dB @ 63-4K Hz	NA	STODDARD D13H-6
DS-101	DISCHARGE SILENCER	30-40DB @ 63-4K HZ	NA	STODDARD D33H-6

INSTRUMENT IDENTIFICATION LETTERS

	FIRST LETTER		SUCCEEDING LETTERS	
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION & MODIFIER
A			ALARM	
C				CONTROL
D			DIFFERENTIAL	
E			SENSOR (PRIMARY ELEMENT)	
F	FLOW			
H	HAND			HIGH
I			INDICATOR	
K	TIME			
L	LEVEL			LOW
M		MONITOR		
P	PRESSURE			
Q		TOTALIZE		
R			RECORD	
S	SYSTEM		SWITCH	
T	TEMPERATURE			SENSOR/ TRANSMITTER
V	VACUUM			VALVE
Y	EVENT, STATE, OR PRESENCE			

NOTES:

1. INSTALL SIX (6) NEW SOIL VAPOR EXTRACTION WELLS AS SPECIFIED ON DRAWINGS H-003.00 & H-007.00.
2. ALL EQUIPMENT SHOWN IS EXISTING AND SHOWN FOR INFORMATIONAL PURPOSES ONLY, EXCEPT FOR NEW SVE WELLS AND CONNECTIONS.

I, SHEILA RANSBOTTOM, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THESE REMEDIAL WORK PLAN (AIR SPARGE SYSTEM) DESIGN PLANS WERE PREPARED IN ACCORDANCE WITH ALL APPLICABLE STATUTES AND REGULATIONS AND IN SUBSTANTIAL CONFORMANCE WITH THE DER TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION (DER-10) AND THAT ALL ACTIVITIES WERE PERFORMED IN FULL ACCORDANCE WITH THE NYSDEC-APPROVED WORK PLAN AND ANY NYSDEC-APPROVED MODIFICATIONS.

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

CORE ENVIRONMENTAL CONSULTANTS
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2312 WEHRLE DRIVE BUFFALO, N.Y. 14221 T: 716-204-8054 F: 716-204-8557
www.COREenv.com

PROJECT TITLE:
THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:
INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:
SOIL VAPOR EXTRACTION SYSTEM PROCESS & INSTRUMENTATION DIAGRAM

SEAL & SIGNATURE

STATE OF NEW YORK · SHEILA A. RANSBOTTOM · NO. 076355 · LICENSED PROFESSIONAL ENGINEER

DATE:	04/01/2015
BIN No.:	4009158
DRAWN BY:	BDB
DESIGNED BY:	BDB
CHECKED BY:	SAR, P.E.
APPROVED BY:	SAR, P.E.
DRAWING No.:	H-005.00
SCALE:	
SHEET No.: 7	OF: 10
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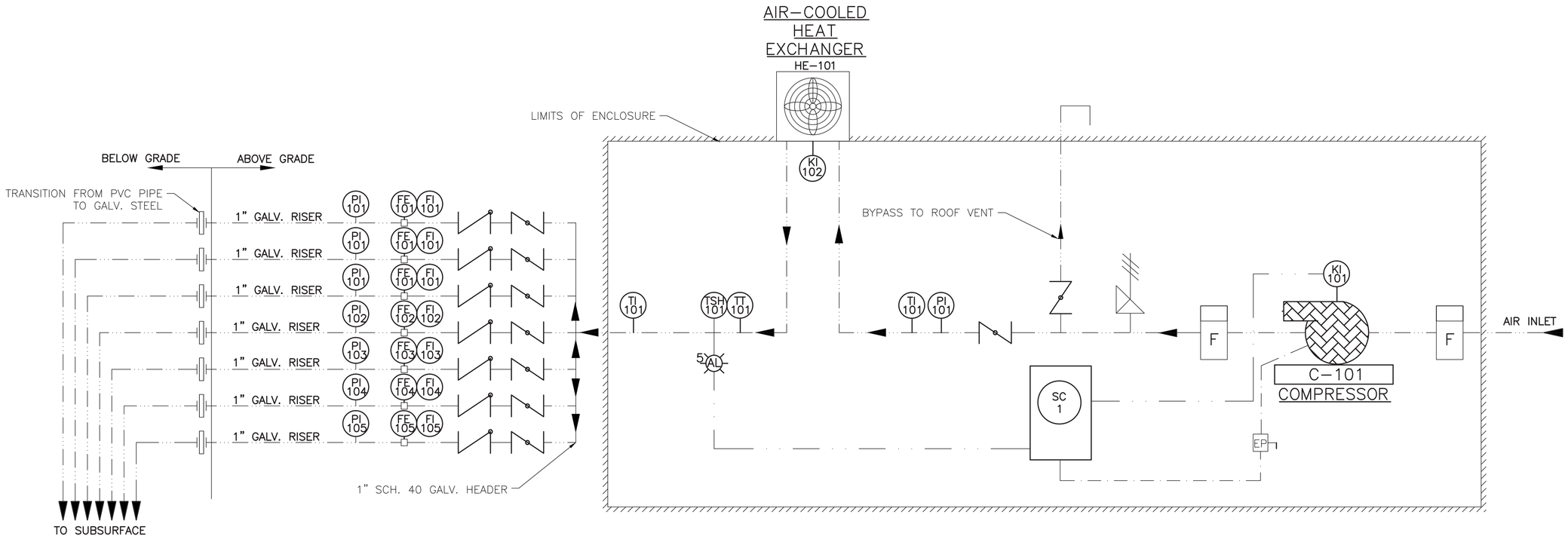

INTERLOCK SCHEDULE

DESIGNATION	FUNCTION
TSH HE–101	HE–101 ON, AL–5 ON
VARIOUS TRANSMITTERS	TELEMETRY ONLY

EQUIPMENT SCHEDULE

I.D.	DESCRIPTION	CAPACITY	MOTOR	MANUFACTURER/MODEL
C–101	ROTARY VANE COMPRESSOR	95 CFM FREE AIR @ MAX. PRESSURE	12 HP	BECKERS KDT 3.140
HE–101	HEAT EXCHANGER	MAX. AMBIENT TEMP 150 DEGREES F/140 CFM	81W/60Hz	FANTECH AEV1000
SC–1	SYSTEM CONTROL PANEL	230V/3/60	NA	EDS RESEARCH SERIES 2 PLUS TYPE A1 MASTER PLC

NOTES:

1. INSTALL ALL SIGNAL AND POWER LINES IN RIGID STEEL CONDUIT TO MEET THE REQUIREMENTS OF CLASS 1, DIVISION 1 ATMOSPHERES.
2. COMPRESSOR SHALL BE EQUIPPED WITH HAND–OFF–AUTO SWITCHES AND RUN–LIGHTS LOCATED IN THE SYSTEM CONTROL CABINET (SC–1).
3. STANDARD ROTARY VANE COMPRESSOR SPECIFIED INCLUDES INTEGRAL INLET AND DISCHARGE FILTERS, AND PRESSURE REGULATING VALVE.
4. AIR SPARGING SYSTEM SHALL BE SHUT DOWN IF EXTRACTION BLOWER IS OFF.

INSTRUMENT IDENTIFICATION LETTERS

	FIRST LETTER		SUCCEEDING LETTERS	
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION & MODIFIER
A			ALARM	
C				CONTROL
D			DIFFERENTIAL	
E			SENSOR (PRIMARY ELEMENT)	
F	FLOW			
H	HAND			HIGH
I			INDICATOR	
K	TIME			
L	LEVEL			LOW
M		MONITOR		
P	PRESSURE			
Q		TOTALIZE		
R			RECORD	
S	SYSTEM		SWITCH	
T	TEMPERATURE			SENSOR/ TRANSMITTER
V	VACUUM			VALVE
Y	EVENT, STATE, OR PRESENCE			

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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43–01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

AIR SPARGE
PROCESS & INSTRUMENTATION DIAGRAM

SEAL & SIGNATURE

STATE OF NEW YORK · SHEILA A. RANSBOTTOM · 095766 · LICENSED PROFESSIONAL ENGINEER · NO. 095766

DATE:	04/01/2015
BIN No.:	4009158
DRAWN BY:	BDB
DESIGNED BY:	BDB
CHECKED BY:	SAR, P.E.
APPROVED BY:	SAR, P.E.
DRAWING No.:	H–006.00
SCALE:	
SHEET No.:	8 OF: 10
95% DRAWING	REVISED BY: –

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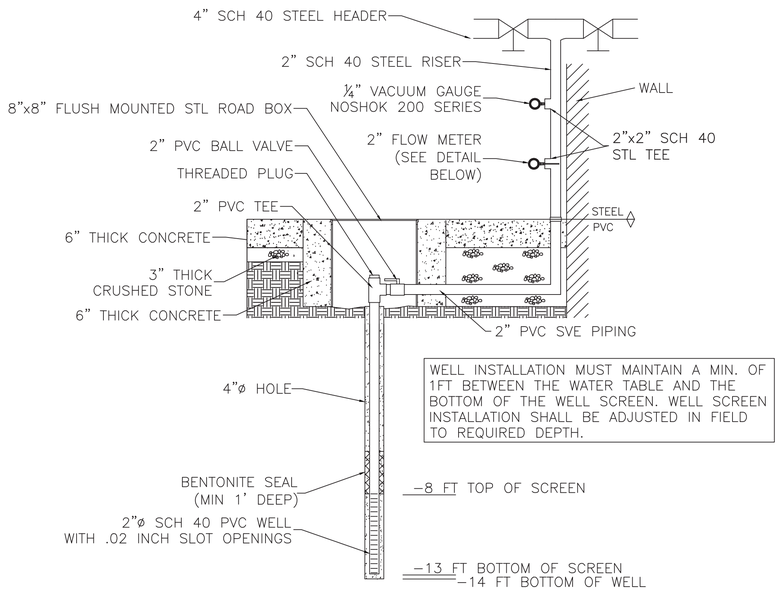
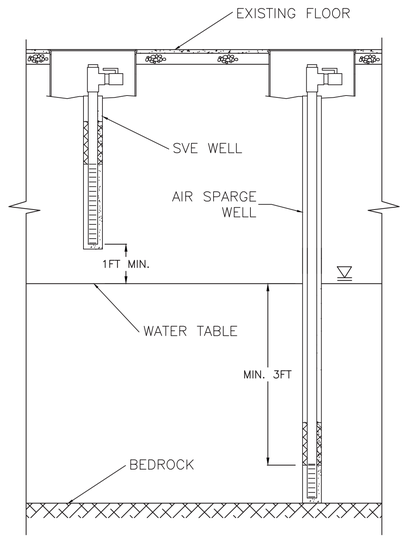


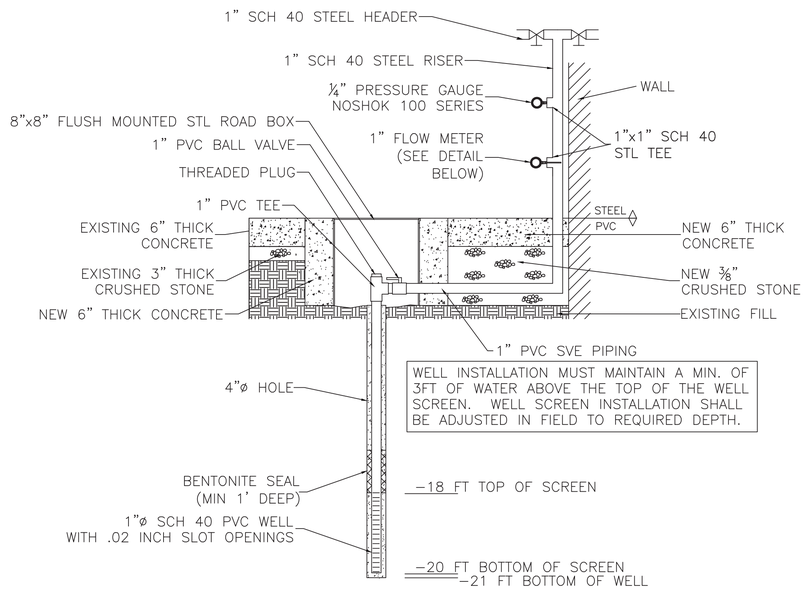
FLUSH MOUNTED SVE WELL CONSTRUCTION DETAIL (TYP.)

NOT TO SCALE



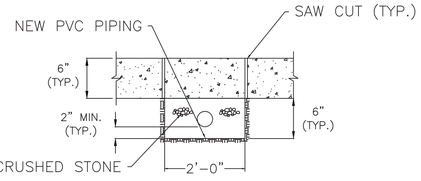
TYPICAL AIR SPARGE & SVE WELL ELEVATION DETAIL

NOT TO SCALE



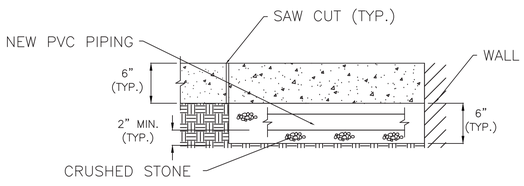
FLUSH MOUNTED AIR SPARGE WELL CONSTRUCTION DETAIL (TYP.)

NOT TO SCALE



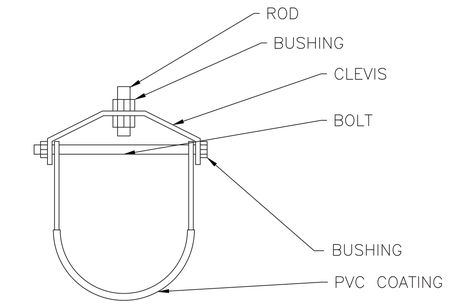
TYPICAL PIPE TRENCH CROSS SECTION DETAIL

NOT TO SCALE



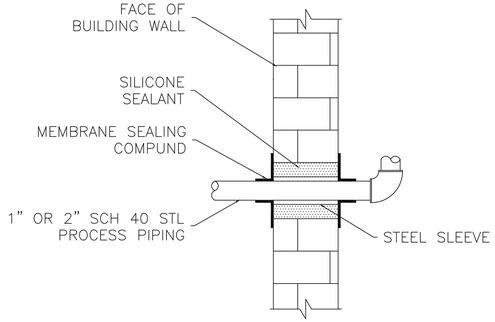
TYPICAL PIPE TRENCH LONGITUDINAL SECTION DETAIL

NOT TO SCALE



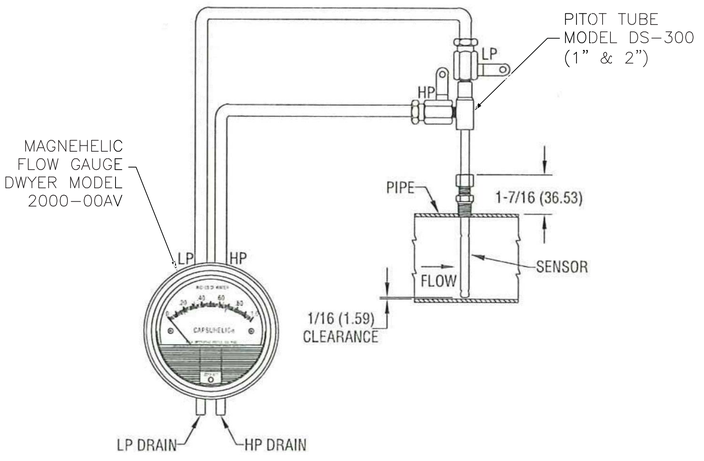
TYPICAL CLEVIS PIPE HANGER DETAIL

NOT TO SCALE



TYPICAL ABOVEGRADE PIPE PENETRATION DETAIL

NOT TO SCALE



FLOW MONITORING DETAIL

NOT TO SCALE

I, SHEILA RANSBOTTOM, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THESE REMEDIAL WORK PLAN (AIR SPARGE SYSTEM) DESIGN PLANS WERE PREPARED IN ACCORDANCE WITH ALL APPLICABLE STATUTES AND REGULATIONS AND IN SUBSTANTIAL CONFORMANCE WITH THE DER TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION (DER-10) AND THAT ALL ACTIVITIES WERE PERFORMED IN FULL ACCORDANCE WITH THE NYSDEC-APPROVED WORK PLAN AND ANY NYSDEC-APPROVED MODIFICATIONS.

CLIENT NAME

SEAL & SIGNATURE

NO.	REVISIONS	DATE

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2312 WEHRLE DRIVE
BUFFALO, N.Y. 14221
T: 716-204-8054
F: 716-204-8557
www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

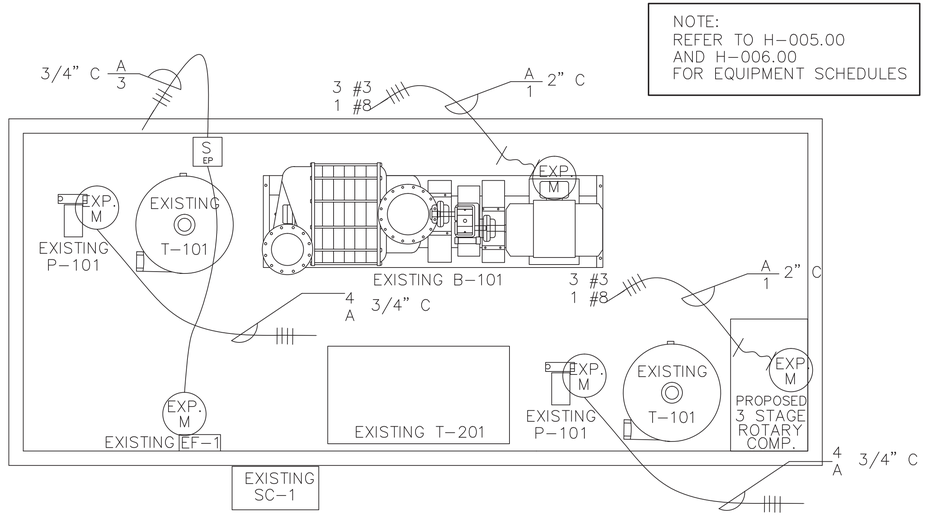
DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

MISCELLANEOUS DETAILS

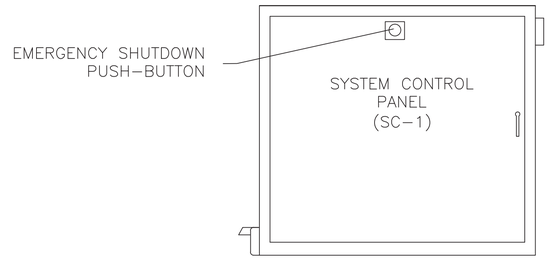
SEAL & SIGNATURE		
	DATE:	04/01/2015
	BIN No.:	4009158
	DRAWN BY:	BDB
	DESIGNED BY:	BDB
	CHECKED BY:	SAR, P.E.
	APPROVED BY:	SAR, P.E.
	DRAWING No.:	H-007.00
SCALE: NOT TO SCALE	SHEET No.: 9	OF: 10
95% DRAWING	REVISED BY:	–



TREATMENT ROOM ELECTRICAL POWER PLAN

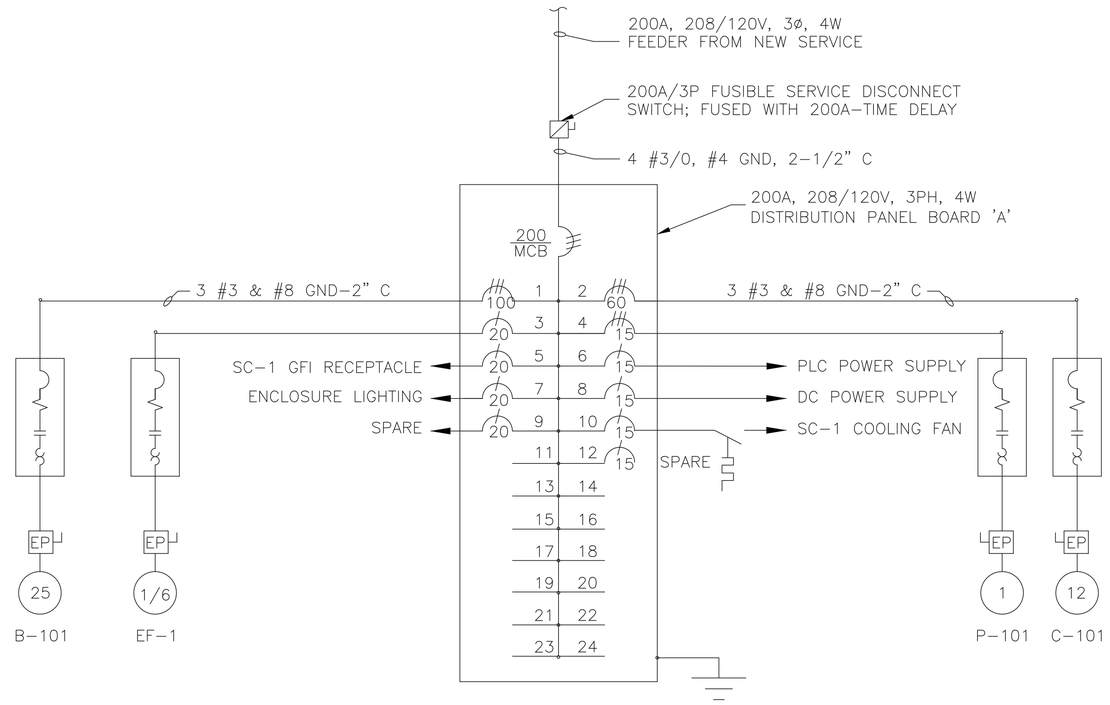
NOTES:

1. MOUNT CONDUITS BETWEEN EQUIPMENT, DEVICES ON MECHANICAL SUPPORTS. ALL FITTINGS, CONDUITS AND BOXES SHALL BE NEMA 7 CONSTRUCTION MEETING OR EXCEEDING EXPLOSION PROOF CLASS 1, DIVISION 1, GROUP D.
2. GROUND ELECTRICAL PANEL AND EQUIPMENT IN ACCORDANCE WITH THE NYC ELECTRICAL CODE AND NEC. PROVIDE ALL NECESSARY GROUNDING RODS, WIRE AND CONNECTIONS TO INSTALL A COMPLETE GROUNDING SYSTEM.
3. ELECTRICAL DETAILS SHOWN REPRESENT GENERAL LAYOUT AND CONFIGURATION ONLY. NOT ALL EQUIPMENT AND APPURTENANCES ARE SHOWN. PROVIDE AND INSTALL ALL EQUIPMENT, CONDUIT, WIRE, PANELS, AND APPURTENANCES REQUIRED FOR A COMPLETE INSTALLATION.
4. CONTROL PANEL DETAILS ARE FOR A TYPICAL INSTALLATION AND MAY NOT REPRESENT ALL EQUIPMENT REQUIRED FOR A COMPLETE INSTALLATION. SUBMIT PROPOSED PANEL EQUIPMENT AND CONFIGURATION IN ACCORDANCE WITH SPECIFICATIONS.
5. PROVIDE EXPLOSION PROOF EQUIPMENT WHERE REQUIRED.



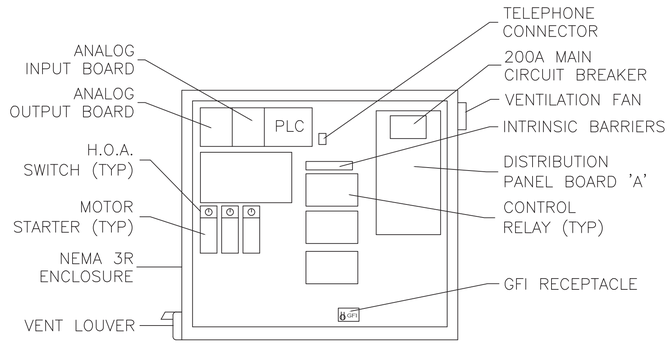
TYPICAL SC-1 PANEL EXTERIOR

NOT TO SCALE



SYSTEM SINGLE LINE DIAGRAM

NOT TO SCALE



TYPICAL SC-1 PANEL INTERIOR

NOT TO SCALE

I, SHEILA RANSBOTTOM, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THESE REMEDIAL WORK PLAN (AIR SPARGE SYSTEM) DESIGN PLANS WERE PREPARED IN ACCORDANCE WITH ALL APPLICABLE STATUTES AND REGULATIONS AND IN SUBSTANTIAL CONFORMANCE WITH THE DER TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION (DER-10) AND THAT ALL ACTIVITIES WERE PERFORMED IN FULL ACCORDANCE WITH THE NYSDEC-APPROVED WORK PLAN AND ANY NYSDEC-APPROVED MODIFICATIONS.

CLIENT NAME

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NO.	REVISIONS	DATE

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www.COREenv.com

PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

TREATMENT ROOM EQUIPMENT
LAYOUT PLAN
& ELECTRICAL SCHEMATIC

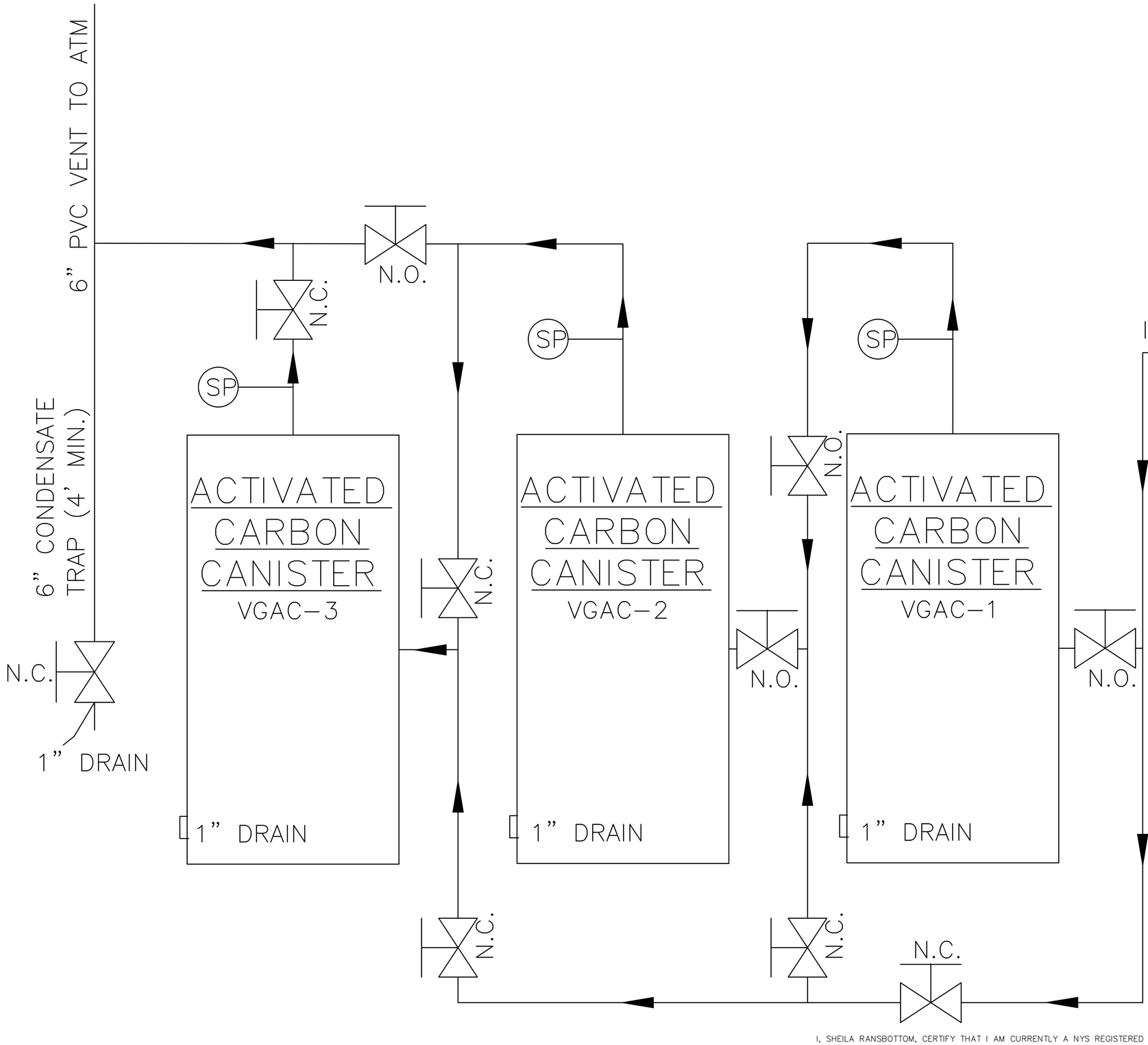
SEAL & SIGNATURE

DATE:	04/01/2015
BIN No.:	4009158
DRAWN BY:	BDB
DESIGNED BY:	BDB
CHECKED BY:	SAR, P.E.
APPROVED BY:	SAR, P.E.
DRAWING No.:	E-001.00
SCALE: NOT TO SCALE	SHEET No.: 10 OF: 10
95% DRAWING	REVISED BY: –

J:\Wills Building – Rockrose\Remedial Work Plan_2015\Air Sparging – SVE\Full Scale\Wills AS-SVE.dwg

APPENDIX D

System Calculations and Monitoring Frequency



I, SHEILA RANSBOTTOM, CERTIFY THAT I AM CURRENTLY A NYS REGISTERED PROFESSIONAL ENGINEER AND THAT THESE REMEDIAL WORK PLAN (AIR SPARGE SYSTEM) DESIGN PLANS WERE PREPARED IN ACCORDANCE WITH ALL APPLICABLE STATUTES AND REGULATIONS AND IN SUBSTANTIAL CONFORMANCE WITH THE DER TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION (DER-10) AND THAT ALL ACTIVITIES WERE PERFORMED IN FULL ACCORDANCE WITH THE NYSDEC-APPROVED WORK PLAN AND ANY NYSDEC-APPROVED MODIFICATIONS.

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NO.	REVISIONS	DATE

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PROJECT TITLE:

THE WILLS BUILDING
43-01 21ST STREET
LONG ISLAND CITY, NY 11103

DESCRIPTION:

INSTALLATION OF AIR SPARGING SYSTEM AND SOIL VAPOR EXTRACTION SYSTEM UPGRADES
REMEDIAL WORK PLAN

DRAWING TITLE:

CARBON ADSORBER
PROCESS & INSTRUMENTATION
DETAIL

SEAL & SIGNATURE		
	DATE:	06/02/2015
	BIN No.:	4009158
	DRAWN BY:	BDB
	DESIGNED BY:	BDB
	CHECKED BY:	SAR, P.E.
	APPROVED BY:	SAR, P.E.
	FIGURE No.: —	
SCALE:	SHEET No.: –	OF: –
95% DRAWING	REVISED BY:	–

J:\Wills Building – Rockrose\Remedial Work Plan_2015\Air Sparging – SVE\Full Scale\Wills AS-SVE.dwg

Prepared By: Benjamin Barrey
Checked By: Sheila Ransbottom

Tetrachloroethylene DAR-1 Impact & Carbon Usage Analysis

The Wills Building

43-01 21st Street
Long Island City, NY 11101

FIELD PARAMETERS:

Est. Influent Concentration:	C_{in} =	200,000	µg/m³	
Est. Percent Reduction:	P.R. =	99.3	%	
Est. Effluent Concentration:	C_{out} =	1400	µg/m³	*=C_{in} x (1-(P.R./100))
Est. Flow rate:	Q_{cfm} =	1400	cfm	

CONSTANTS & CONVERSIONS:

1 mg =	1000.0	µg
1 g =	1000.0	mg
1 lb. =	453.6	g
1 ft^3 =	0.02832	m^3
1 hr. =	60.0	min
1 day =	24.0	hr.
1 yr. =	365.0	days
1 in. H2O =	0.03614	psi

Calculations:

Emission rate:	Q =	0.0073424	lbs./hr.	*=Q_{cfm} x C_{out}
	Q_d =	0.1762172	lbs./day	
	Q_a =	64.3192846	lbs./yr.	

Impact Analysis

Height of Stack	h_s =	46.0	ft	
Height of Building	h_b =	42.0	ft	
Stack to Building Ratio	h_s/h_b =	1.1		
Effective Stack Height	h_e =	46.0	ft	*h_s/h_b < 1.5
Actual Annual Impact	C_a =	0.0700305	µg/m³	*=(6.0 x Q_a)/$h_e^{2.25}$
Potential Annual Impact	C_p =	0.0699506	µg/m³	*=(52000 x Q)/$h_e^{2.25}$
Annual Guidance Concentration	AGC =	4.0	µg/m³	*C_p < AGC

C_p > AGC but C_a < AGC = No

Short term impact	C_{ST} =	4.54679	µg/m³	* =C_p x 65 *Not adjusted
Short term Guideline Concentration	SGC =	300.0	µg/m³	*C_{ST} < SGC

Prepared By: Benjamin Barrey
Checked By: Sheila Ransbottom

Tetrachloroethylene DAR-1 Impact & Carbon Usage Analysis

The Wills Building

43-01 21st Street
Long Island City, NY 11101

Contaminate :	pce		**T =**	**(6,430,000xSxW) / (QxMxC)**
Concentration (PPMV) :	35	*200,000 µg/m^3		
M (Mol Wt) =	165			**Life Expectancy of Carbon**
S (% capacity) =	0.475	* Standard R.H.	**T =**	755.53 Hours
W (lbs of C) =	2000		**T =**	**31.48 Days (24Hr)**
KG =	909			**Carbon Use per 24Hr Day**
Q (cfm air flow) =	1400		**W =**	63.53 Lbs Per Day
CuM / Hr =	2379		**W =**	2.65 Lbs Per Hour

Compound	MW	Concentration	S =	Concentration	S =
TCE =	131.39	10 ppmv	0.19		
PCE =	165.83	10 ppmv	0.39	35 ppmv	0.475

Estimated Mass of PCE Removed

$$\Delta m_{PCE} = (Influent\ Concentration)(Flowrate)\left(\frac{60\ min.}{hr.}\right)\left(\frac{m^3}{35.31\ ft^3}\right)\left(\frac{lb.}{4.54x10^8 \mu g}\right)$$

$$\Delta m_{PCE} = \left(200{,}000\frac{\mu g}{m^3}\right)(1400\ cfm)\left(\frac{60\ min.}{hr.}\right)\left(\frac{m^3}{35.31\ ft^3}\right)\left(\frac{lb.}{4.54x10^8 \mu g}\right)$$

$$\Delta m_{PCE} = 1.05\frac{lbs.}{hr.}$$

$$\Delta m_{PCE} = \left(1.05\frac{lbs.}{hr.}\right)(24\ hrs.)$$

$$\Delta m_{PCE} = 25.15\frac{lbs.}{day}$$

$$\Delta m_{PCE} = \left(25.15\frac{lbs.}{day}\right)(365\ days)$$

$$\Delta m_{PCE} = \sim 9180\frac{lbs.}{yr.}$$

Compound	C_p	AGC	C_{ST}	SGC
Styrene	7.8E-05	1000	0.00505	17000
p-Ethyltoluene	7.4E-05	1.30E-01	0.00484	1300
p- & m- Xylenes	0.00023	100	0.01473	22000
o-Xylene	5.2E-05	100	0.00337	22000
n-Hexane	0.00371	700	0.24115	N/A
n-Heptane	0.00019	3900	0.01206	210000
Methylene Chloride	0.01012	60	0.65794	14000
p-Bromofluorobenzene	0.0004	1.30E-01	0.02621	1300
Isopropanol	0.00186	7000	0.12065	98000
Ethyl Benzene	5.6E-05	1000	0.00365	N/A
Cyclohexane	0.00041	6000	0.02651	N/A
Chloromethane	6.5E-05	90	0.00421	22000
Chloroform	0.00082	14.7	0.05317	150
Trichloroethylene	0.02202	2.00E-01	1.43134	14000
Benzene	9E-05	1.30E-01	0.00582	1300
Acetone	0.00851	30000	0.55343	180000
2-Butanone	0.00028	5000	0.01817	13000
1,2,4-Trimethylbenzene	9.6E-05	1.30E-01	0.00624	1300
Toluene	0.00265	5000	0.17255	37000
Methyl Methacrylate	0.00013	700	0.00842	41000
Tetrahydrofuran	0.00012	350	0.00807	30000
Tetrachloroethylene	0.49964	4	32.4763	300

*C_p = DAR-1 Estimated Annual Potential Impact (ug/m3)

*C_{ST} = DAR-1 Estimated Short term Impact (ug/m3)

*AGC = DAR-1 Annual Guidance Concentration (ug/m3)

*SGC = DAR-1 Short-term Guidance Concentration (ug/m3)

Sample ID	15A0658-01	15A0870-01	15A0909-03	15B0279-01	15C0502-01	15D1215-01	15E0806-01
Sample Type	Carbon-In	Carbon-In	Carbon-In	Carbon-In	Carbon-In	Carbon-In	Carbon-In
Sample Date	1/21/2015	1/28/2015	1/29/2015	2/9/2015	3/17/2015	4/29/2015	5/20/2015
Volatile Organic Compound	**($\mu g/m^3$)**						
Vinyl Chloride	0	0	0	0	0	0	0
Styrene	0	0	7.2	0	0	0	0
Propylene	0	0	0	0	0	0	0
p-Ethyltoluene	0	0	6.9	0	0	0	0
p- & m- Xylenes	0	0	21	0	0	0	0
o-Xylene	0	0	4.8	0	0	0	0
n-Hexane	81	13	18	7.8	160	41	23
n-Heptane	0	0	7.8	0	4.5	0	4.9
Methylene Chloride	260	120	120	83	85	130	140
Methyl tert-butyl ether (MTBE)	0	0	0	0	0	0	0
p-Bromofluorobenzene	8.9	9.24	9.55	9.68	0	0	0
4-Methyl-2-pentanone	0	0	0	0	0	0	0
Isopropanol	0	13	40	16	15	22	66
Hexachlorobutadiene	0	0	0	0	0	0	0
Ethyl Benzene	0	0	5.2	0	0	0	0
Ethyl acetate	0	0	0	0	0	0	0
Vinyl acetate	0	0	0	0	0	0	0
Cyclohexane	0	8.9	8.3	0	12	8.6	0
cis-1,3-Dichloropropylene	0	0	0	0	0	0	0
cis-1,2-Dichloroethylene	0	0	0	0	0	0	0
Chloromethane	0	3.1	2.9	0	0	0	0
Chloroform	0	5.4	8.3	6.8	0	7.3	48
Chloroethane	0	0	0	0	0	0	0
Carbon tetrachloride	0	0	0	0	0	0	0
Carbon disulfide	0	0	0	0	0	0	0
Bromomethane	0	0	0	0	0	0	0
Trichloroethylene	2000	9.1	17	7.5	0	0	7
Bromoform	0	0	0	0	0	0	0
Bromodichloromethane	0	0	0	0	0	0	0
Benzyl chloride	0	0	0	0	0	0	0
Benzene	0	0	0	0	0	5.1	3.2
Acetone	190	46	140	50	63	120	180
2-Hexanone	0	0	0	0	0	0	0
trans-1,3-Dichloropropylene	0	0	0	0	0	0	0
2-Butanone	0	8.3	6.8	0	2.9	4.4	3.5
1,4-Dioxane	0	0	0	0	0	0	0
1,4-Dichlorobenzene	0	0	0	0	0	0	0
1,3-Dichlorobenzene	0	0	0	0	0	0	0
1,3-Butadiene	0	0	0	0	0	0	0
1,3,5-Trimethylbenzene	0	0	0	0	0	0	0
1,2-Dichlorotetrafluoroethane	0	0	0	0	0	0	0
trans-1,2-Dichloroethylene	0	0	0	0	0	0	0
1,2-Dichloropropane	0	0	0	0	0	0	0
1,2-Dichloroethane	0	0	0	0	0	0	0
1,2-Dichlorobenzene	0	0	0	0	0	0	0
1,2,4-Trimethylbenzene	0	0	7.9	0	0	0	1
1,2,4-Trichlorobenzene	0	0	0	0	0	0	0
1,1-Dichloroethylene	0	0	0	0	0	0	0
Toluene	45	29	61	29	31	20	31
1,1-Dichloroethane	0	0	0	0	0	0	0
Trichlorofluoromethane (Freon 11)	0	0	0	0	0	0	0
1,1,2-Trichloroethane	0	0	0	0	0	0	0
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 11	0	0	0	0	0	0	0
1,1,2,2-Tetrachloroethane	0	0	0	0	0	0	0
1,1,1-Trichloroethane	0	0	0	0	0	0	0
Dichlorodifluoromethane	0	0	0	0	0	0	0
1,2-Dibromoethane	0	0	0	0	0	0	0
Dibromochloromethane	0	0	0	0	0	0	0
Methyl Methacrylate	0	0	0	0	0	0	12
Tetrahydrofuran	0	4.4	7.1	0	0	0	0
Chlorobenzene	0	0	0	0	0	0	0
Tetrachloroethylene	8700	4200	10000	4400	7200	4600	7200
TOTAL VOCS	11285	4469	10500	4610	7573	4958	7720

	$C_{Observed\ SSDS\ AVG.}$	$C_{in,\ Est.}$	$C_{out,\ Est.}$	Q	Qa	C_p	C_{ST}
Volatile Organic Compound	**(µg/m³)**			**(lb/hr)**	**(lb/yr)**	**(µg/m³)**	
Vinyl Chloride	0	0	0	0.0000000	0.000	0.000000	0.000000
Styrene	1	31	2	0.0000082	0.071	0.000078	0.005050
Propylene	0	0	0	0.0000000	0.000	0.000000	0.000000
p-Ethyltoluene	1	30	1	0.0000078	0.068	0.000074	0.004840
p- & m- Xylenes	3	91	5	0.0000238	0.208	0.000227	0.014730
o-Xylene	1	21	1	0.0000054	0.048	0.000052	0.003367
n-Hexane	49	1485	74	0.0003894	3.411	0.003710	0.241153
n-Heptane	2	74	4	0.0000195	0.171	0.000186	0.012065
Methylene Chloride	134	4052	203	0.0010625	9.307	0.010122	0.657944
Methyl tert-butyl ether (MTBE)	0	0	0	0.0000000	0.000	0.000000	0.000000
p-Bromofluorobenzene	5	161	8	0.0000423	0.371	0.000403	0.026213
4-Methyl-2-pentanone	0	0	0	0.0000000	0.000	0.000000	0.000000
Isopropanol	25	743	37	0.0001948	1.707	0.001856	0.120646
Hexachlorobutadiene	0	0	0	0.0000000	0.000	0.000000	0.000000
Ethyl Benzene	1	22	1	0.0000059	0.052	0.000056	0.003647
Ethyl acetate	0	0	0	0.0000000	0.000	0.000000	0.000000
Vinyl acetate	0	0	0	0.0000000	0.000	0.000000	0.000000
Cyclohexane	5	163	8	0.0000428	0.375	0.000408	0.026514
cis-1,3-Dichloropropylene	0	0	0	0.0000000	0.000	0.000000	0.000000
cis-1,2-Dichloroethylene	0	0	0	0.0000000	0.000	0.000000	0.000000
Chloromethane	1	26	1	0.0000068	0.060	0.000065	0.004209
Chloroform	11	327	16	0.0000859	0.752	0.000818	0.053169
Chloroethane	0	0	0	0.0000000	0.000	0.000000	0.000000
Carbon tetrachloride	0	0	0	0.0000000	0.000	0.000000	0.000000
Carbon disulfide	0	0	0	0.0000000	0.000	0.000000	0.000000
Bromomethane	0	0	0	0.0000000	0.000	0.000000	0.000000
Trichloroethylene	292	8815	441	0.0023114	20.248	0.022021	1.431344
Bromoform	0	0	0	0.0000000	0.000	0.000000	0.000000
Bromodichloromethane	0	0	0	0.0000000	0.000	0.000000	0.000000
Benzyl chloride	0	0	0	0.0000000	0.000	0.000000	0.000000
Benzene	1	36	2	0.0000094	0.082	0.000090	0.005822
Acetone	113	3408	170	0.0008937	7.829	0.008514	0.553430
2-Hexanone	0	0	0	0.0000000	0.000	0.000000	0.000000
trans-1,3-Dichloropropylene	0	0	0	0.0000000	0.000	0.000000	0.000000
2-Butanone	4	112	6	0.0000293	0.257	0.000279	0.018167
1,4-Dioxane	0	0	0	0.0000000	0.000	0.000000	0.000000
1,4-Dichlorobenzene	0	0	0	0.0000000	0.000	0.000000	0.000000
1,3-Dichlorobenzene	0	0	0	0.0000000	0.000	0.000000	0.000000
1,3-Butadiene	0	0	0	0.0000000	0.000	0.000000	0.000000
1,3,5-Trimethylbenzene	0	0	0	0.0000000	0.000	0.000000	0.000000
1,2-Dichlorotetrafluoroethane	0	0	0	0.0000000	0.000	0.000000	0.000000
trans-1,2-Dichloroethylene	0	0	0	0.0000000	0.000	0.000000	0.000000
1,2-Dichloropropane	0	0	0	0.0000000	0.000	0.000000	0.000000
1,2-Dichloroethane	0	0	0	0.0000000	0.000	0.000000	0.000000
1,2-Dichlorobenzene	0	0	0	0.0000000	0.000	0.000000	0.000000
1,2,4-Trimethylbenzene	1	38	2	0.0000101	0.088	0.000096	0.006243
1,2,4-Trichlorobenzene	0	0	0	0.0000000	0.000	0.000000	0.000000
1,1-Dichloroethylene	0	0	0	0.0000000	0.000	0.000000	0.000000
Toluene	35	1063	53	0.0002786	2.441	0.002655	0.172552
1,1-Dichloroethane	0	0	0	0.0000000	0.000	0.000000	0.000000
Trichlorofluoromethane (Freon 11)	0	0	0	0.0000000	0.000	0.000000	0.000000
1,1,2-Trichloroethane	0	0	0	0.0000000	0.000	0.000000	0.000000
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0	0	0	0.0000000	0.000	0.000000	0.000000
1,1,2,2-Tetrachloroethane	0	0	0	0.0000000	0.000	0.000000	0.000000
1,1,1-Trichloroethane	0	0	0	0.0000000	0.000	0.000000	0.000000
Dichlorodifluoromethane	0	0	0	0.0000000	0.000	0.000000	0.000000
1,2-Dibromoethane	0	0	0	0.0000000	0.000	0.000000	0.000000
Dibromochloromethane	0	0	0	0.0000000	0.000	0.000000	0.000000
Methyl Methacrylate	2	52	3	0.0000136	0.119	0.000129	0.008417
Tetrahydrofuran	2	50	2	0.0000130	0.114	0.000124	0.008066
Chlorobenzene	0	0	0	0.0000000	0.000	0.000000	0.000000
Tetrachloroethylene	6614	200000	10000	0.0524444	459.413	0.499636	32.476336
TOTAL VOCS	7302	220800	11040	0.0578987	507.193	0.551599	35.853924

$C_{PCE,anticipated}$	200000.00	µg/m³
Sparging Factor	30.24	
Carbon Efficiency	0.95	
Q_{cfm}	1400.00	*cfm*
H_{stack}	46.00	*ft*
$H_{building}$	42.00	*ft*
H_s/H_b	1.10	
H_e	46.00	*ft*

*Q = Estimated VOC Emmission (lb./hr.)
*Q_a = Estimated VOC Emission (lb./yr.)
*C_p = DAR-1 Estimated Annual Potential Impact (µg/m³)
*C_{ST} = DAR-1 Estimated Short term Impact (µg/m³)
*AGC = DAR-1 Annual Guidance Concentration (µg/m³)
*SGC = DAR-1 Short-term Guidance Concentration (µg/m³)
*Sparging Factor = ($C_{PCE,anticipated}/C_{PCE,\ observed\ SSDS\ avg.}$)

CORE ENVIRONMENTAL CONSULTANTS

Vapor Phase Carbon Adsorber
Annual Sampling Frequency

The Wills Building
43-01 21st Street
Long Island City, New York

VAPOR-PHASE ACTIVATED CARBON ADSORBER SAMPLING FREQUENCY (Weeks 1-26)																											
Location	week 1	week 2	week 3	week 4	week 5	week 6	week 7	week 8	week 9	week 10	week 11	week 12	week 13	week 14	week 15	week 16	week 17	week 18	week 19	week 20	week 21	week 22	week 23	week 24	week 25	week 26	
Influent	X	X	X	X				X				X				X				X				X			
Stack	X	X	X	X				X				X				X				X				X			
Breakthrough	X	X	X	X				X				X				X				X				X			

VAPOR-PHASE ACTIVATED CARBON ADSORBER SAMPLING FREQUENCY (Weeks 27-52)																											
Location	week 27	week 28	week 29	week 30	week 31	week 32	week 33	week 34	week 35	week 36	week 37	week 38	week 39	week 40	week 41	week 42	week 43	week 44	week 45	week 46	week 47	week 48	week 49	week 50	week 51	week 52	
Influent		X				X				X				X				X				X				X	
Stack		X				X				X				X				X				X				X	
Breakthrough		X				X				X				X				X				X				X	

APPENDIX E

System Start-up Data Monitoring Log

CORE ENVIRONMENTAL CONSULTANTS

CORE ENVIRONMENTAL CONSULTANTS

2312 Wehrle Drive, Buffalo, NY 14221 | Phone: 716-204-8054 | Fax: 716-204-8557
46-11 54th Avenue, Maspeth, NY 11378 | Phone: 718-786-4730 | Fax: 718-786-4764

AS-SVE System Start-up Data Monitoring Log

The Wills Building

43-01 21st Street
Long Island City, NY 11101

Technician:						
Date:		**Hours of Operation:**				
Time:		**Total Flow (ft^3):**				
Location	**Flowrate (fpm)**	**Pressure / Vaccuum (in. H2O)**	**DO (ug/L)**	**Temperature (F)**	**Level (in.)**	**Comments**
Blower Inlet (B-101)						
Blower Outlet (B-101)						
Compressor Inlet (C-101)						
Compressor Outlet (C-101)						
Influent VGAC-1						
Effluent VGAC-1						
Effluent VGAC-2						
Separator (T-101)						
Storage Tank (T-201)						
Transfer Pump (P-101)						
Heat exchanger (HE-101)						
Monitoring Well (C-MW-3)						

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AS-SVE System Start-up Data Monitoring Log

The Wills Building

43-01 21st Street
Long Island City, NY 11101

Technician:						
Date:		**Hours of Operation:**				
Time:		**Total Flow (ft^3):**				
Location	**Flowrate (fpm)**	**Pressure / Vaccuum (in. H2O)**	**DO (ug/L)**	**Temperature (F)**	**Level (in.)**	**Comments**
Air Sparge Well 1 (AS-1)						
Air Sparge Well 2 (AS-2)						
Air Sparge Well 3 (AS-3)						
Air Sparge Well 4 (AS-4)						
Air Sparge Well 5 (AS-5)						
Air Sparge Well 6 (AS-6)						
Air Sparge Well 7 (AS-7)						
Extraction well 15 (EW-15)						
Extraction well 16 (EW-16)						
Extraction well 17 (EW-17)						
Extraction well 18 (EW-18)						
Extraction well 19 (EW-19)						
Extraction well 20 (EW-20)						