November 26, 2019

Ms. Jane O'Connell
New York State Department of Environmental Conservation
Division of Environmental Remediation - Region 2
47-40 21st Street
Long Island City, New York 11101

Re: Interim Remedial Measure Work Plan
BCP Applicant: 11-20 46th Road Owner LLC
BCP Site: 11-20 46th Road Site, 11-20 46th Road, Long Island City, New York

Dear Ms. O'Connell:

On behalf of 11-20 46th Road Owner LLC (BCP Applicant), Roux Environmental Engineering and Geology, D.P.C. (Roux) has prepared this Interim Remedial Measure Work Plan (IRMWP) for the site located at 11-20 46th Road, Long Island City, New York (Site) (Figure 1). The Scope of Work (SOW) contained within this IRMWP has been prepared based on the findings from previous soil vapor assessments performed at the Site.

As you are aware based on our previous communications, a New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Application has been prepared for the Site, and this IRMWP is being submitted concurrently with the BCP Application. This IRMWP includes additional investigation tasks designed to further characterize the subsurface impacts and indoor air quality at the Site, as well as vapor intrusion (VI) mitigation tasks, and post-IRM monitoring activities. The overarching goal of this IRMWP is to complete VI mitigation and generate data to confirm the Site is safe for tenant occupancy. This SOW is being submitted to NYSDEC in the form of an IRM, so the vapor mitigation measures and confirmation sampling can be completed in the most expedited timeframe possible, to allow the BCP Applicant to comply with existing lease agreements (note the building is currently unoccupied).

We are fully aware that once this IRM is completed and the building is occupied, a formal Remedial Investigation Work Plan (RIWP) will be submitted to fully assess the subsurface geology/hydrogeology and nature and extent of impacts associated with the Site, and all the subsequent typical and appropriate steps associated with the NYSDEC BCP will be completed.

Background

The Site is approximately 0.229 acres in size and is developed with a commercial building. The building contains a partial subgrade cellar and three upper levels above grade. As part of the Site redevelopment, the existing building was renovated to be suitable for its intended future office and educational use. The building is currently unoccupied while interior construction is being completed. The full building has been leased to Theracare of New York, which will operate the bottom two levels as an education school for children with special needs and the top two stories for administration office use. Based on conversations with the BCP Applicant, the basement slab was removed and replaced in accordance with the Sharon Engineering, P.C. foundation plans, dated September 13, 2016, which included the installation of a 15-mil vapor barrier under the new slab. However, the vapor barrier was not installed over the pile caps and original slabs in the sub-basement.

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California ■ Illinois ■ Massachusetts ■ New Jersey ■ New York ■ Texas

At the BCP Applicant's request, Roux became involved with this project and performed indoor air sampling within the basement space on August 23, 2019 after the Applicant's lender requested soil vapor sampling. A subsequent VI investigation, which included both sub-slab vapor sample collection beneath the basement slab and indoor air sample collection within the basement space and two soil and groundwater samples, was performed on September 26, 2019. Additionally, on October 21, 2019 Roux completed two shallow soil borings, which include the collection of soil and groundwater samples. All sample results are summarized in Tables 1 through 4, and on Figures 2 through 4.

Soil sample results were compared to the NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and groundwater sample results were compared to the NYSDEC Ambient-Water Quality Standards and Guidance Values (AWQSGVs). **Based on the results, no exceedance of either standard was detected in any soil or groundwater samples**. Concentrations of sub-slab vapor and indoor air were compared to the New York State Department of Health (NYSDOH) Soil Vapor / Indoor Air Decision Matrices[1]. Based on the decision matrix, additional assessment and mitigation for tetrachloroethylene (PCE) and trichloroethylene (TCE) in vapor was deemed to be required at the Site. As shown in Table 4 and Figure 4, the most elevated concentration of PCE in sub-slab vapor and indoor air was 2,540 micrograms per cubic meter (ug/m3) and 5.93 ug/m3, respectively, and the most elevated concentration of TCE in sub-slab vapor and indoor air was 200 ug/m3 and 0.704 ug/m3, respectively.

On behalf of the BCP Applicant, shortly after receipt of vapor data indicating mitigation may be required, Roux contacted the New York City Office of Environmental Remediation (NYCOER) to discuss entry into NYCOER's Voluntary Cleanup Program (VCP). The BCP Applicant and Roux attended an OER VCP pre-application meeting at NYCOER's office on October 11, 2019. OER determined that a call with the NYSDEC was required. Based on the call between the BCP Applicant, NYSDEC, NYCOER and Roux on November 18, 2019, NYSDEC determined that the Site is required to participate in the NYS BCP and that NYSDEC will be overseeing this project. Based on this call and as directed by NYSDEC, a BCP Application has been prepared, and is being submitted to NYSDEC (concurrently with this IRMWP).

Proposed Scope of Work

In order to further assess and mitigate the occurrence of VI at the Site, Roux proposes to complete the following tasks as part of this IRMWP SOW:

- Task 1 –Soil and Groundwater Investigation;
- Task 2 – Supplemental Sub-Slab Vapor, Indoor Air, and Ambient Air Sampling;
- Task 3 – Interim VI Mitigation Measures (Including Installation of Sub-Slab Depressurization System and Application of Retro-Coat™);
- Task 4 – Post IRM Performance Monitoring; and
- Task 5 – Reporting.

Since this Site will likely enter the NYSDEC BCP, this IRM SOW will be conducted in accordance with all applicable requirements of the NYSDEC Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10) and applicable NYSDOH guidelines. This includes, but is not limited to, implementing applicable quality assurance protocols, including collection of appropriate QA/QC samples, as well as obtaining full Category B laboratory deliverable so that data can be reviewed by a third-party data validator and a Data Usability Summary Report (DUSR) can be prepared.

[1] Matrices A, B, and C from the NYSDOH Guidance for Evaluating Soil Vapor Intrusion dated October 2006 and updated in May 2017.

Task 1 – Soil and Groundwater Assessment

In an effort to assess current soil and groundwater conditions at the Site, Roux proposes to advance nine soil borings (SB-3 through SB-11), collect up to two soil samples from each location, and install and sample six temporary monitoring wells (TW-3 through TW-8) beneath the basement, as shown on Figure 5. Each soil boring location will be advanced by hand to a maximum depth of seven feet below the basement slab, approximately five feet below the assumed water table. Should a utility be observed during soil boring advancement, the soil boring location will be relocated to no more than five feet away from the original proposed location. The existing vapor barrier will be penetrated in an effort to allow for the advancement of the soil borings and installation of the temporary monitoring wells, however, all boring locations will be sealed with grout once complete. During soil boring advancement, soil will be collected continuously, lithology will be recorded, and soil will be inspected for evidence (visual or olfactory) of contamination and field screened continuously for volatile organic compounds (VOCs) using a photoionization detector (PID) with a 10.6 eV lamp. One soil sample will be collected at each soil boring location from the two-foot interval exhibiting the highest observed evidence of contamination, and a second soil sample will be collected from the bottom two-foot interval (if not identified to be the most impacted). Each soil sample will be analyzed for VOCs per the United States Environmental Protection Agency (USEPA) Method 8260.

After soil boring advancement and soil sampling have been completed, a temporary monitoring well, with a 5-foot well screen, will be installed at six of the soil boring locations. It is anticipated that these temporary monitoring wells will be installed at SB-3/TW-3, SB-4/TW-4, SB-5/TW-5, SB-6/TW-6, SB-7/TW-7, and SB-8/TW-8 as shown on Figure 5, however, if warranted, this will be adjusted based on field observations made during the completion of the soil borings. Each temporary monitoring well will be constructed of 1-inch diameter, Schedule 40 polyvinyl chloride (PVC) casing and 0.020-inch slot, machined screen. Each temporary monitoring well will be purged prior to sample collection in an effort to remove standing water prior to sample collection. A groundwater sample will be collected, using low flow sampling techniques, from each temporary monitoring well and analyzed for VOCs per the USEPA Method 8260. The temporary monitoring wells will be surveyed by a New York State Licensed Surveyor to obtain horizontal and vertical coordinates. The depth to groundwater in each temporary monitoring well will be measured using an electronic water level meter and the data will be used to contour groundwater flow at the Site. If possible, flushmount covers will be installed over the wells to allow for future water level measurement and groundwater sample collection, if necessary. Soil cuttings, development water, and purge water will be containerized in labeled 55-gallon drums and will be disposed of off-site at a permitted waste disposal facility.

Task 2 – Supplemental Sub-Slab Vapor, Indoor Air, and Ambient Air Sampling

Supplemental sub-slab vapor, indoor air, and ambient air sampling is proposed as part of this IRMWP SOW. six sub-slab vapor samples (SS-7 through SS-12), as shown on Figure 5, will be collected from permanent sub-slab vapor points installed by hand to a depth directly beneath the basement floor slab and existing vapor barrier. New Teflon®-lined tubing will be attached to the sub-slab soil vapor sampling points prior to sample collection. The sub-slab vapor samples will be collected using pre-cleaned 6-liter summa canisters with regulators calibrated to collect samples over an 8-hour period and analyzed using USEPA Method TO-15 for VOCs. A helium tracer gas test will be performed on each sub-slab vapor point prior to sampling in accordance with the procedures outlined in the NYSDOH Guidance.

Six indoor air samples will be collected from the basement (co-located with the sub-slab vapor samples), and two from each of the upper floors (floors 1 through 3) for a total of 12 indoor air samples (see Figure 5 for proposed basement locations). The indoor air samples will be collected using pre-cleaned 6-liter summa canisters with regulators calibrated to collect samples over an 8-hour period and analyzed using USEPA Method TO-15 Selective Ion Monitoring (SIM) for VOCs. The outdoor ambient air sample (AA-2) will be collected concurrently with the sub-slab vapor and indoor air samples. The ambient air sample will be collected using a pre-cleaned 6-liter summa canister with a regulator calibrated to collect the sample over an 8-hour period and analyzed using USEPA Method TO-15 SIM for VOCs. The outdoor ambient air sample will serve to better define the background atmospheric conditions within the area of

the Site. This canister will be placed in a location chosen to provide representative background results based on conditions at the time of sampling.

Task 3 – Interim Vapor Mitigation Measures (Including Installation of Sub-Slab Depressurization System and Application of Retro-Coat™)

It is Roux's understanding that during construction of the new slab that a 15-mil vapor barrier was installed in accordance with the foundation plans. However, the vapor barrier was not installed over the pile caps or over any remaining slab. To provide additional vapor intrusion mitigation, Roux proposes to install a sub-slab depressurization system (SSDS) comprised of two 4-foot by 4-foot pits installed 8-inches below the existing building slab in areas of high soil vapor concentrations. Each pit will be installed with a horizontal 4-foot length of perforated PVC piping surrounded by gravel and wrapped with geotextile fabric and then connected to a riser leading to the roof. Once installed, the concrete slab will be restored over the 4-foot by 4-foot pit. SSDS Plan and Details have been provided on Drawing 1.

Additionally, Roux proposes that once all intrusive sub-slab activities are complete, to install a post-applied Retro-Coat™ Vapor Intrusion Coating (Attachment 1) along the entire basement floor slab. The Retro-Coat™ system is a two part, odorless, no VOC, 100% solids, chemically resistant coating designed to protect existing structures from vapor intrusion including trichloroethene (TCE) and tetrachloroethene (PCE). This coating would be installed across the entire basement slab. In accordance with the manufacturer's procedures, the bottom portions of existing walls will be removed to allow for application of this material beneath all wall spaces.

The purpose of these mitigative measures would be to allow for occupancy of the building, meanwhile the Site would still proceed with investigation and remediation under the NYSDEC BCP, as required by the NYSDEC.

Task 4 – Post IRM Performance Monitoring

After IRM activities have been completed, one round of performance monitoring will be performed at the Site. The performance monitoring will be conducted to confirm the SSDS and Retro-Coat™ are effectively mitigating VI, and to confirm the building is safe for occupancy. The performance monitoring will include the collection of sub-slab vapor, indoor air, and ambient air sampling, as described in Task 2. Specifically, five sub-slab vapor samples, and five indoor air samples will be collected from the basement. Additionally, two indoor air samples will be collected from each of the upper floors (11 indoor air samples in total), and one ambient air sample will be collected as part of this task. The results of the post IRM performance monitoring will be submitted to NYSDEC and NYSDOH for review as described in the task below.

Task 5 – Reporting

All laboratory results will be submitted to a data validator for third-party review and preparation of a DUSR. Upon receipt of the DUSR, Roux will prepare an IRM Letter Report for submission to the NYSDEC documenting the IRM activities and results. The report will include a general description of the IRM activities, as-built drawings/figures, photographs, and all analytical reports. The IRM Letter Report will be submitted to NYSDEC within 30 days after receipt of all analytical data.

Anticipated Schedule

Due to the rapid occupancy schedule, the BCP Applicant plans to begin implementation of this IRMWP immediately. The field activities are anticipated to be completed within approximately three weeks. The IRM Completion Letter Report will be completed and submitted to NYSDEC 30 days after receipt of all laboratory data.

Please do not hesitate to call either of the undersigned if you have any questions or require additional information related to this IRMWP.

Sincerely,

ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY, D.P.C.

David Kaiser, P.E.
Senior Engineer

Robert Kovacs, P.G.
Principal Scientist

Attachments

cc: David Schwarz, BCP Applicant
Linda Shaw, Knauf Shaw
Shaminder Chawla, NYCOER

TABLES

Notes Utilized Throughout Tables	
Soil Tables	
J -	Estimated value
U -	Indicates that the compound was analyzed for but not detected
FD -	Duplicate sample
NA -	Compound was not analyzed for by laboratory
mg/kg -	Milligrams per kilogram
NYSDEC -	New York State Department of Environmental Conservation
SCO -	Soil Cleanup Objectives
NJDEP -	New Jersey Department of Environmental Protection
PA DEP -	Pennsylvania Department of Environmental Protection
SRS -	Soil Remediation Standards
--	No SCO available
--	No NJDEP Soil Remediation Standards available
--	No Standards available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use SCO	
Groundwater Tables	
J -	Estimated Value
U -	Compound was analyzed for but not detected
FD -	Duplicate
µg/L -	Micrograms per liter
NYSDEC -	New York State Department of Environmental Conservation
AWQSGVs -	Ambient Water-Quality Standards and Guidance Values
--	No NYSDEC AWQSGV available
Bold data indicates that parameter was detected above the NYSDEC AWQSGVs	
Soil Vapor/Ambient Air	
J -	Estimated value
U -	Indicates that the compound was analyzed for but not detected
ug/m3 -	Micrograms per cubic meter
Bold data indicates that parameter was detected	

Table 1. Summary of Volatile Organic Compounds in Soil, 11-20 46th Road, Long Island City, New York

	Sample Designation:		**SB-1**	**SB-1**	**SB-2**
	Sample Date:		**10/21/2019**	**10/21/2019**	**10/21/2019**
	Sample Depth (ft bls):		**0 - 2**	**0 - 2**	**1 - 3**
	Normal Sample or Field Duplicate:		**N**	**FD**	**N**
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Unit			
1,1,1,2-Tetrachloroethane	--	MG/KG	0.00061 U	0.00067 U	0.00056 U
1,1,1-Trichloroethane (TCA)	0.68	MG/KG	0.00061 U	0.00067 U	0.00056 U
1,1,2,2-Tetrachloroethane	--	MG/KG	0.00061 U	0.00067 U	0.00056 U
1,1,2-Trichloroethane	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
1,1-Dichloroethane	0.27	MG/KG	0.0012 U	0.0013 U	0.0011 U
1,1-Dichloroethene	0.33	MG/KG	0.0012 U	0.0013 U	0.0011 U
1,1-Dichloropropene	--	MG/KG	0.00061 U	0.00067 U	0.00056 U
1,2,3-Trichlorobenzene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,2,3-Trichloropropane	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,2,4,5-Tetramethylbenzene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,2,4-Trichlorobenzene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,2,4-Trimethylbenzene	3.6	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,2-Dibromo-3-Chloropropane	--	MG/KG	0.0037 U	0.004 U	0.0034 U
1,2-Dibromoethane (Ethylene Dibromide)	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
1,2-Dichlorobenzene	1.1	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,2-Dichloroethane	0.02	MG/KG	0.0012 U	0.0013 U	0.0011 U
1,2-Dichloropropane	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
1,3,5-Trimethylbenzene (Mesitylene)	8.4	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,3-Dichlorobenzene	2.4	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,3-Dichloropropane	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,4-Dichlorobenzene	1.8	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,4-Diethyl Benzene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
1,4-Dioxane (P-Dioxane)	0.1	MG/KG	0.098 U	0.11 U	0.09 U
2,2-Dichloropropane	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
2-Chlorotoluene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
2-Hexanone	--	MG/KG	0.012 U	0.013 U	0.011 U
4-Chlorotoluene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
4-Ethyltoluene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
Acetone	0.05	MG/KG	0.0088 J	0.0072 J	0.013
Acrylonitrile	--	MG/KG	0.0049 U	0.0054 U	0.0045 U
Benzene	0.06	MG/KG	0.00061 U	0.00067 U	0.00056 U
Bromobenzene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
Bromochloromethane	--	MG/KG	0.0024 U	0.0027 U	0.0023 U

Table 1. Summary of Volatile Organic Compounds in Soil, 11-20 46th Road, Long Island City, New York

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	Sample Date:		**10/21/2019**	**10/21/2019**	**10/21/2019**
	Sample Depth (ft bls):		**0 - 2**	**0 - 2**	**1 - 3**
	Normal Sample or Field Duplicate:		**N**	**FD**	**N**
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Unit			
Bromodichloromethane	--	MG/KG	0.00061 U	0.00067 U	0.00056 U
Bromoform	--	MG/KG	0.0049 U	0.0054 U	0.0045 U
Bromomethane	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
Carbon Disulfide	--	MG/KG	0.012 U	0.013 U	0.011 U
Carbon Tetrachloride	0.76	MG/KG	0.0012 U	0.0013 U	0.0011 U
Chlorobenzene	1.1	MG/KG	0.00061 U	0.00067 U	0.00056 U
Chloroethane	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
Chloroform	0.37	MG/KG	0.0018 U	0.002 U	0.0017 U
Chloromethane	--	MG/KG	0.0049 U	0.0054 U	0.0045 U
Cis-1,2-Dichloroethylene	0.25	MG/KG	0.0012 U	0.0013 U	0.0011 U
Cis-1,3-Dichloropropene	--	MG/KG	0.00061 U	0.00067 U	0.00056 U
Cymene	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
Dibromochloromethane	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
Dibromomethane	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
Dichlorodifluoromethane	--	MG/KG	0.012 U	0.013 U	0.011 U
Dichloroethylenes	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
Diethyl Ether (Ethyl Ether)	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
Ethylbenzene	1	MG/KG	0.0012 U	0.0013 U	0.0011 U
Hexachlorobutadiene	--	MG/KG	0.0049 U	0.0054 U	0.0045 U
Isopropylbenzene (Cumene)	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
m,p-Xylene	--	MG/KG	0.0024 U	0.0027 U	0.0023 U
Methyl Ethyl Ketone (2-Butanone)	0.12	MG/KG	0.012 U	0.013 U	0.011 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	MG/KG	0.012 U	0.013 U	0.011 U
Methylene Chloride	0.05	MG/KG	0.0061 U	0.0067 U	0.0056 U
Naphthalene	12	MG/KG	0.0049 U	0.0054 U	0.0045 U
N-Butylbenzene	12	MG/KG	0.0012 U	0.0013 U	0.0011 U
N-Propylbenzene	3.9	MG/KG	0.0012 U	0.0013 U	0.0011 U
O-Xylene (1,2-Dimethylbenzene)	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
Sec-Butylbenzene	11	MG/KG	0.0012 U	0.0013 U	0.0011 U
Styrene	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
T-Butylbenzene	5.9	MG/KG	0.0024 U	0.0027 U	0.0023 U
Tert-Butyl Methyl Ether	0.93	MG/KG	0.0024 U	0.0027 U	0.0023 U
Tetrachloroethylene (PCE)	1.3	MG/KG	0.01	0.0073	0.0058

Table 1. Summary of Volatile Organic Compounds in Soil, 11-20 46th Road, Long Island City, New York

	Sample Designation:		**SB-1**	**SB-1**	**SB-2**
	Sample Date:		**10/21/2019**	**10/21/2019**	**10/21/2019**
	Sample Depth (ft bls):		**0 - 2**	**0 - 2**	**1 - 3**
	Normal Sample or Field Duplicate:		**N**	**FD**	**N**
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Unit			
Toluene	0.7	MG/KG	0.0012 U	0.0013 U	0.0011 U
Total, 1,3-Dichloropropene (Cis And Trans)	--	MG/KG	0.00061 U	0.00067 U	0.00056 U
Trans-1,2-Dichloroethene	0.19	MG/KG	0.0018 U	0.002 U	0.0017 U
Trans-1,3-Dichloropropene	--	MG/KG	0.0012 U	0.0013 U	0.0011 U
Trans-1,4-Dichloro-2-Butene	--	MG/KG	0.0061 U	0.0067 U	0.0056 U
Trichloroethylene (TCE)	0.47	MG/KG	0.00061 U	0.00067 U	0.00041 J
Trichlorofluoromethane	--	MG/KG	0.0049 U	0.0054 U	0.0045 U
Vinyl Acetate	--	MG/KG	0.012 U	0.013 U	0.011 U
Vinyl Chloride	0.02	MG/KG	0.0012 U	0.0013 U	0.0011 U
Xylenes	0.26	MG/KG	0.0012 U	0.0013 U	0.0011 U

Table 2. Summary of General Chemistry in Soil, 11-20 46th Road, Long Island City, New York

		Sample Designation:	SB-1	SB-1	SB-2
		Sample Date:	10/21/2019	10/21/2019	10/21/2019
		Sample Depth (ft bls):	0 - 2	0 - 2	1 - 3
		Normal Sample or Field Duplicate:	N	FD	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Unit			
Total Solids	--	PERCENT	83.7	80	85.5

Table 3. Summary of Volatile Organic Compounds in Groundwater, 11-20 46th Road, Long Island City, New York

	Sample Designation:		TW-1	TW-1	TW-2
	Sample Date:		10/21/2019	10/21/2019	10/21/2019
	Normal Sample or Field Duplicate:		N	FD	N
Parameter	NYSDEC Ambient Water-Quality Standards and Guidance Values	Unit			
1,1,1,2-Tetrachloroethane	5	UG/L	2.5 U	2.5 U	2.5 U
1,1,1-Trichloroethane (TCA)	5	UG/L	2.5 U	2.5 U	2.5 U
1,1,2,2-Tetrachloroethane	5	UG/L	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	1	UG/L	1.5 U	1.5 U	1.5 U
1,1-Dichloroethane	5	UG/L	2.5 U	2.5 U	2.5 U
1,1-Dichloroethene	5	UG/L	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	5	UG/L	2.5 U	2.5 U	2.5 U
1,2,3-Trichlorobenzene	5	UG/L	2.5 U	2.5 U	2.5 U
1,2,3-Trichloropropane	0.04	UG/L	2.5 U	2.5 U	2.5 U
1,2,4,5-Tetramethylbenzene	5	UG/L	2 U	2 U	2 U
1,2,4-Trichlorobenzene	5	UG/L	2.5 U	2.5 U	2.5 U
1,2,4-Trimethylbenzene	5	UG/L	2.5 U	2.5 U	2.5 U
1,2-Dibromo-3-Chloropropane	0.04	UG/L	2.5 U	2.5 U	2.5 U
1,2-Dibromoethane (Ethylene Dibromide)	--	UG/L	2 U	2 U	2 U
1,2-Dichlorobenzene	3	UG/L	2.5 U	2.5 U	2.5 U
1,2-Dichloroethane	0.6	UG/L	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	1	UG/L	1 U	1 U	1 U
1,3,5-Trimethylbenzene (Mesitylene)	5	UG/L	2.5 U	2.5 U	2.5 U
1,3-Dichlorobenzene	3	UG/L	2.5 U	2.5 U	2.5 U
1,3-Dichloropropane	5	UG/L	2.5 U	2.5 U	2.5 U
1,4-Dichlorobenzene	3	UG/L	2.5 U	2.5 U	2.5 U
1,4-Diethyl Benzene	--	UG/L	2 U	2 U	2 U
1,4-Dioxane (P-Dioxane)	--	UG/L	250 U	250 U	250 U
2,2-Dichloropropane	5	UG/L	2.5 U	2.5 U	2.5 U
2-Chlorotoluene	5	UG/L	2.5 U	2.5 U	2.5 U
2-Hexanone	50	UG/L	5 U	5 U	5 U
4-Chlorotoluene	5	UG/L	2.5 U	2.5 U	2.5 U
4-Ethyltoluene	--	UG/L	2 U	2 U	2 U
Acetone	50	UG/L	5 U	1.5 J	5 U
Acrylonitrile	5	UG/L	5 U	5 U	5 U
Benzene	1	UG/L	0.5 U	0.5 U	0.5 U
Bromobenzene	5	UG/L	2.5 U	2.5 U	2.5 U

Table 3. Summary of Volatile Organic Compounds in Groundwater, 11-20 46th Road, Long Island City, New York

Parameter	NYSDEC Ambient Water-Quality Standards and Guidance Values	Unit	TW-1 10/21/2019 N	TW-1 10/21/2019 FD	TW-2 10/21/2019 N
Bromochloromethane	5	UG/L	2.5 U	2.5 U	2.5 U
Bromodichloromethane	50	UG/L	0.5 U	0.5 U	0.5 U
Bromoform	50	UG/L	2 U	2 U	2 U
Bromomethane	5	UG/L	2.5 U	2.5 U	2.5 U
Carbon Disulfide	60	UG/L	5 U	5 U	5 U
Carbon Tetrachloride	5	UG/L	0.5 U	0.5 U	0.5 U
Chlorobenzene	5	UG/L	2.5 U	2.5 U	2.5 U
Chloroethane	5	UG/L	2.5 U	2.5 U	2.5 U
Chloroform	7	UG/L	2.5 U	2.5 U	2.5 U
Chloromethane	--	UG/L	2.5 U	2.5 U	2.5 U
Cis-1,2-Dichloroethylene	5	UG/L	2.5 U	2.5 U	2.5 U
Cis-1,3-Dichloropropene	5	UG/L	0.5 U	0.5 U	0.5 U
Cymene	5	UG/L	2.5 U	2.5 U	2.5 U
Dibromochloromethane	50	UG/L	0.5 U	0.5 U	0.5 U
Dibromomethane	5	UG/L	5 U	5 U	5 U
Dichlorodifluoromethane	5	UG/L	5 U	5 U	5 U
Dichloroethylenes	5	UG/L	2.5 U	2.5 U	2.5 U
Diethyl Ether (Ethyl Ether)	--	UG/L	2.5 U	2.5 U	2.5 U
Ethylbenzene	5	UG/L	2.5 U	2.5 U	2.5 U
Hexachlorobutadiene	0.5	UG/L	2.5 U	2.5 U	2.5 U
Isopropylbenzene (Cumene)	5	UG/L	2.5 U	2.5 U	2.5 U
m,p-Xylene	5	UG/L	2.5 U	2.5 U	2.5 U
Methyl Ethyl Ketone (2-Butanone)	50	UG/L	5 U	5 U	5 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	UG/L	5 U	5 U	5 U
Methylene Chloride	5	UG/L	2.5 U	2.5 U	2.5 U
Naphthalene	10	UG/L	2.5 U	2.5 U	2.5 U
N-Butylbenzene	5	UG/L	2.5 U	2.5 U	2.5 U
N-Propylbenzene	5	UG/L	2.5 U	2.5 U	2.5 U
O-Xylene (1,2-Dimethylbenzene)	5	UG/L	2.5 U	2.5 U	2.5 U
Sec-Butylbenzene	5	UG/L	2.5 U	2.5 U	2.5 U
Styrene	5	UG/L	2.5 U	2.5 U	2.5 U
T-Butylbenzene	5	UG/L	2.5 U	2.5 U	2.5 U

Table 3. Summary of Volatile Organic Compounds in Groundwater, 11-20 46th Road, Long Island City, New York

	Sample Designation:		**TW-1**	**TW-1**	**TW-2**
	Sample Date:		**10/21/2019**	**10/21/2019**	**10/21/2019**
	Normal Sample or Field Duplicate:		**N**	**FD**	**N**
Parameter	NYSDEC Ambient Water-Quality Standards and Guidance Values	Unit			
Tert-Butyl Methyl Ether	10	UG/L	2.5 U	2.5 U	2.5 U
Tetrachloroethylene (PCE)	5	UG/L	0.9	0.98	0.5 U
Toluene	5	UG/L	2.5 U	2.5 U	2.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	0.4	UG/L	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	5	UG/L	2.5 U	2.5 U	2.5 U
Trans-1,3-Dichloropropene	--	UG/L	0.5 U	0.5 U	0.5 U
Trans-1,4-Dichloro-2-Butene	--	UG/L	2.5 U	2.5 U	2.5 U
Trichloroethylene (TCE)	5	UG/L	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	5	UG/L	2.5 U	2.5 U	2.5 U
Vinyl Acetate	--	UG/L	5 U	5 U	5 U
Vinyl Chloride	2	UG/L	1 U	1 U	1 U
Xylenes	5	UG/L	2.5 U	2.5 U	2.5 U

Table 4. Summary of Volatile Organic Compounds in Sub-Slab Soil Vapor, Indoor Air, and Ambient Air, 11-20 46th Road, Long Island City, New York

Sample Designation:		AA-1	IA-1	IA-2	AA-1	IA-1	IA-2	SS-1	SS-2
Sample Date:		08/23/2019	08/23/2019	08/23/2019	09/26/2019	09/26/2019	09/26/2019	09/26/2019	09/26/2019
Parameter	Units								
1,1,1-Trichloroethane (TCA)	UG/M3	0.192 U	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	1.36 U	1.56 U
1,1,2,2-Tetrachloroethane	UG/M3	0.241 U	1.37 U	1.37 U	1.37 U	1.37 U	1.37 U	1.72 U	1.96 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	0.672 U	1.53 U	1.53 U	1.53 U	1.53 U	1.53 U	1.92 U	2.19 U
1,1,2-Trichloroethane	UG/M3	0.192 U	1.09 U	1.09 U	1.09 U	1.09 U	1.09 U	1.36 U	1.56 U
1,1-Dichloroethane	UG/M3	0.142 U	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	1.01 U	1.16 U
1,1-Dichloroethene	UG/M3	0.139 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.991 U	1.13 U
1,2,4-Trichlorobenzene	UG/M3	0.651 U	1.48 U	1.48 U	1.48 U	1.48 U	1.48 U	1.86 U	2.12 U
1,2,4-Trimethylbenzene	UG/M3	**1.21**	**1.05**	**1.06**	0.983 U	**1.1**	0.983 U	**2.12**	**1.94**
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	0.27 U	1.54 U	1.54 U	1.54 U	1.54 U	1.54 U	1.92 U	2.2 U
1,2-Dichlorobenzene	UG/M3	0.211 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.5 U	1.72 U
1,2-Dichloroethane	UG/M3	0.142 U	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	1.01 U	1.16 U
1,2-Dichloropropane	UG/M3	0.162 U	0.924 U	0.924 U	0.924 U	0.924 U	0.924 U	1.16 U	1.32 U
1,2-Dichlorotetrafluoroethane	UG/M3	0.613 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.75 U	2 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	**0.353**	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	1.23 U	1.41 U
1,3-Butadiene	UG/M3	0.078 U	0.442 U	0.442 U	0.442 U	0.442 U	0.442 U	**1.46**	0.633 U
1,3-Dichlorobenzene	UG/M3	0.211 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.5 U	1.72 U
1,4-Dichlorobenzene	UG/M3	**0.263**	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.5 U	1.72 U
1,4-Dioxane (P-Dioxane)	UG/M3	0.631 U	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	**5.48**	**1.17**
2,2,4-Trimethylpentane	UG/M3	**9.9**	**1.54**	0.934 U	**1.85**	**9.29**	**5.42**	1.17 U	**2.88**
2-Hexanone	UG/M3	1.44 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	1.02 U	**3.72**
4-Ethyltoluene	UG/M3	**0.327**	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	1.23 U	1.41 U
Acetone	UG/M3	**15.6**	**26.4**	**27.8**	**10.4**	**29.9**	**29.5**	**651**	**820**
Allyl Chloride (3-Chloropropene)	UG/M3	1.1 U	0.626 U	0.626 U	0.626 U	0.626 U	0.626 U	0.783 U	0.895 U
Benzene	UG/M3	**0.693**	**1.02**	**0.652**	0.639 U	**0.754**	**0.732**	**27.5**	**3.32**
Benzyl Chloride	UG/M3	1.82 U	1.04 U	1.04 U	1.04 U	1.04 U	1.04 U	1.29 U	1.48 U
Bromodichloromethane	UG/M3	0.235 U	1.34 U	1.34 U	1.34 U	1.34 U	1.34 U	1.67 U	1.92 U
Bromoform	UG/M3	0.363 U	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.58 U	2.96 U
Bromomethane	UG/M3	0.136 U	0.777 U	0.777 U	0.777 U	0.777 U	0.777 U	0.971 U	1.11 U
Carbon Disulfide	UG/M3	1.09 U	**1.17**	0.623 U	0.623 U	0.623 U	0.623 U	**12.7**	**3.24**
Carbon Tetrachloride	UG/M3	**0.419**	**0.396**	**0.403**	**0.478**	**0.484**	**0.497**	1.57 U	1.8 U
Chlorobenzene	UG/M3	0.806 U	0.921 U	0.921 U	0.921 U	0.921 U	0.921 U	1.15 U	1.32 U
Chloroethane	UG/M3	0.462 U	0.528 U	0.528 U	0.528 U	0.528 U	0.528 U	0.66 U	0.755 U
Chloroform	UG/M3	**0.274**	0.977 U	0.977 U	0.977 U	**1.02**	0.977 U	**9.77**	1.4 U
Chloromethane	UG/M3	**1.11**	**0.983**	**0.954**	**1.03**	**1.03**	**1.03**	**4.83**	0.591 U
Cis-1,2-Dichloroethylene	UG/M3	0.139 U	0.079 U	0.079 U	**0.202**	**1.19**	**1.65**	**28.4**	1.13 U
Cis-1,3-Dichloropropene	UG/M3	0.159 U	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	1.13 U	1.3 U
Cyclohexane	UG/M3	1.21 U	**0.916**	0.688 U	0.688 U	0.688 U	0.688 U	**15.8**	**2.17**

Table 4. Summary of Volatile Organic Compounds in Sub-Slab Soil Vapor, Indoor Air, and Ambient Air, 11-20 46th Road, Long Island City, New York

Sample Designation:		AA-1	IA-1	IA-2	AA-1	IA-1	IA-2	SS-1	SS-2
Sample Date:		08/23/2019	08/23/2019	08/23/2019	09/26/2019	09/26/2019	09/26/2019	09/26/2019	09/26/2019
Parameter	Units								
Dibromochloromethane	UG/M3	0.299 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	2.13 U	2.44 U
Dichlorodifluoromethane	UG/M3	**1.96**	**2.1**	**2.18**	**2.52**	**2.54**	**2.49**	**2.84**	**2.95**
Ethanol	UG/M3	**36.4**	**318**	**616**	**47.5**	**281**	**207**	**379**	**177**
Ethyl Acetate	UG/M3	3.16 U	**2.25**	**4.07**	1.8 U	1.8 U	1.8 U	2.25 U	2.57 U
Ethylbenzene	UG/M3	**1.01**	**1.28**	**1.52**	0.869 U	**2.17**	**1.21**	**3.14**	**3.5**
Hexachlorobutadiene	UG/M3	0.935 U	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U	2.67 U	3.05 U
Isopropanol	UG/M3	**2.46**	**3.71**	**3.69**	**1.99**	**8.16**	**6.76**	**33.2**	**27.8**
m,p-Xylene	UG/M3	**3.47**	**4.6**	**5.73**	**1.82**	**10.8**	**5.56**	**12.1**	**13.1**
Methyl Ethyl Ketone (2-Butanone)	UG/M3	2.59 U	**1.52**	1.47 U	1.47 U	1.47 U	1.47 U	**31**	**49.8**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	3.59 U	**7.95**	**16.3**	2.05 U	2.05 U	2.05 U	**18.3**	**12**
Methylene Chloride	UG/M3	3.05 U	**3.41**	1.74 U	**2.23**	1.74 U	1.74 U	**3.39**	2.48 U
N-Heptane	UG/M3	1.44 U	**1.02**	0.82 U	0.82 U	0.82 U	0.82 U	**37.5**	**3.41**
N-Hexane	UG/M3	1.24 U	**2.22**	**0.754**	**0.916**	**1.13**	**1.3**	**125**	**7.65**
O-Xylene (1,2-Dimethylbenzene)	UG/M3	**1.03**	**1.32**	**1.58**	0.869 U	**3.21**	**1.69**	**2.56**	**2.84**
Styrene	UG/M3	**0.239**	0.852 U	0.852 U	0.852 U	0.852 U	**0.92**	1.06 U	1.22 U
Tert-Butyl Alcohol	UG/M3	2.66 U	**1.79**	**2.99**	**3.55**	**23.3**	**19.6**	**15.9**	**16.6**
Tert-Butyl Methyl Ether	UG/M3	1.27 U	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	0.901 U	1.03 U
Tetrachloroethylene (PCE)	UG/M3	**1.12**	**1.01**	**0.956**	**0.956**	**2.27**	**5.93**	**67.5**	**22.9**
Tetrahydrofuran	UG/M3	**2.68**	**6.19**	**3.24**	1.47 U	**1.58**	1.47 U	1.84 U	2.11 U
Toluene	UG/M3	**4.45**	**5.8**	**4.6**	**1.84**	**2.33**	**2.06**	**15.6**	**11.7**
Trans-1,2-Dichloroethene	UG/M3	0.139 U	0.793 U	0.793 U	0.793 U	0.793 U	0.793 U	**2.47**	1.13 U
Trans-1,3-Dichloropropene	UG/M3	0.159 U	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	1.13 U	1.3 U
Trichloroethylene (TCE)	UG/M3	0.189 U	0.107 U	**0.107**	0.107 U	**0.199**	**0.704**	**7.9**	1.54 U
Trichlorofluoromethane	UG/M3	**1.01**	1.12 U	1.12 U	**1.31**	**1.28**	**1.25**	**2.44**	**13.7**
Vinyl Bromide	UG/M3	1.53 U	0.874 U	0.874 U	0.874 U	0.874 U	0.874 U	1.09 U	1.25 U
Vinyl Chloride	UG/M3	0.09 U	0.051 U	0.051 U	0.051 U	**0.169**	**0.194**	**16.7**	0.731 U

Table 4. Summary of Volatile Organic Compounds in Sub-Slab Soil Vapor, Indoor Air, and Ambient Air, 11-20 46th Road, Long Island City, New York

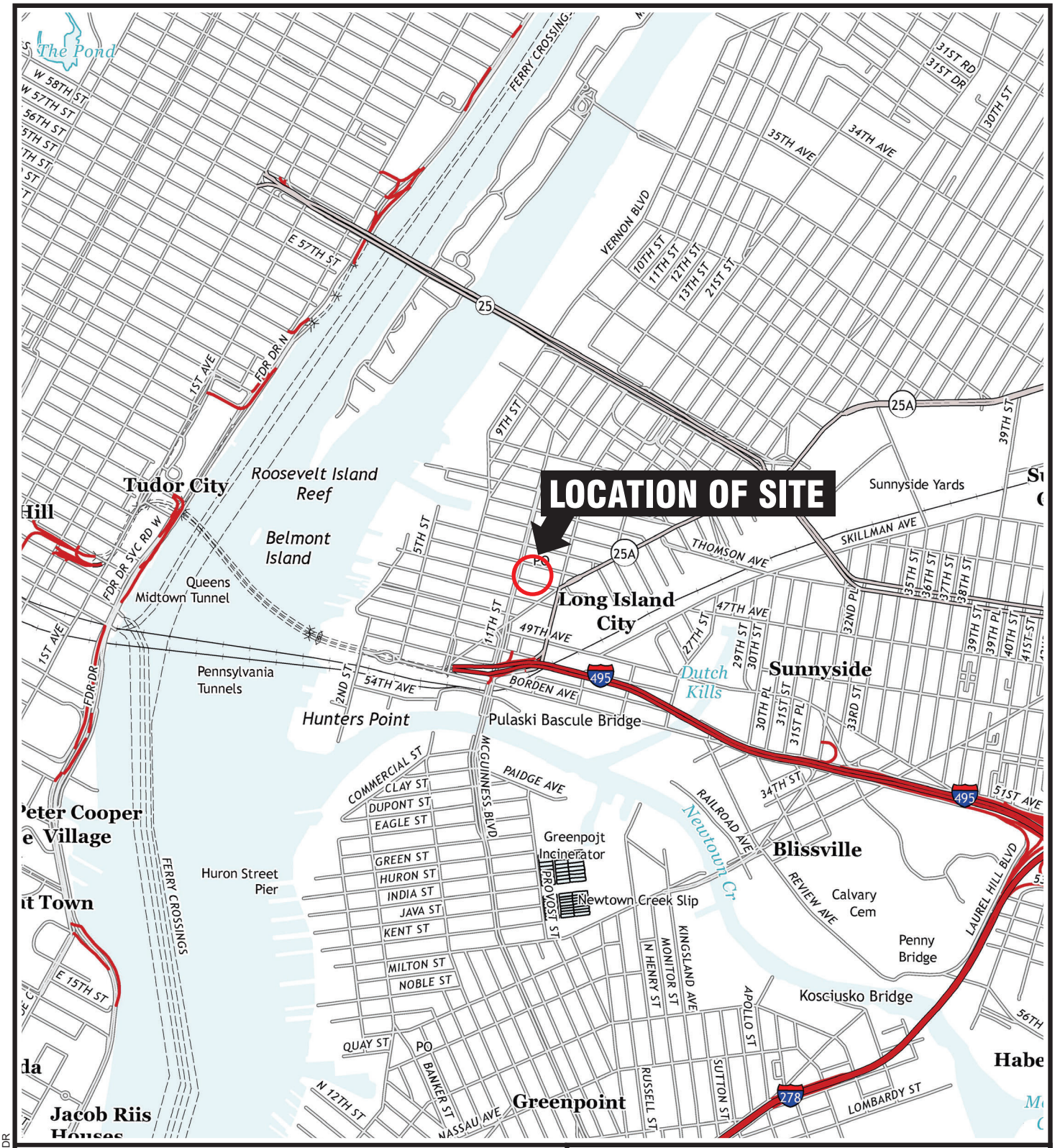
Sample Designation:		SS-3	SS-4	SS-5	SS-6
Sample Date:		09/26/2019	09/26/2019	09/26/2019	09/26/2019
Parameter	Units				
1,1,1-Trichloroethane (TCA)	UG/M3	3.64 U	7.8 U	1.56 U	3.03 U
1,1,2,2-Tetrachloroethane	UG/M3	4.58 U	9.82 U	1.96 U	3.82 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	5.11 U	11 U	2.19 U	4.26 U
1,1,2-Trichloroethane	UG/M3	3.64 U	7.8 U	1.56 U	3.03 U
1,1-Dichloroethane	UG/M3	2.7 U	5.79 U	1.16 U	2.25 U
1,1-Dichloroethene	UG/M3	2.64 U	5.67 U	1.13 U	2.2 U
1,2,4-Trichlorobenzene	UG/M3	4.95 U	10.6 U	2.12 U	4.13 U
1,2,4-Trimethylbenzene	UG/M3	**8.11**	7.03 U	**1.88**	2.73 U
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	5.13 U	11 U	2.2 U	4.27 U
1,2-Dichlorobenzene	UG/M3	4.01 U	8.6 U	1.72 U	3.34 U
1,2-Dichloroethane	UG/M3	2.7 U	5.79 U	1.16 U	2.25 U
1,2-Dichloropropane	UG/M3	3.08 U	6.61 U	1.32 U	2.57 U
1,2-Dichlorotetrafluoroethane	UG/M3	4.66 U	10 U	2 U	3.89 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	**4.82**	7.03 U	1.41 U	2.73 U
1,3-Butadiene	UG/M3	1.48 U	3.16 U	**1.41**	1.23 U
1,3-Dichlorobenzene	UG/M3	4.01 U	8.6 U	1.72 U	3.34 U
1,4-Dichlorobenzene	UG/M3	4.01 U	8.6 U	1.72 U	3.34 U
1,4-Dioxane (P-Dioxane)	UG/M3	2.4 U	5.15 U	**1.23**	2 U
2,2,4-Trimethylpentane	UG/M3	3.12 U	6.68 U	**6.31**	**5.42**
2-Hexanone	UG/M3	2.73 U	5.86 U	**3.77**	2.28 U
4-Ethyltoluene	UG/M3	3.28 U	7.03 U	1.41 U	2.73 U
Acetone	UG/M3	**1710**	**634**	**753**	**1500**
Allyl Chloride (3-Chloropropene)	UG/M3	2.09 U	4.48 U	0.895 U	1.74 U
Benzene	UG/M3	**72.5**	**6.96**	**9.58**	**2.25**
Benzyl Chloride	UG/M3	3.45 U	7.4 U	1.48 U	2.88 U
Bromodichloromethane	UG/M3	4.47 U	9.58 U	1.92 U	3.72 U
Bromoform	UG/M3	6.9 U	14.8 U	2.96 U	5.75 U
Bromomethane	UG/M3	2.59 U	5.55 U	1.11 U	2.16 U
Carbon Disulfide	UG/M3	**204**	4.45 U	**16.8**	1.73 U
Carbon Tetrachloride	UG/M3	4.2 U	9 U	1.8 U	3.5 U
Chlorobenzene	UG/M3	3.07 U	6.59 U	1.32 U	2.56 U
Chloroethane	UG/M3	1.76 U	3.77 U	0.755 U	1.47 U
Chloroform	UG/M3	3.26 U	**17**	1.4 U	**5.18**
Chloromethane	UG/M3	1.38 U	2.95 U	**1.18**	1.15 U
Cis-1,2-Dichloroethylene	UG/M3	**70.6**	**36.2**	**101**	2.2 U
Cis-1,3-Dichloropropene	UG/M3	3.03 U	6.49 U	1.3 U	2.52 U
Cyclohexane	UG/M3	**120**	4.92 U	**4.41**	**2.72**

Table 4. Summary of Volatile Organic Compounds in Sub-Slab Soil Vapor, Indoor Air, and Ambient Air, 11-20 46th Road, Long Island City, New York

Sample Designation:		SS-3	SS-4	SS-5	SS-6
Sample Date:		09/26/2019	09/26/2019	09/26/2019	09/26/2019
Parameter	Units				
Dibromochloromethane	UG/M3	5.68 U	12.2 U	2.44 U	4.74 U
Dichlorodifluoromethane	UG/M3	3.3 U	7.07 U	**2.28**	2.75 U
Ethanol	UG/M3	**220**	**114**	**241**	**230**
Ethyl Acetate	UG/M3	6.02 U	12.9 U	2.57 U	5.01 U
Ethylbenzene	UG/M3	**7.86**	6.21 U	**3.45**	**2.94**
Hexachlorobutadiene	UG/M3	7.11 U	15.3 U	3.05 U	5.93 U
Isopropanol	UG/M3	**32.4**	**42.3**	**38.6**	**41.3**
m,p-Xylene	UG/M3	**21.8**	12.4 U	**11.9**	**10.5**
Methyl Ethyl Ketone (2-Butanone)	UG/M3	**43.9**	**33**	**52.2**	**50.1**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	6.84 U	14.6 U	**16.4**	**14.5**
Methylene Chloride	UG/M3	**9.03**	12.4 U	**2.99**	4.83 U
N-Heptane	UG/M3	**60.7**	5.86 U	**6.31**	**3.06**
N-Hexane	UG/M3	**130**	**6.98**	**16**	**5.57**
O-Xylene (1,2-Dimethylbenzene)	UG/M3	**9.82**	6.21 U	**2.71**	2.42 U
Styrene	UG/M3	2.84 U	6.09 U	**1.46**	2.37 U
Tert-Butyl Alcohol	UG/M3	**17.8**	**12.3**	**11.6**	**15.6**
Tert-Butyl Methyl Ether	UG/M3	2.4 U	5.16 U	1.03 U	2 U
Tetrachloroethylene (PCE)	UG/M3	**71.2**	**2540**	**11.7**	**48.7**
Tetrahydrofuran	UG/M3	4.93 U	10.5 U	**3.42**	4.1 U
Toluene	UG/M3	**39.9**	**12.4**	**16.1**	**9.46**
Trans-1,2-Dichloroethene	UG/M3	**8.92**	5.67 U	**2.97**	2.2 U
Trans-1,3-Dichloropropene	UG/M3	3.03 U	6.49 U	1.3 U	2.52 U
Trichloroethylene (TCE)	UG/M3	**11**	**200**	**8.06**	2.99 U
Trichlorofluoromethane	UG/M3	3.75 U	**15.1**	1.61 U	**6.69**
Vinyl Bromide	UG/M3	2.92 U	6.25 U	1.25 U	2.43 U
Vinyl Chloride	UG/M3	**111**	3.66 U	**110**	1.42 U

FIGURES

1. Site Location Map
2. Detections of VOCs in Soil
3. Detections of VOCs in Groundwater
4. Detections of VOCs in Sub-Slab Soil Vapor, Indoor Air and Ambient Air
5. Former and Proposed Sampling Locations
6. Sub-Slab Depressurization System Plan and Details



QUADRANGLE LOCATION

SOURCE:
USGS; 2013, Central Park, NY-NJ
7.5 Minute Topographic Quadrangle

N

0 2000'

Title:

SITE LOCATION MAP

Prepared for:

11-20 46TH ROAD OWNER LLC

ROUX

Compiled by: R.L.	Date: 20NOV19	FIGURE
Prepared by: G.M.	Scale AS SHOWN	1
Project Mgr: R.L.	Project: 3371.0001Y000	
File: 3371.0001Y110.01.CDR		

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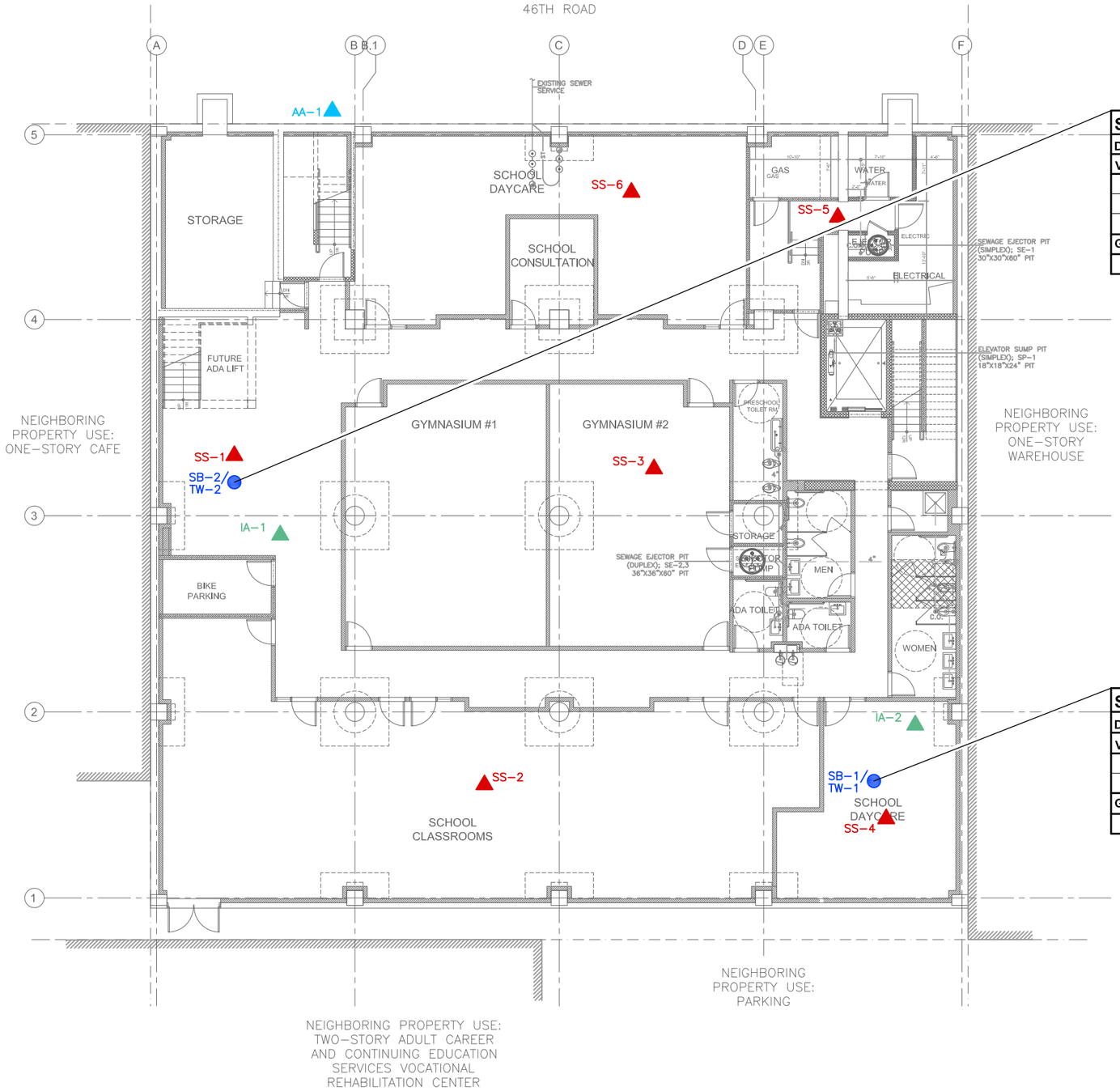

SB-2	10/21/2019
Depth (ft bls)	1 - 3
VOCs	
Acetone	0.013
Tetrachloroethylene (PCE)	0.0058
Trichloroethylene (TCE)	0.00041 J
General Chemistry	
Total Solids	85.5

SB-1	10/21/2019	10/21/2019 DUP
Depth (ft bls)	0-2	0-2
VOCs		
Acetone	0.0088 J	0.0072 J
Tetrachloroethylene (PCE)	0.01	0.0073
General Chemistry		
Total Solids	83.7	80

NOTE

GROUNDWATER WAS ENCOUNTERED APPROXIMATELY 1–2 FEET BELOW BOTTOM OF BASEMENT SLAB. TOP OF BASEMENT SLAB IS APPROXIMATELY 8 FEET BELOW SIDEWALK GRADE.

LEGEND

- IA–1 — APPROXIMATE INDOOR AIR SAMPLE LOCATION AND DESIGNATION
- AA–1 — APPROXIMATE AMBIENT AIR SAMPLE LOCATION AND DESIGNATION
- SS–1 — APPROXIMATE SUB–SLAB VAPOR SAMPLE LOCATION AND DESIGNATION
- SB–1/TW–1 — APPROXIMATE SOIL BORING AND TEMPORARY WELL LOCATION AND DESIGNATION

Parameter	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives
VOCs	
Acetone	0.05
Tetrachloroethylene (PCE)	1.3
Trichloroethylene (TCE)	0.47
General Chemistry	
Total Solids	--

CONCENTRATIONS IN mg/kg

mg/kg – MILLIGRAMS PER KILOGRAM

NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

-- – NO SOIL CLEANUP OBJECTIVES AVAILABLE

J – ESTIMATED VALUE

DUP – DUPLICATE SAMPLE

VOCs – VOLATILE ORGANIC COMPOUNDS

ft bls – FEET BELOW LAND SURFACE

15' 0 15'

Title:

DETECTIONS OF VOCs IN SOIL

Prepared for:

11-20 46TH ROAD OWNER LLC

ROUX

Compiled by: R.H.	Date: 20NOV19	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	2
Project Mgr: R.H.	Project: 3371.0001Y000	
File: 3371.0001Y110.02.DWG		

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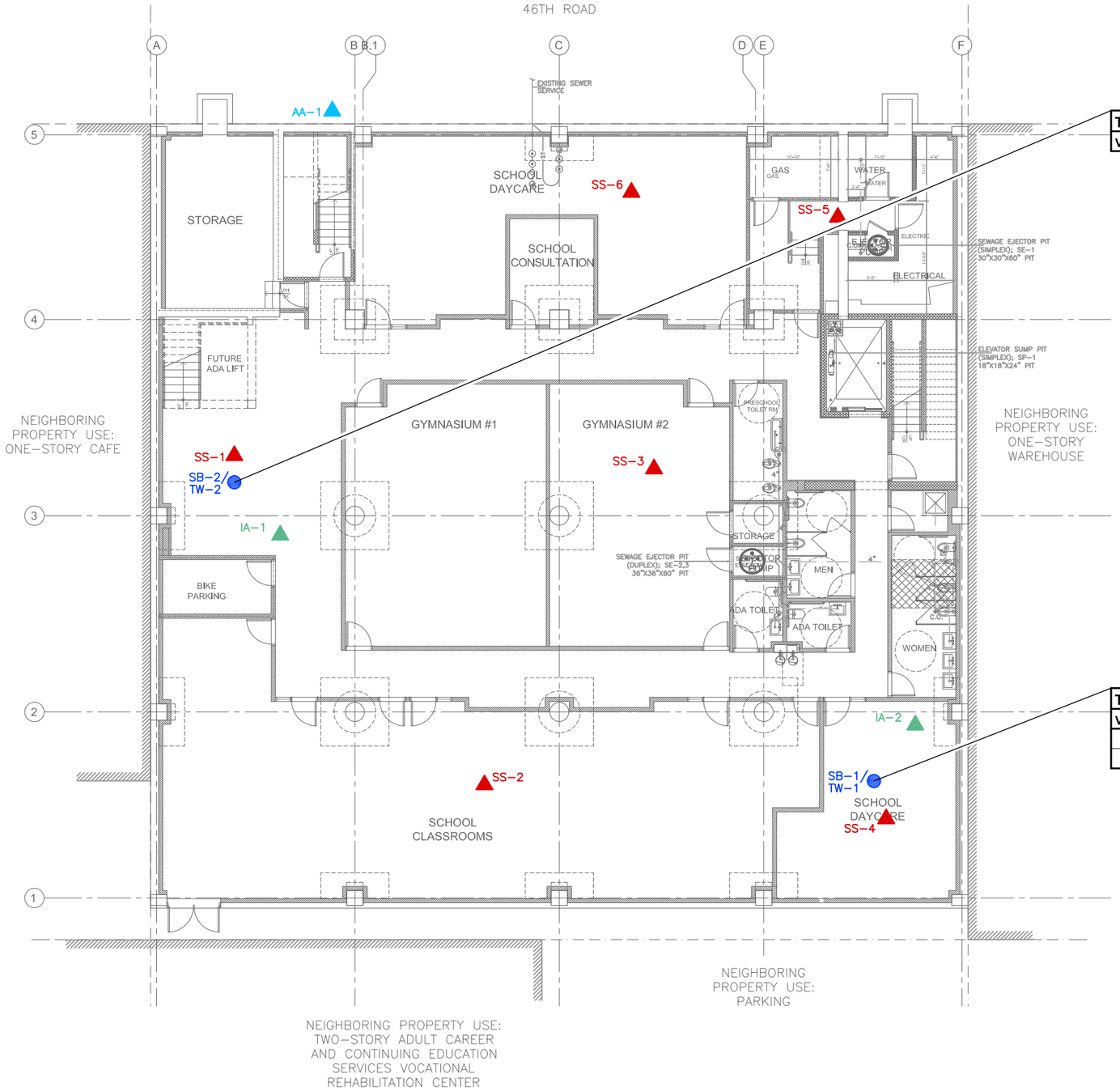

TW-2	10/21/2019
VOCs	ND

TW-1	10/21/2019	10/21/2019 DUP
VOCs		
Acetone	ND	1.5 J
Tetrachloroethylene (PCE)	0.9	0.98

LEGEND

- IA–1 — APPROXIMATE INDOOR AIR SAMPLE LOCATION AND DESIGNATION
- AA–1 — APPROXIMATE AMBIENT AIR SAMPLE LOCATION AND DESIGNATION
- SS–1 — APPROXIMATE SUB–SLAB VAPOR SAMPLE LOCATION AND DESIGNATION
- SB–1/TW–1 — APPROXIMATE SOIL BORING AND TEMPORARY WELL LOCATION AND DESIGNATION

Parameter	NYSDEC AWQSGVs
VOCs	
Acetone	50
Tetrachloroethylene (PCE)	5

CONCENTRATIONS IN µg/L

µg/L – MICROGRAMS PER LITER

* – NYSDEC AWQSGVS

NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

AWQSGVs – AMBIENT WATER–QUALITY STANDARDS AND GUIDANCE VALUES

– – NOT DETECTED ABOVE NYSDEC AWQSGV

J – ESTIMATED VALUE

DUP – DUPLICATE SAMPLE

VOCs – VOLATILE ORGANIC COMPOUNDS

ND – NO DETECTION

15' 0 15'

NOTE

GROUNDWATER WAS ENCOUNTERED APPROXIMATELY 1–2 FEET BELOW BOTTOM OF BASEMENT SLAB. TOP OF BASEMENT SLAB IS APPROXIMATELY 8 FEET BELOW SIDEWALK GRADE.

Title:

DETECTIONS OF VOCs IN GROUNDWATER

Prepared for:

11-20 46TH ROAD OWNER LLC

ROUX

Compiled by: R.H.	Date: 20NOV19	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	3
Project Mgr: R.H.	Project: 3371.0001Y000	
File: 3371.0001Y110.02.DWG		

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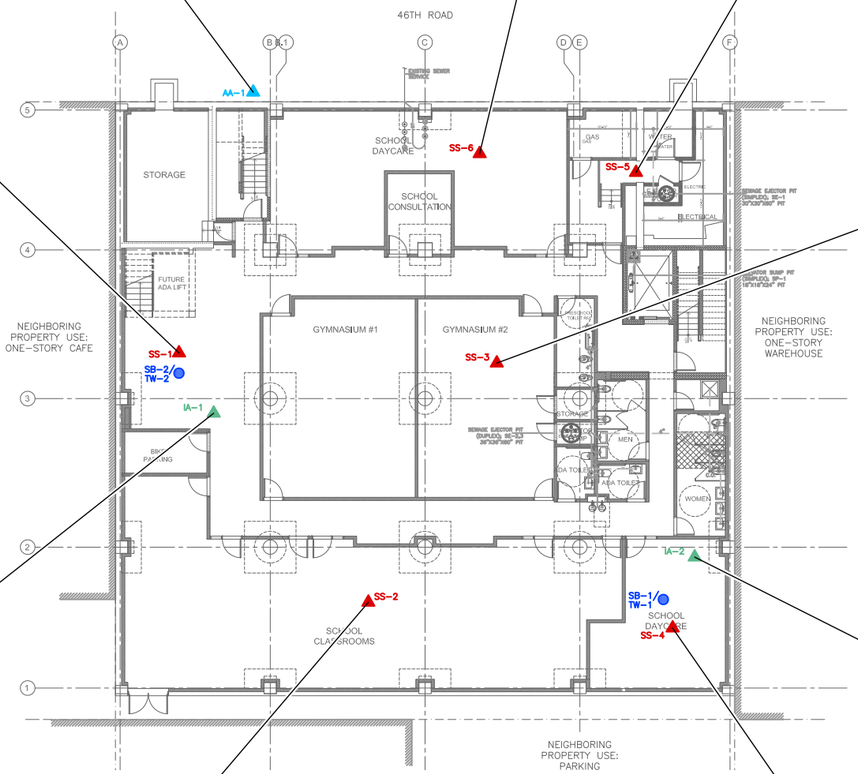
AA-1	08/23/2019	09/26/2019
Analyte		
VOCs		
1,2,4-Trimethylbenzene	**1.21**	ND
1,3,5-Trimethylbenzene (Mesitylene)	**0.353**	ND
1,4-Dichlorobenzene	**0.263**	ND
2,2,4-Trimethylpentane	**9.9**	**1.85**
4-Ethyltoluene	**0.327**	ND
Acetone	**15.6**	**10.4**
Benzene	**0.693**	ND
Carbon Tetrachloride	**0.419**	**0.478**
Chloroform	**0.274**	ND
Chloromethane	**1.11**	**1.03**
Cis-1,2-Dichloroethylene	ND	**0.202**
Dichlorodifluoromethane	**1.96**	**2.52**
Ethanol	**36.4**	**47.5**
Ethylbenzene	**1.01**	ND
Isopropanol	**2.46**	**1.99**
m,p-Xylene	**3.47**	**1.82**
Methyl Ethyl Ketone (2-Butanone)	ND	ND
Methylene Chloride	ND	**2.23**
N-Hexane	ND	**0.916**
O-Xylene (1,2-Dimethylbenzene)	**1.03**	ND
Styrene	**0.239**	ND
Tert-Butyl Alcohol	ND	**3.55**
Tetrachloroethylene (PCE)	**1.12**	**0.956**
Tetrahydrofuran	**2.68**	ND
Toluene	**4.45**	**1.84**
Trichlorofluoromethane	**1.01**	**1.31**

SS-6	09/26/2019
Analyte	
VOCs	
2,2,4-Trimethylpentane	**5.42**
Acetone	**1500**
Benzene	**2.25**
Chloroform	**5.18**
Cyclohexane	**2.72**
Ethanol	**230**
Ethylbenzene	**2.94**
Isopropanol	**41.3**
m,p-Xylene	**10.5**
Methyl Ethyl Ketone (2-Butanone)	**50.1**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	**14.5**
N-Heptane	**3.06**
N-Hexane	**5.57**
Tert-Butyl Alcohol	**15.6**
Tetrachloroethylene (PCE)	**48.7**
Toluene	**9.46**
Trichlorofluoromethane	**6.69**

SS-5	09/26/2019
Analyte	
VOCs	
1,2,4-Trimethylbenzene	**1.88**
1,3-Butadiene	**1.41**
1,4-Dioxane (P-Dioxane)	**1.23**
2,2,4-Trimethylpentane	**6.31**
2-Hexanone	**3.77**
Acetone	**753**
Benzene	**9.58**
Carbon Disulfide	**16.8**
Chloromethane	**1.18**
Cis-1,2-Dichloroethylene	**101**
Cyclohexane	**4.41**
Dichlorodifluoromethane	**2.28**
Ethanol	**241**
Ethylbenzene	**3.45**
Isopropanol	**38.6**
m,p-Xylene	**11.9**
Methyl Ethyl Ketone (2-Butanone)	**52.2**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	**16.4**
Methylene Chloride	**2.99**
N-Heptane	**6.31**
N-Hexane	**16**
O-Xylene (1,2-Dimethylbenzene)	**2.71**
Styrene	**1.46**
Tert-Butyl Alcohol	**11.6**
Tetrachloroethylene (PCE)	**11.7**
Tetrahydrofuran	**3.42**
Toluene	**16.1**
Trans-1,2-Dichloroethene	**2.97**
Trichloroethylene (TCE)	**8.06**
Vinyl Chloride	**110**

SS-1	09/26/2019
Analyte	
VOCs	
1,2,4-Trimethylbenzene	**2.12**
1,3-Butadiene	**1.46**
1,4-Dioxane (P-Dioxane)	**5.48**
Acetone	**651**
Benzene	**27.5**
Carbon Disulfide	**12.7**
Chloroform	**9.77**
Chloromethane	**4.83**
Cis-1,2-Dichloroethylene	**28.4**
Cyclohexane	**15.8**
Dichlorodifluoromethane	**2.84**
Ethanol	**379**
Ethylbenzene	**3.14**
Isopropanol	**33.2**
m,p-Xylene	**12.1**
Methyl Ethyl Ketone (2-Butanone)	**31**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	**18.3**
Methylene Chloride	**3.39**
N-Heptane	**37.5**
N-Hexane	**125**
O-Xylene (1,2-Dimethylbenzene)	**2.56**
Tert-Butyl Alcohol	**15.9**
Tetrachloroethylene (PCE)	**67.5**
Toluene	**15.6**
Trans-1,2-Dichloroethene	**2.47**
Trichloroethylene (TCE)	**7.9**
Trichlorofluoromethane	**2.44**
Vinyl Chloride	**16.7**

SS-3	09/26/2019
Analyte	
VOCs	
1,2,4-Trimethylbenzene	**8.11**
1,3,5-Trimethylbenzene (Mesitylene)	**4.82**
Acetone	**1710**
Benzene	**72.5**
Carbon Disulfide	**204**
Cis-1,2-Dichloroethylene	**70.6**
Cyclohexane	**120**
Ethanol	**220**
Ethylbenzene	**7.86**
Isopropanol	**32.4**
m,p-Xylene	**21.8**
Methyl Ethyl Ketone (2-Butanone)	**43.9**
Methylene Chloride	**9.03**
N-Heptane	**60.7**
N-Hexane	**130**
O-Xylene (1,2-Dimethylbenzene)	**9.82**
Tert-Butyl Alcohol	**17.8**
Tetrachloroethylene (PCE)	**71.2**
Toluene	**39.9**
Trans-1,2-Dichloroethene	**8.92**
Trichloroethylene (TCE)	**11**
Vinyl Chloride	**111**



IA-1	08/23/2019	09/26/2019
Analyte		
VOCs		
1,2,4-Trimethylbenzene	**1.05**	**1.1**
1,3,5-Trimethylbenzene (Mesitylene)	ND	ND
2,2,4-Trimethylpentane	**1.54**	**9.29**
4-Ethyltoluene	ND	ND
Acetone	**26.4**	**29.9**
Benzene	**1.02**	**0.754**
Carbon Disulfide	**1.17**	ND
Carbon Tetrachloride	**0.396**	**0.484**
Chloroform	ND	**1.02**
Chloromethane	**0.983**	**1.03**
Cis-1,2-Dichloroethylene	ND	**1.19**
Cyclohexane	**0.916**	ND
Dichlorodifluoromethane	**2.1**	**2.54**
Ethanol	**318**	**281**
Ethyl Acetate	**2.25**	ND
Ethylbenzene	**1.28**	**2.17**
Isopropanol	**3.71**	**8.16**
m,p-Xylene	**4.6**	**10.8**
Methyl Ethyl Ketone (2-Butanone)	**1.52**	ND
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	**7.95**	ND
Methylene Chloride	**3.41**	ND
N-Heptane	**1.02**	ND
N-Hexane	**2.22**	**1.13**
O-Xylene (1,2-Dimethylbenzene)	**1.32**	**3.21**
Styrene	ND	ND
Tert-Butyl Alcohol	**1.79**	**23.3**
Tetrachloroethylene (PCE)	**1.01**	**2.27**
Tetrahydrofuran	**6.19**	**1.58**
Toluene	**5.8**	**2.33**
Trans-1,2-Dichloroethene	ND	ND
Trichloroethylene (TCE)	ND	**0.199**
Trichlorofluoromethane	ND	**1.28**
Vinyl Chloride	ND	**0.169**

SS-2	09/26/2019
Analyte	
VOCs	
1,2,4-Trimethylbenzene	**1.94**
1,4-Dioxane (P-Dioxane)	**1.17**
2,2,4-Trimethylpentane	**2.88**
2-Hexanone	**3.72**
Acetone	**820**
Benzene	**3.32**
Carbon Disulfide	**3.24**
Cyclohexane	**2.17**
Dichlorodifluoromethane	**2.95**
Ethanol	**177**
Ethylbenzene	**3.5**
Isopropanol	**27.8**
m,p-Xylene	**13.1**
Methyl Ethyl Ketone (2-Butanone)	**49.8**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	**12**
N-Heptane	**3.41**
N-Hexane	**7.65**
O-Xylene (1,2-Dimethylbenzene)	**2.84**
Tert-Butyl Alcohol	**16.6**
Tetrachloroethylene (PCE)	**22.9**
Toluene	**11.7**
Trichlorofluoromethane	**13.7**

SS-4	09/26/2019
Analyte	
VOCs	
Acetone	**634**
Benzene	**6.96**
Chloroform	**17**
Cis-1,2-Dichloroethylene	**36.2**
Ethanol	**114**
Isopropanol	**42.3**
Methyl Ethyl Ketone (2-Butanone)	**33**
N-Hexane	**6.98**
Tert-Butyl Alcohol	**12.3**
Tetrachloroethylene (PCE)	**2540**
Toluene	**12.4**
Trichloroethylene (TCE)	**200**
Trichlorofluoromethane	**15.1**

IA-2	08/23/2019	09/26/2019
Analyte		
VOCs		
1,2,4-Trimethylbenzene	**1.06**	ND
1,3,5-Trimethylbenzene (Mesitylene)	ND	ND
2,2,4-Trimethylpentane	ND	**5.42**
4-Ethyltoluene	ND	ND
Acetone	**27.8**	**29.5**
Benzene	**0.652**	**0.732**
Carbon Tetrachloride	**0.403**	**0.497**
Chloroform	ND	ND
Chloromethane	**0.954**	**1.03**
Cis-1,2-Dichloroethylene	ND	**1.65**
Cyclohexane	ND	ND
Dichlorodifluoromethane	**2.18**	**2.49**
Ethanol	**616**	**207**
Ethyl Acetate	**4.07**	ND
Ethylbenzene	**1.52**	**1.21**
Isopropanol	**3.69**	**6.76**
m,p-Xylene	**5.73**	**5.56**
Methyl Ethyl Ketone (2-Butanone)	ND	ND
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	**16.3**	ND
N-Heptane	ND	ND
N-Hexane	**0.754**	**1.3**
O-Xylene (1,2-Dimethylbenzene)	**1.58**	**1.69**
Styrene	ND	**0.92**
Tert-Butyl Alcohol	**2.99**	**19.6**
Tetrachloroethylene (PCE)	**0.956**	**5.93**
Tetrahydrofuran	**3.24**	ND
Toluene	**4.6**	**2.06**
Trichloroethylene (TCE)	**0.107**	**0.704**
Trichlorofluoromethane	ND	**1.25**
Vinyl Chloride	ND	**0.194**

LEGEND

- IA-1 ▲ — APPROXIMATE INDOOR AIR SAMPLE LOCATION AND DESIGNATION
- AA-1 ▲ — APPROXIMATE AMBIENT AIR SAMPLE LOCATION AND DESIGNATION
- SS-1 ▲ — APPROXIMATE SUB-SLAB VAPOR SAMPLE LOCATION AND DESIGNATION
- SB-1/TW-1 ● — APPROXIMATE SOIL BORING AND TEMPORARY WELL LOCATION AND DESIGNATION
- ug/m³ – CONCENTRATIONS IN MICROGRAMS PER CUBIC METER
- VOCs – VOLATILE ORGANIC COMPOUNDS
- ND – COMPOUND WAS ANALYZED FOR BUT NOT DETECTED
- BOLD – INDICATES THAT PARAMETER WAS DETECTED

NOTE

GROUNDWATER WAS ENCOUNTERED APPROXIMATELY 1-2 FEET BELOW BOTTOM OF BASEMENT SLAB. TOP OF BASEMENT SLAB IS APPROXIMATELY 8 FEET BELOW SIDEWALK GRADE.

15' 0 15'

Title:

DETECTIONS OF VOCs IN SUB-SLAB SOIL VAPOR, INDOOR AIR, AND AMBIENT AIR

Prepared for:

11-20 46TH ROAD OWNER LLC

ROUX

Compiled by: R.H.	Date: 20NOV19	FIGURE 4
Prepared by: G.M.	Scale: AS SHOWN	
Project Mgr: R.H.	Project: 3371.0001Y000	
File: 3371.0001Y110.02.DWG		

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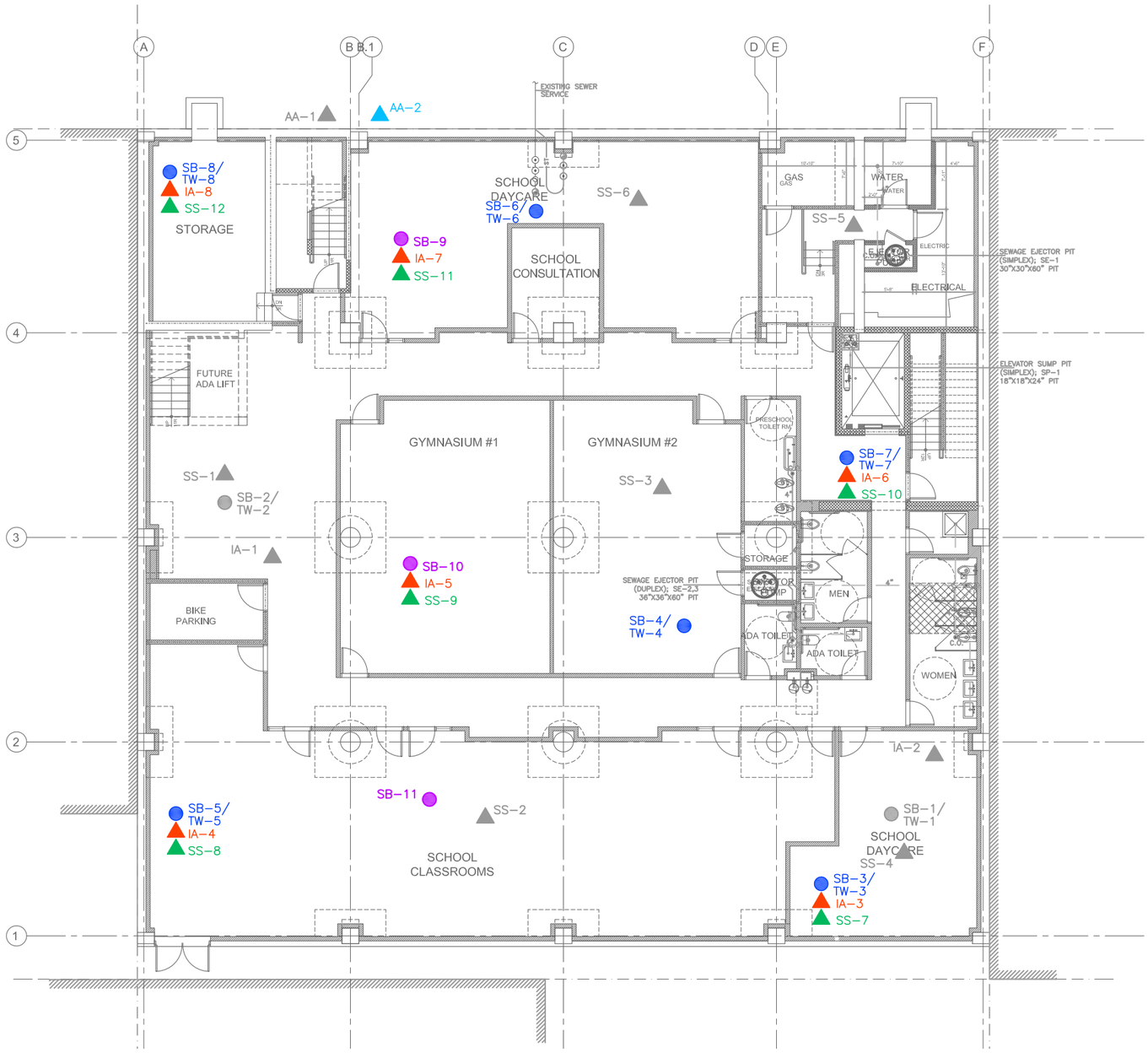

LEGEND

IA–1 ▲	APPROXIMATE INDOOR AIR SAMPLE LOCATION AND DESIGNATION
AA–1 ▲	APPROXIMATE AMBIENT AIR SAMPLE LOCATION AND DESIGNATION
SS–1 ▲	APPROXIMATE SUB–SLAB VAPOR SAMPLE LOCATION AND DESIGNATION
SB–1/ TW–1 ●	APPROXIMATE SOIL BORING AND TEMPORARY WELL LOCATION AND DESIGNATION
SB–10 ●	APPROXIMATE PROPOSED SOIL BORING LOCATION AND DESIGNATION
SB–3/ TW–3 ●	APPROXIMATE PROPOSED SOIL BORING AND TEMPORARY WELL LOCATION AND DESIGNATION
IA–3 ▲	APPROXIMATE PROPOSED INDOOR AIR LOCATION AND DESIGNATION
SS–7 ▲	APPROXIMATE PROPOSED SUB–SLAB VAPOR LOCATION AND DESIGNATION
AA–2 ▲	APPROXIMATE PROPOSED AMBIENT AIR SAMPLE LOCATION AND DESIGNATION

NOTE

1. GROUNDWATER IS ANTICIPATED TO BE ENCOUNTERED APPROXIMATELY 1–2 FEET BELOW THE BOTTOM OF OF THE SLAB. TOP OF THE BASEMENT SLAB IS APPROXIMATELY 8 FEET BELOW SIDEWALK GRADE.
2. TWO ADDITIONAL INDOOR AIR SAMPLES WILL BE COLLECTED FROM EACH OF THE UPPER FLOORS.

15' 0 15'

Title:

FORMER AND PROPOSED SAMPLING LOCATIONS

Prepared for:

11-20 46TH ROAD OWNER LLC

ROUX	Compiled by: R.H.	Date: 20NOV19	FIGURE 5
	Prepared by: G.M.	Scale: AS SHOWN	
	Project Mgr: R.H.	Project: 3371.0001Y000	
	File: 3371.0001Y110.03.DWG		

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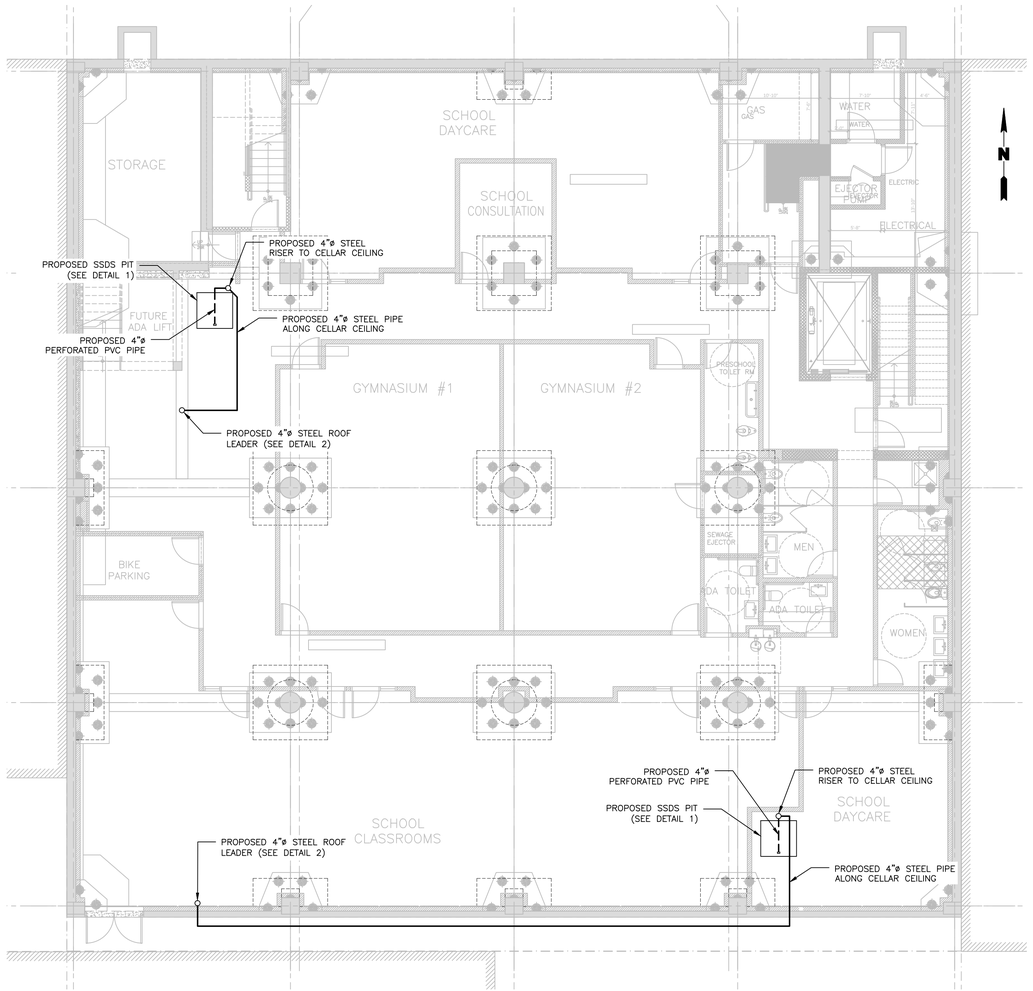


CELLAR FLOOR SITE PLAN

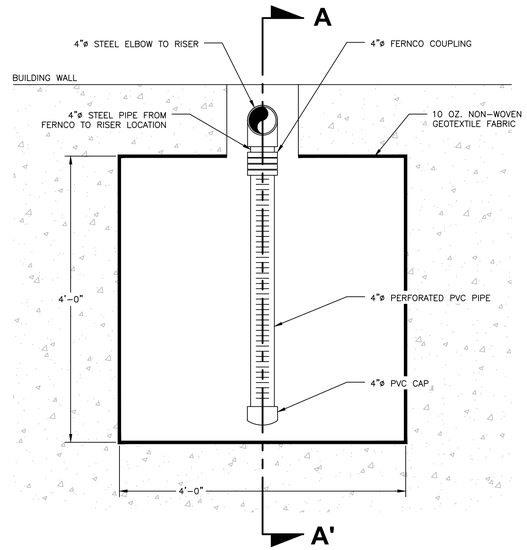
SCALE: 1/8" = 1'

SUB-SLAB PLAN NOTES

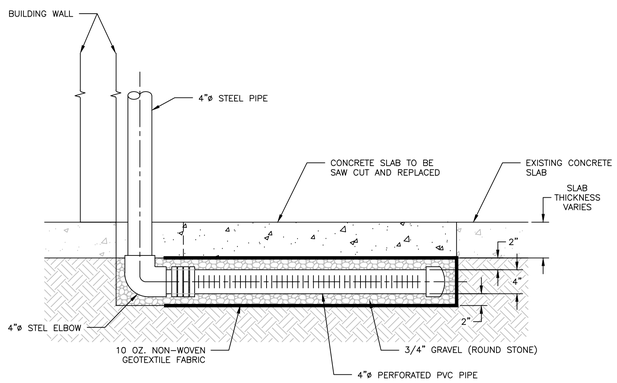
1. CONTRACTOR SHALL COORDINATE INSTALLATION OF SUB-SLAB DEPRESSURIZATION SYSTEM WITH THE FOUNDATION, PLUMBING, MECHANICAL AND ELECTRICAL CONTRACTORS.
2. CONTRACTOR SHALL FIELD VERIFY THE DESIGN INVERT ELEVATIONS (BOTTOM OF PIPING) FOR THE WALL PENETRATIONS. THE CONTRACTOR SHALL ALSO FIELD VERIFY THE HORIZONTAL OFFSETS FOR THE LOCATIONS OF THE VERTICAL RISERS.

SSDS PIPE NOTES

1. CONTRACTOR SHALL COORDINATE WITH PLUMBING, MECHANICAL, CIVIL AND ELECTRICAL CONTRACTORS FOR ALL UTILITY CROSSINGS.
2. ALL SSDS PIPING SHALL BE SLOPED TOWARDS THE PERFORATED PIPE PITS TO PREVENT ANY POTENTIAL MOISTURE BUILD UP AND BLOCKAGES.
3. THE SURFACES TO BE LINED WITH GEOTEXTILE SHALL BE FREE OF ALL ROCKS, STONES, SHARP OBJECTS OR CONSTRUCTION DEBRIS OF ANY KIND.
4. INSTALL GEOTEXTILE NONWOVEN FABRIC DIRECTLY ON FILL. MATERIAL OVERLAPS SHALL BE A MINIMUM OF 12" THE OVERLAPPED SEAMS WILL BE SEALED WITH TAPE.
5. ALL PENETRATIONS THROUGH THE SLAB ON GRADE (SOG) SHALL BE SEALED USING A SILICONE BASED WATERPROOF SEALANT OR EQUIVALENT.



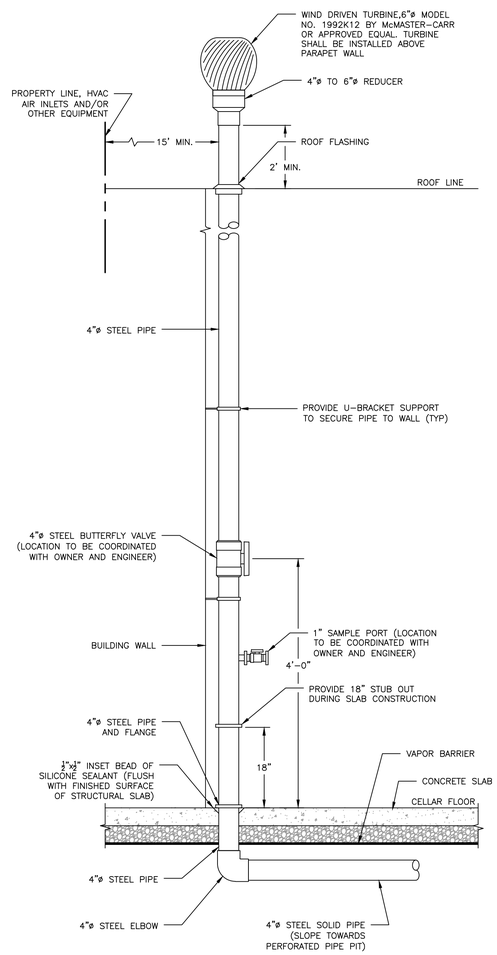
PLAN VIEW



PROFILE VIEW A-A'

1 SUB-SLAB DEPRESSURIZATION SYSTEM PIT DETAIL

SCALE: N.T.S.



2 RISER DETAIL

SCALE: N.T.S.

NO.	DATE	REVISION DESCRIPTION	INT.

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DESIGNED BY:	D.K.	CHECKED BY:	R.K.
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DRAWING FILE:	3371.0001Y107.01.DWG		

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Roux Environmental Engineering and Geology, D.P.C.
209 SHAFTER STREET ISLANDIA NEW YORK 11749
(631) 232-2600

PROJECT NAME:
11-20 46TH ROAD OWNER, LLC
11-20 46TH ROAD, LONG ISLAND CITY, NY 11101

PROJECT FOR:
11-20 46TH ROAD OWNER, LLC
11-20 46TH ROAD, LONG ISLAND CITY, NY 11101

TITLE:
SUB-SLAB DEPRESSURIZATION SYSTEM PLAN AND DETAILS

DRAWING NO.
1
DRAWING 1 OF 1

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ATTACHMENT 1

Retro-Coat™

Retro-Coat™

Vapor Intrusion Coating

Vapor Intrusion Coating System **for Existing Structures**

Product Description

The Retro-Coat™ Vapor Intrusion Coating System is a complete product line that consists of chemically resistant materials to properly protect existing structures from the threat of contaminant vapor intrusion without the need for additional concrete protection. Developed by the R&D team of Land Science®, the Retro-Coat system has been subjected to rigorous testing procedures to prove its ability to combat the most aggressive chemical vapors. The main component of the Retro-Coat system is the Retro-Coat coating which is a two part, odorless, no VOC, 100% solids coating.

Retro-Coat finishes to a high gloss, easy-to-clean surface that is impervious to vapor and moisture transmission. Available in a variety of colors, Retro-Coat can be applied on damp as well as dry concrete, concrete masonry units, tile, brick and metal. For enhanced slip resistance, a suitable aggregate can be added. In addition, other additives or materials can be utilized to achieve a desired performance or aesthetic look.

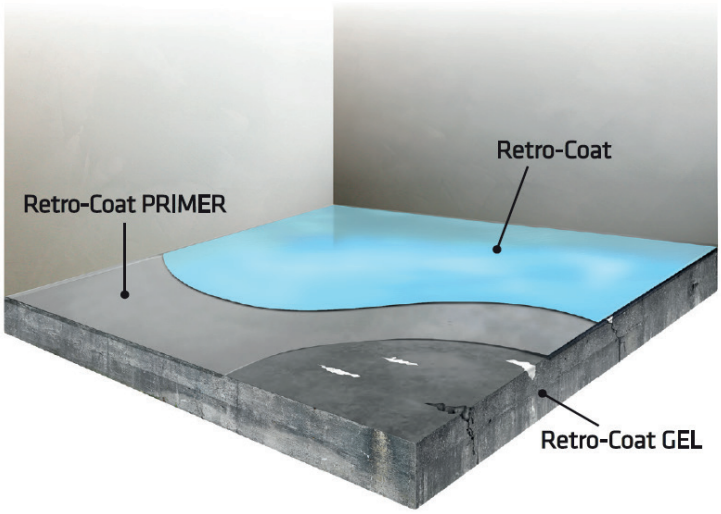
Typical Application

Retro-Coat is suitable as a barrier to block contaminated vapors from entering existing structures. Particular uses include coating the horizontal surfaces of existing structures where contamination under, or adjacent to, a structure can potentially migrate inside the structure and create a vapor encroachment condition. This condition is most commonly found when the existing structure was operated as a dry cleaner, gas station, manufacturing facility or located in close proximity to any structure where carcinogenic chemicals were utilized.

A typical application consists of a minimum 20 mil thick system; consisting of two 10 mil coats of Retro-Coat at 160 SF/gallon per coat and is recommended along with a 6 mil coat of Retro-Coat PRIMER. The typical 20 mil application can withstand forklift traffic, other machinery and even act as secondary containment. However, if Retro-Coat is exposed to harsh conditions over a longer period of time and/or used for a unique application, please consult with a LST representative to discuss options and a recommended approach.

Retro-Coat Advantages

Retro-Coat™
Vapor Intrusion Coating



- Our R&D team developed all of the Retro-Coat system components specifically for vapor intrusion protection in existing structures
- Retro-Coat is resistant to both TCE and PCE, the vast majority of coatings cringe at such aggressive chemicals
- Retro-Coat is a wearing surface, meaning no additional concrete protection is necessary
- No odor and fast cure time reduce building downtime
- Carpet, tile, linoleum or other floor coverings can be applied directly over Retro-Coat, if desired
- Eliminates the need to remove the existing slab and when combined with *in situ* treatment, lowers overall remediation cost
- Retro-Coat can increase the performance of an existing active sub-slab depressurization system
- Retro-Coat can aid in the retiring of existing active systems
- Available and installed by Land Science certified contractors

Installation

Particular care must be taken to follow those instructions precisely to assure proper installation. These instructions pertain to a standard 20 mil application; please contact us if the desired application is different.

1. New concrete should be allowed to cure a minimum of 28 days and/or be checked with a rubber mat or plastic sheet to ensure adequate curing time has occurred.
2. All surfaces to be covered should be power washed, shot blasted, acid etched, scarified or sanded to present a clean, sound substrate to which to bond to. The prepared surface should have a ph of 7.
3. Any bugholes and cracks wider than 1/8" should be filled with Retro-Coat PREP and allowed to dry before coating. More severely damaged concrete or other special conditions will require the proper Retro-Coat product.
4. When installing the standard 20 mil application of Retro-Coat, apply a 6 mil coat of Retro-Coat PRIMER and allow to dry prior to applying the initial coat of Retro-Coat. Priming may not be necessary when Retro-Coat is applied to a thickness greater than 20 mils. On new concrete or old concrete with an open porosity and on wood surfaces apply Retro-Coat PRIMER and allow to dry.
5. The two Retro-Coat ingredients should be mixed in the prescribed ratios, using a low speed "jiffy-style" mixer, (maximum 750 rpm). Mix Part A for about 1 minute then, add Part B and mix until uniform in color and consistency (at least one additional minute.)
6. Do not mix less than the prescribed amount of any ingredient or add any solvent to the mix.
7. Apply the mixed Retro-Coat material with a short nap roller, a squeegee or a brush. Apply approximately 160 SF per gallon per coat to achieve 10 mils of coating.
8. Apply a second coat while the first coat is still tacky if using spike shoes or dry enough to walk on, but before 7 hours at 75°F. If the first coat has set and is no longer tacky then the first coat should be sanded before recoating.
9. A suitable aggregate may be broadcast onto the surface after backrolling to provide more anti-slip profile to the finished surface. It is advisable to test various types and sizes of aggregate to achieve the desired finished profile.

Product Specification

The specified area shall receive an application of Retro-Coat as manufactured by Land Science. The material shall be installed by precisely following the manufacturer's published recommendations pertaining to surface preparation, mixing and application. The material shall be a low odor, two part, solvent free 100% solids, high gloss flexibilized system with good resilience to resist thermal and mechanical shock. It should be able to be roller applied at a minimum of 10 mils thickness per coat on vertical surfaces without sagging (at ambient conditions). The system must adhere to damp as well as dry concrete, wood, metal tile, terrazzo and sound existing epoxy and urethane coatings. It shall have tensile elongation of at least 6.0% when tested under ASTM-638. Its bond strength to quarry tile shall exceed 1000 psi when tested with an Elcometer pull test. Its hardness shall not exceed 83, as measured on the Shore D scale. The system shall be unaffected by oils and greases and shall withstand chemical attack for at least 72 hours against 98% sulfuric, 50% hydrofluoric acid, glacial acetic acid and acrylonitrile.

Precautions

1. This is a fast reacting product; immediately pour onto floor after mixing and spread with notched squeegee. Recoat window without sanding at 70°F: 8 hours
2. A severe skin and eye irritant; check MSDS before use
3. Do not apply below 50°F

Note: Failure to follow the above instruction, unless expressly authorized by a Land Science Representative, will void our material warranty.

Chemical Resistance

Retro-Coat™ is considered chemically resistant to neat concentrated acids, caustics and solvents. For permeation or diffusion coefficients please contact Land Science.

Physical Properties

Tensile Strength (ASTM D-638) : 9800 psi

Tensile Elongation (D-638) : 6.0%

Flexural Strength (D-790) : 7035 psi

Hardness, Shore D (D-2240) : 83

Gardner Impact Strength (D-2794) : 80 in. lbs.

Bond Strength to Quarry Tile : >1000 psi

Vapor Transmission Rate (E-96) : .027 perms

Water Absorption (D-570) : 0.2% in 24hrs.

Taber Abrasion (D-1044) : 86 mg loss.

60° Gloss : 100

Physical Characteristics

Density, lbs/gal.	Mixing Ratios	By Volume	By Weight	
Pt. A : 11.0	Pt. A : Pt. B	2:1	2.3:1	
Pt. B : 8.9				
A&B Mixed : 9.3	**Curing Times @**	**50° F**	**77°F**	**90°F**
Viscosity @ 77°F, cps	Pot Life	35 min.	30 min.	20 min.
Pt. A : 18,400	Working Times	20 min.	20 min.	15 min.
Pt. B : 500	Hard, Foot Traffic	14 hrs.	7 hrs.	3 ½ hrs.
A&B Mixed : 4800	Maximum hardness and chemical resistance are achieved after 7 days at 77°F			

Color Availability

Standard colors: beige, black, blue, dark gray, green, gray, red, white, yellow

Shelf Life: 1 Year at 77°F in unopened containers

Packaging and Coverage Rates (for 20 mil coverage)

4 Gallon Kit : 320 SF

20 Gallon Kit : 1600 SF

100 Gallon Kit : 8,000 SF

World Class Clients

Environmental consultants, engineers, and real estate professionals trust Land Science to produce results knowing our expertise and industry knowledge has been proven time and again at the job site. Our world class clients include leaders in the food, banking, government, and housing industries.

Get Started Today

To recieve a custom vapor intrusion solution, please call **949.481.8118** or email **info@landsciencetech.com**

One of our Technical Solutions Managers will review your project details and provide you with a customized vapor intrusion solution designed to achieve your goals.

EXPERTS IN VAPOR INTRUSION MITIGATION

Land Science® develops vapor intrusion mitigation solutions that protect people and invigorate renewal of contaminated properties.

We leverage our industry expertise to assist clients in developing site specific solutions that are technically sound and cost-effective.

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