

SOIL VAPOR INVESTIGATION (SVI)

OF

**PUBLIC SCHOOL 86 ANNEX (X886) - (LEASE RENEWAL)
124 EAMES PLACE
BRONX, NEW YORK 10468
BLOCK 3248, LOT 62**

**SCA LLW NO. 104997
SCA CONTRACT NO. C000013007
SERVICE ID NO. 64569**

D&B PROJECT NO. 3415-AR2

OCTOBER 14, 2016

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NOTICE OF REMEDIATION REQUIRED

Environmental contamination at the project site must be remediated prior to, or during, site development. Remedial design documents must be included within bid specifications for the construction contract. Contact IEH Department for additional information or assistance.

Site Name	Public School 86 Annex (X886)	LLW No.	104997
Description	124 Eames Place, Bronx, New York 10468	IEH Service ID Number	64569
District	10	Consultant Vendor	D&B Engineers and Architects, P.C.
Borough	Bronx	Phase I ESA Delivery Date	6/16/2016
Block/ Lot	Block 3248, Lot 62	SVI Delivery Date	10/14/2016

Identified Contamination

MEDIA	CONTAMINANT	CONCENTRATION RANGE	UNITS
Soil Vapor	Chloroethane	<0.26 to 1.32	ug/m3
Soil Vapor	Naphthalene	1 to 11.5	ug/m3
Soil Vapor	1,3,5-Trimethylbenzene	0.64 to 6.88	ug/m3

Required Remediation

MEASURE (list recommended remediation measures)	METHOD (e.g., Contractor HASP, soil excavation, removed soil characterization, sub-slab vapor membrane, etc.)	COST ESTIMATE
N/A	N/A	N/A

Comments

D&B Engineers and Architects, P.C. (D&B) conducted a Soil Vapor Investigation (SVI) for Public School 86 Annex (X886) located at 124 Eames Place, Bronx, New York (hereafter referred to as the "Site"). The Site consists of an approximate 14,550-square-foot lot improved with a three-story 14,155-square-foot building and a partial basement. The purpose of the SVI was to determine whether vapor intrusion has affected the suitability of the Site for continued use as a public school facility.

The SVI consisted of a geophysical survey and the collection and analysis of two (2) sub-slab vapor samples for volatile organic compounds (VOCs). The laboratory analytical results indicated that VOCs were not detected in soil vapor above their corresponding New York State Department of Health (NYSDOH) Air Guideline Values. Three VOCs (i.e., chloroethane, naphthalene and 1,3,5-trimethylbenzene) exceeded the NYSDOH published background levels in one sub-slab vapor sample, but were below relevant risk based assessment guideline values.

Based on the results of the SVI, D&B concludes that vapor intrusion is not a concern and the Site is suitable for continued use as a public school facility. D&B recommends that any suspect asbestos-containing material, lead-based paint, and/or polychlorinated biphenyl-containing building components affected by any future renovations, repairs or demolition be identified and properly managed during such activities in accordance with all applicable regulations and NYCSCA policies and procedures. In addition, D&B recommends that the source of the water infiltration be eliminated with all water damaged and any mold impacted areas abated. Finally, if consideration is given to purchasing the property in the future or if future development requires significant soil disturbance, then a comprehensive Phase II Environmental Site Investigation should be completed.

Attachments

The following environmental reports are attached to this document:

REPORT	PREPARE FIRM	DATE
Soil Vapor Investigation	D&B Engineers and Architects, P.C.	10/14/2016

Signature

Emily Hepding	D&B Engineers and Architects, P.C.	10/14/2016
Preparer	Firm	Date

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TABLE OF CONTENTS

Section	Page
EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	2
1.1 Background	2
1.2 Purpose	2
2.0 DESCRIPTION OF SOIL VAPOR INVESTIGATION FIELD ACTIVITIES	3
2.1 Soil Vapor Investigation Sampling.....	4
2.1.1 Geophysical Survey	4
2.1.2 Asbestos Clearance	4
2.1.3 Sub-Slab Vapor Sampling.....	4
2.1.4 Ambient Air Sampling.....	6
3.0 SITE SETTING	7
3.1 Site Description	7
3.2 Site Physical Characteristics.....	7
3.2.1 Topography	7
3.2.2 Geology	7
3.2.3 Soils	8
3.2.4 Hydrogeology	8
4.0 DISCUSSION OF FINDINGS.....	9
4.1 Applicable Regulatory Standards	9
4.1.1 Sub-Slab Soil Vapor Sampling Guidelines	9
4.1.2 Ambient Air Sampling Guidelines	9
4.2 Sub-Slab Soil Vapor Findings.....	10
4.3 Ambient Air Findings.....	10
4.3 Summary of Findings	11
5.0 CONCLUSIONS AND RECOMMENDATIONS	12
6.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS	13
7.0 REFERENCES	14

LIST OF FIGURES

- Figure 1 – Site Location Map
- Figure 2 – Site Plan with Sample Locations

LIST OF TABLES

- Table 1 – List of analyzed Volatile Organic Compounds
- Table 2 – Summary of Sub-Slab Soil Vapor and Ambient Air Analytical Results

APPENDICES

APPENDIX A	GEOPHYSICAL SURVEY REPORT
APPENDIX B	ASBESTOS CLEARANCE REPORT
APPENDIX C	LABORATORY ANALYTICAL DATA REPORTS
APPENDIX D	LABORATORY CERTIFICATION

EXECUTIVE SUMMARY

On behalf of the New York City School Construction Authority (NYCSCA), D&B Engineers and Architects, P.C. (D&B) conducted a Soil Vapor Investigation (SVI) for Public School 86 Annex (X886) located at 124 Eames Place, Bronx, New York (hereafter referred to as the “Site”). The Site consists of an approximate 14,550-square-foot lot improved with a three-story 14,155-square-foot building with a partial basement. The site building, constructed in 1959, is currently utilized as P.S. 307 - Louisa Pineiro Fuentes School of Science and Discovery. The NYCSCA is considering renewing the existing lease for P.S. 86 Annex.

D&B performed a Phase I Environmental Site Assessment (ESA) for the Site in June 2016. The Phase I ESA identified on-site recognized environmental conditions (RECs) associated with historic fill of unknown origin and the potential presence of buried structures and debris. Off-site RECs include an adjoining closed spill associated with an underground storage tank (UST); the current presence of a dry cleaner and two historical dry cleaners in the surrounding properties; the historical presence of an automobile station; as well as multiple regulatory listings for registered petroleum bulk storage tanks. Based upon the findings of the Phase I ESA, D&B recommended conducting an SVI to assess whether the RECs and/or vapor encroachment conditions (VECs) have affected the suitability of the Site for continued use as a public school facility.

The SVI field activities were performed on August 11 and 15, 2016 and September 10, 2016 and included a geophysical survey, asbestos clearance, and the collection and laboratory analysis of two sub-slab soil vapor samples and an ambient air sample. Sampling was conducted in accordance with the New York State Department of Health (NYSDOH) Soil Vapor Intrusion Guidance Document (October 2006). The samples were analyzed for volatile organic compounds (VOCs) utilizing United States Environmental Protection Agency (USEPA) Method TO-15.

The laboratory analytical results indicated that VOCs were not detected in sub-slab soil vapor samples exceeding NYSDOH Air Guideline Values (AGVs). However, chloroethane, naphthalene and 1,3,5-trimethylbenzene were detected at concentrations above published background levels. In the absence of established AGVs for these compounds, the detected concentrations were compared to relevant guideline values. None of these compounds exceed the relevant guideline values.

Based on the results of the SVI, D&B concludes that vapor intrusion is not a concern and the Site is suitable for continued use as a public school facility. D&B recommends that any suspect asbestos-containing material, lead-based paint, and/or polychlorinated biphenyl-containing building components affected by any future renovations, repairs or demolition be identified and properly managed during such activities in accordance with all applicable regulations and NYCSCA policies and procedures. In addition, D&B recommends that the source of the water infiltration be eliminated with all water damaged and any mold impacted areas abated. Finally, if consideration is given to purchasing the property in the future or if future development requires significant soil disturbance, then a comprehensive Phase II Environmental Site Investigation should be completed.

1.0 INTRODUCTION

On behalf of the New York School Construction Authority (NYCSCA), D&B Engineers and Architects, P.C. (D&B) conducted a SVI for Public School 86 Annex (X886) located at 124 Eames Place, Bronx, New York (hereafter referred to as the “Site”). The SVI was performed in accordance with the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 (VI Guidance Document). The Site consists of an approximate 14,550-square-foot lot improved with a three-story 14,155-square-foot building with a partial basement. The site building, constructed in 1959, is currently utilized as P.S. 307 - Louisa Pineiro Fuentes School of Science and Discovery. The Site is located in an area that is primarily characterized by a mixture of commercial, residential and institutional uses. The NYCSCA is considering renewing the existing lease for P.S. 86 Annex. A Site Location Map is provided as *Figure 1*. A Site Plan showing the Site and surrounding properties is provided as *Figure 2*.

1.1 Background

A Phase I Environmental Site Assessment (ESA) was completed by D&B on behalf of the New York City School Construction Authority (NYCSCA) dated June 16, 2016 for Public School 86 Annex (X886). The main objective of the Phase I ESA was to identify the presence or likely presence, use, or release of hazardous substances or petroleum products in, on, or at the property, which are defined in American Society for Testing and Materials (ASTM) Standard Practice E 1527-13 as recognized environmental conditions (RECs). In addition, other environmental issues or conditions such as radon, asbestos-containing materials (ACM), lead-based paint (LBP), and polychlorinated biphenyl (PCB)-containing equipment were evaluated. The Phase I ESA included a site inspection, a review of the existing data on geology and hydrology of the area, and a review of historical maps, federal, state, and local agency records, and other documents to assess past and current uses of the Site and adjacent areas.

The Phase I ESA identified on-site RECs associated with historic fill of unknown origin and the potential presence of buried structures and debris. Off-site RECs include an adjoining closed spill associated with an underground storage tank (UST); the current presence of a dry cleaner and two historical dry cleaners in the surrounding properties; the historical presence of an automobile station; as well as multiple regulatory listings for registered petroleum bulk storage tanks. Additionally, the evaluation revealed the presence of environmental concerns associated with the potential presence of asbestos-containing materials (ACM), lead-based paint (LBP), polychlorinated biphenyl (PCB)-containing material and potential mold growth associated with observed water damage on the second and third floors in the building.

Based on the RECs identified in the Phase I ESA, the performance of an SVI was recommended.

1.2 Purpose

The SVI was performed in order to assess whether the identified RECs and/or VECs have affected the suitability of the Site for continued use as a public school facility

2.0 DESCRIPTION OF SOIL VAPOR INVESTIGATION FIELD ACTIVITIES

The SVI field activities were performed on August 11 and 15, 2016 and September 10, 2016 in accordance with the NYSDOH Vapor Intrusion Guidance Document dated October 2006 and the scope of work prepared for the project dated June 16, 2016. The weather conditions during the SVI were sunny and approximately 90 degrees Fahrenheit on both August 15 and September 10, 2016. The Soil Vapor Investigation included the following:

- A geophysical survey of the proposed sub-slab vapor sample locations;
- Coordination with the NYCSCA IEH Division Survey and Design Group to ensure that the intrusive sampling locations were cleared of suspect asbestos-containing material (ACM);
- Installation of two (2) sub-slab vapor probes below the first floor slab of the existing school building and collection and analysis of an 8-hour duration, sub-slab vapor sample from each vapor probe; and
- Collection and analysis of an 8-hour duration ambient air sample from the roof of the building.

Figure 2 provides the sampling locations.

The SVI was conducted in general accordance with the Scope of Work (SOW) dated June 16, 2016, with the following exceptions:

- Indoor air samples were collected during the field activities in accordance with the SOW. However, these samples were placed on-hold at the laboratory pending the analytical results of the sub-slab vapor samples. Based on a review of the analytical results of the sub-slab vapor samples, it was determined that the indoor air samples did not require analysis.
- During the initial sampling round performed on August 15, 2016, the school fireman began applying polyurethane to the gymnasium floor located on the second floor of the building at about 10 a.m., approximately 1.5 hours after the sampling activities had initiated. Odors and elevated photoionization detector (PID) readings from the polyurethane application were noted at the ambient air sample location after approximately one hour and at the indoor air sampling locations after approximately 1.5 hours. Following a conversation with the NYCSCA, it was determined that the sampling should continue for the full 8-hour duration but that the vapor concentrations indicated on the PID be recorded and the type of polyurethane investigated. Following receipt of the sub-slab vapor and ambient air sample analytical results, it was observed that the polyurethane activities had compromised the samples. As a result, it was determined that the sampling activities should be repeated without interfering conditions. The second round sampling activities were performed on September 10, 2016 in the same manner. Since the results of the August 15, 2016 sampling event were compromised by the polyurethane activities, further discussion of this sampling event and associated results is not provided in this report.

The scope of the field activities and methods are described in the following sections.

2.1 Soil Vapor Investigation Sampling

2.1.1 Geophysical Survey

A geophysical survey was performed on August 11, 2016 by Nova Geophysical Services of Douglaston, New York to verify that the proposed sample locations were clear of subsurface structures and utilities. The geophysical survey equipment consisted of Conquest HD 1000 MHz ground penetrating radar (GPR) shielded antenna and 3M DYNATL. The sample locations were established in areas that did not conflict with any subsurface structures or utilities. A copy of the geophysical survey report is attached as *Appendix A*.

2.1.2 Asbestos Clearance

Based on the findings of the geophysical survey, D&B marked the proposed sub-slab vapor sample locations to allow for subsequent asbestos clearance. The concrete material through which the borings would be advanced was characterized as presumed asbestos-containing material. As a result, the borings were completed within containment on August 12, 2016. A New York State Department of Labor (NYSDOL) Inspector, Project Monitor and Air Sampling Technician from Precision Environmental, Inc. performed the air and suspect ACM sample collection and project monitoring. Trio, a subcontractor to Precision Environmental, Inc., advanced the boreholes and constructed the containment. Following the pre-probe survey, these boreholes were left open so that D&B could collect its sub-slab soil vapor samples from these locations on August 15, 2016. Following completion of the sampling activities, Trio returned to the Site to seal the boreholes. A copy of the pre-probe survey report is provided in *Appendix B*.

2.1.3 Sub-Slab Vapor Sampling

Sub-slab soil vapor sampling was conducted on September 10, 2016 in accordance with the applicable procedures described in ASTM E 2600-10 “Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions”, the October 2006 New York State Department of Health (NYSDOH) guidance document entitled, “Guidance for Evaluating Soil Vapor Intrusion in the State of New York”, and the Scope of Work dated June 16, 2016, with the exceptions indicated previously. *Figure 2* shows the sampling locations. The samples were collected for laboratory analysis of VOCs as follows:

- Sub-slab soil vapor sample PS86A-SSV1 was collected from the western hallway within the first floor of the building; and
- Sub-slab soil vapor sample PS86A-SSV2 was collected from the eastern hallway within the first floor of the building.

The sub-slab soil vapor samples were collected immediately below the building floor slab surface (i.e., less than 6 inches below the bottom of the floor slab) by inserting the Teflon tubing into a 0.25-inch diameter stainless steel screen placed immediately below the building floor slab and sealing the annular space with clay.

The adequacy of each seal was tested in accordance with the NYSDOH-approved method for sub-slab soil vapor and soil vapor sampling. A 5-gallon bucket was placed over each borehole and sealed from ambient air. Helium tracer gas was then pumped into the bucket. The above-grade end of the tubing, which was connected to the sample collection point, was then attached to a helium gas detector. Direct readings of helium of less than 10 percent were considered sufficient to verify a tight seal. The testing confirmed that the sub-slab vapor points were adequately sealed.

Each of the temporary sub-slab soil vapor probes was purged of three volumes of air using a PID. PID readings were non-detect during purging. Soil vapor purge volume and length of time were calculated based on the depth of installation, diameter of the tubing, and pumping rate of the instrument used.

The two (2) sub-slab soil vapor samples were collected utilizing individually certified-clean 6-liter Summa[®] canisters. The samples were collected for approximately eight (8) hours. The sub-slab vapor samples were collected by connecting the polyethylene tubing directly to the Summa[®] canisters. Immediately after opening each Summa[®] canister, the initial vacuum (inches of mercury) in each canister was recorded as shown in the table below. After approximately eight hours, final vacuum readings (inches of mercury) were noted and the Summa[®] canisters were closed. During the sampling, no activities were being performed in the immediate vicinity that could interfere with the sub-slab vapor sampling.

Summary of Sampling Field Data

Sample ID	Canister Vacuum at Start (inches Hg)	Canister Vacuum at Completion (inches Hg)
PS86A-SSV1	29	10.5
PS86A-SSV2	30	12

The sub-slab soil vapor samples were analyzed for the following VOCs utilizing USEPA Method TO-15: benzene, carbon tetrachloride, chlorobenzene, chloroethane, chloromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloropropane, ethylbenzene, methyl tert-butyl ether, methylene chloride, naphthalene, tetrachloroethene (PCE), toluene, 1,1,1-trichloroethane (TCA), trichloroethene (TCE), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride, m&p-xylenes and o-xylene. These VOCs were selected for analyses since they represent a broad range of petroleum and solvent-related VOCs which could potentially be present based on the RECs identified in the Phase I ESA completed by D&B dated June 16, 2016. Refer to the attached *Table 1* for a description of these compounds.

The samples were collected over approximately eight (8) hours, in order to obtain a sufficient sample volume for a laboratory reporting limit of approximately 1.0 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for the majority of analytes. In accordance with the NYSDOH VI Guidance Document, the reporting limit for vinyl chloride, carbon tetrachloride, and TCE is 0.25 $\mu\text{g}/\text{m}^3$.

The Summa[®] canisters were properly labeled and shipped via courier to Chemtech of Mountainside, New Jersey for analysis. Chemtech is a NYSDOH Environmental Laboratory Approval Program (ELAP) certified analytical laboratory for air quality sample analyses by USEPA Method TO-15. A summary of the analytical results is presented in *Table 2*. The laboratory analytical data report is in *Appendix C*.

Upon completion of sampling at each sub-slab vapor location, the point was backfilled to the bottom of the concrete slab, the concrete slab was restored and the damaged floor tile was replaced by Precision Environmental, Inc.'s coring subcontractor.

2.1.4 Ambient Air Sampling

Ambient air sampling was conducted on September 10, 2016 in accordance with the applicable procedures described in the NYSDOH VI Guidance Document and the Scope of Work dated June 16, 2016. *Figure 2* shows the sampling locations. One ambient air sample was collected from the roof of the building and identified as sample PS86A-AA3.

The ambient air vapor sample was collected utilizing an individually certified-clean 6-liter Summa[®] canister. The sample was collected for approximately eight (8) hours. The ambient air sample was collected directly into the Summa[®] canister. Immediately after opening the Summa[®] canister, the initial vacuum (inches of mercury) in the canister was recorded as shown in the table below. After approximately eight hours, a final vacuum reading (inches of mercury) was noted and the Summa[®] canister was closed.

Summary of Sampling Field Data

Sample ID	Canister Vacuum at Start (inches Hg)	Canister Vacuum at Completion (inches Hg)
PS86A-AA3	26	0

The ambient air sample was analyzed for the following VOCs utilizing USEPA Method TO-15: benzene, carbon tetrachloride, chlorobenzene, chloroethane, chloromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloropropane, ethylbenzene, methyl tert-butyl ether, methylene chloride, naphthalene, tetrachloroethene (PCE), toluene, 1,1,1-trichloroethane (TCA), trichloroethene (TCE), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride, m&p-xylenes and o-xylene. These VOCs were selected for analyses since they represent a broad range of petroleum and solvent-related VOCs which could potentially be present based on the RECs identified in the Phase I ESA completed by D&B dated June 16, 2016. Refer to the attached *Table 1* for a description of these compounds.

The sample was collected over approximately eight (8) hours, in order to obtain a sufficient sample volume for a laboratory reporting limit of approximately 1.0 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for the majority of analytes. In accordance with the NYSDOH VI Guidance Document, the reporting limit for vinyl chloride, carbon tetrachloride, and TCE is $0.25 \mu\text{g}/\text{m}^3$.

The Summa[®] canister was properly labeled and shipped via courier to Chemtech of Mountainside, New Jersey for analysis. Chemtech is a NYSDOH Environmental Laboratory Approval Program (ELAP) certified analytical laboratory for air quality sample analyses by USEPA Method TO-15. A summary of the analytical results is presented in *Table 2*. The laboratory analytical data report is in *Appendix C*.

3.0 SITE SETTING

3.1 Site Description

The Site is located at 124 Eames Place in Bronx, New York. The legal description of the Site is Block 3248, Lot 62. The Site consists of an approximate 14,550-square-foot lot improved with a three-story 14,155-square-foot building with a partial basement. The site building, constructed in 1959, is currently utilized as P.S. 307 - Louisa Pineiro Fuentes School of Science and Discovery. The Site is located in an area that is primarily characterized by a mixture of commercial, residential and institutional uses.

The Site is bounded to the north by Eames Place followed by residential properties; to the east by a residential property; to the south by commercial and residential properties; and, to the west by Webb Avenue followed by commercial and residential properties. *Figure 1* presents a Site Location Map. A Site plan showing Site features, tax block and lot numbers and anticipated groundwater flow direction is provided in *Figure 2*.

3.2 Site Physical Characteristics

Information regarding topography, geology, site soils, and hydrology was obtained from previous site investigations and assessments and is summarized below.

3.2.1 Topography

According to the United States Geological Survey (USGS.) 7.5-Minute Quadrangle Map, Central Park, New York, dated 2013, the elevation of the Site is approximately 164 feet above mean sea level and the topographic gradient of the area generally slopes down to the west-southwest. The topography of the immediate Site area was observed to slope down slightly to the southeast. The nearest surface water body is the Harlem River located approximately a half mile to the west of the Site.

3.2.2 Geology

Information on local geology is available from the entry in the NYSDEC Environmental Site Remediation Database for a nearby Voluntary Cleanup Program site (2614 University Avenue) located approximately 600 feet south of the Site. Bedrock at 2614 University Avenue was shallow, being observed at depths ranging from 0 to 8 feet below grade. Given the proximity and similar elevation of the Site as compared to 2614 University Avenue, bedrock is also likely shallow at the Site. However, bedrock outcropping was not observed on the Site, and a partial basement is present in the building. Therefore, it is estimated that bedrock is located approximately 10 feet below grade at the Site. Note that actual bedrock depth can vary greatly in this area and can only be determined through the completion of geotechnical borings. The Geologic Map of New York, Lower Hudson Sheet, dated 1970 indicates that the bedrock type in the vicinity of the Site is most likely Inwood Marble.

According to the Surficial Geologic Map of New York, Lower Hudson Sheet, dated 1989, the unconsolidated deposits above the bedrock at the Site likely consist of glacial till, which is an unsorted mixture of gravel, sand, silt and clay, beneath any urban fill that may be present.

3.2.3 *Soils*

According to the New York City Reconnaissance Soil Survey compiled by the United States Department of Agriculture - Natural Resources Conservation Service, the Site is located in an urban area with more than 80% impervious pavement and buildings. This area is nearly level to gently sloping and contains glacial till beneath urbanized surfaces.

3.2.4 *Hydrogeology*

According to observations collected at the 2614 University Avenue site discussed in Section 3.2.2, groundwater was not encountered at all locations in the overburden present in the area but is expected to be encountered above the bedrock at approximately 0 to 8 feet below grade in the vicinity of the Site, flowing in an overall southeasterly direction toward Aqueduct Avenue. However, estimated groundwater levels and/or flow direction(s) may vary due to seasonal fluctuations in precipitation, local usage demands, geology, underground structures, or dewatering operations. There is no data available regarding groundwater flow within bedrock.

There are no surface water bodies located on or adjoining the Site. The nearest surface water body is the Jerome Park Reservoir located approximately 1,500 feet north of the Site, and the Harlem River is located approximately a half mile west of the Site.

4.0 DISCUSSION OF FINDINGS

This section presents a discussion of the findings of the Soil Vapor Investigation.

4.1 Applicable Regulatory Standards

This subsection identifies the regulatory criteria used to evaluate the results of the sub-slab soil vapor and ambient air samples. The standards and guidelines used to evaluate the specific data are described individually below.

4.1.1 Sub-Slab Soil Vapor Sampling Guidelines

Analytical results for the sub-slab soil vapor samples were compared to the NYSDOH Air Guideline Values (AGVs) and to background levels of VOCs in indoor air presented in the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 (“NYSDOH Vapor Intrusion Guidance Document”), including Upper Fence Limit Indoor Air Values from “Table C-1, NYSDOH 2003: Study of Volatile Organic Chemicals in Air of Fuel Oil Heated Homes,” 90th Percentile Indoor Air Values from “Table C-2, EPA 2001: Building Assessment and Survey Evaluation (BASE) Database, SUMMA Canister Method”, and the 95th Percentile Indoor Air Values from “Table C-5, Health Effects Institute (HEI) 2005: Relationship of Indoor, Outdoor and Personal Air” published in the NYSDOH Soil Vapor Intrusion Guidance Document, Appendix C (October 2006). Tetrachloroethene (PCE) levels were compared to the Air Guideline Value presented in the NYSDOH Fact Sheet on Tetrachloroethene in Indoor and Outdoor Air, dated September 2013 (see <https://www.health.ny.gov/environmental/chemicals/tetrachloroethene/docs/perc.pdf>). Trichloroethene (TCE) levels were compared to the Air Guideline Value presented in the NYSDOH Fact Sheet on Trichloroethene in Indoor and Outdoor Air, dated August 2015 (see https://www.health.ny.gov/environmental/investigations/soil_gas/svi_guidance/docs/fs_tce.pdf). The results of the analyses of the sub-slab vapor samples were compared to Matrices 1 and 2 in the NYSDOH Vapor Intrusion Guidance Document (*please note that the matrices rely in part on indoor air data and indoor air samples were not analyzed as part of this Soil Vapor Investigation*). In addition, the results of the analyses of the sub-slab vapor samples were also compared to the New Jersey Department of Environmental Protection (NJDEP) Soil Gas Screening Levels for specific compounds.

4.1.2 Ambient Air Sampling Guidelines

Analytical results for the ambient air sample were compared to the NYSDOH AGVs and to background levels of VOCs in outdoor air presented in the NYSDOH Vapor Intrusion Guidance Document, including Upper Fence Limit Outdoor Air Values from “Table C-1, NYSDOH 2003: Study of Volatile Organic Chemicals in Air of Fuel Oil Heated Homes,” 90th Percentile Outdoor Air Values from “Table C-2, EPA 2001: Building Assessment and Survey Evaluation (BASE) Database, SUMMA Canister Method”, and the 95th Percentile Outdoor Air Values from “Table C-5, HEI 2005: Relationship of Indoor, Outdoor and Personal Air published in the NYSDOH Soil Vapor Intrusion Guidance Document, Appendix C” (October 2006). Tetrachloroethene (PCE) levels were compared to the Air Guideline Value presented in the NYSDOH Fact Sheet on Tetrachloroethene in Indoor and Outdoor Air, dated September 2013 (see <https://www.health.ny.gov/environmental/chemicals/tetrachloroethene/docs/perc.pdf>). Trichloroethene (TCE) levels were compared to the Air Guideline Value presented in the NYSDOH Fact Sheet on Trichloroethene in Indoor and Outdoor Air, dated August 2015 (see https://www.health.ny.gov/environmental/investigations/soil_gas/svi_guidance/docs/fs_tce.pdf). In addition, the results were

compared to the maximum values recorded in 2015 at the NYSDEC Ambient Air Monitoring Station located at New York Botanical Gardens (2900 Southern Boulevard, Bronx, New York), which is approximately 1 mile east of the Site.

4.2 Sub-Slab Soil Vapor Findings

A review of the sub-slab soil vapor sample analytical results indicates that 14 of the 26 VOCs analyzed utilizing USEPA Method TO-15 for the parameters listed in Table 1 were detected in one or more samples. These compounds include: benzene, carbon tetrachloride, chloroethane, chloromethane, ethylbenzene, methylene chloride, naphthalene, PCE, toluene, TCE, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, m&p-xylenes, and o-xylene. None of the VOCs were detected at concentrations above the corresponding AGVs.

The sub-slab soil vapor sampling results for carbon tetrachloride and TCE were compared to Matrix 1 of the NYSDOH VI Guidance Document. The results of the analysis for carbon tetrachloride ranged from 0.38 $\mu\text{g}/\text{m}^3$ to 0.44 $\mu\text{g}/\text{m}^3$. The results of the analysis for TCE ranged from 0.16 $\mu\text{g}/\text{m}^3$ to 0.54 $\mu\text{g}/\text{m}^3$. Based on Matrix 1, the recommended actions for carbon tetrachloride and TCE concentrations less than 5 $\mu\text{g}/\text{m}^3$ in soil vapor is either “no further action” or “take reasonable and practical actions to identify source(s) and reduce exposures”, depending on corresponding indoor air concentrations. It should be noted that “monitoring” or “mitigation” would not be the recommended action, regardless of the corresponding indoor air concentrations.

The sub-slab soil vapor sampling results for PCE and TCA were compared to Matrix 2 of the NYSDOH VI Guidance Document. The results of analysis for TCA were non-detect. The results of analysis for PCE ranged from 0.41 $\mu\text{g}/\text{m}^3$ to 2.03 $\mu\text{g}/\text{m}^3$. Based on Matrix 2, the recommended actions for TCA and PCE concentrations less than 100 $\mu\text{g}/\text{m}^3$ in soil vapor is either “no further action” or “take reasonable and practical actions to identify source(s) and reduce exposures”, depending on corresponding indoor air concentrations. It should be noted that “monitoring” or “mitigation” would not be the recommended action, regardless of the corresponding indoor air concentrations.

The following VOCs were detected at concentrations above the published background levels presented in the NYSDOH Vapor Intrusion Guidance Document: chloroethane, naphthalene and 1,3,5-trimethylbenzene. The NYSDOH does not provide action levels for these compounds in soil gas; however, the New Jersey Department of Environmental Protection (NJDEP) provides Soil Gas Screening Levels for these compounds. Since none of the VOCs detected in the sub-slab vapor samples exceed the NJDEP’s action levels, vapor intrusion does not represent a concern at the Site.

The summary of the analytical results is presented in *Table 2*. The complete laboratory analytical data report is included in *Appendix C*.

4.3 Ambient Air Findings

A review of the ambient air sample analytical results indicates that 12 of the 26 VOCs analyzed utilizing USEPA Method TO-15 for the parameters listed in Table 1 were detected in the sample. These compounds include: benzene, carbon tetrachloride, chloromethane, ethylbenzene, methylene chloride, PCE, toluene, TCE, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, m&p-xylenes, and o-xylene. VOCs were not detected at concentrations above the corresponding AGVs or the range of published outdoor air background levels presented in the NYSDOH Vapor Intrusion Guidance Document.

The summary of the analytical results is presented in *Table 2*. The complete laboratory analytical data report is included in *Appendix C*.

4.3 Summary of Findings

The SVI consisted of the collection and laboratory analysis of two (2) sub-slab vapor samples and one (1) ambient air sample. The laboratory analytical results indicated that VOCs were not detected in the sub-slab soil vapor or ambient air samples exceeding NYSDOH AGVs. However, chloroethane, naphthalene and 1,3,5-trimethylbenzene were detected at concentrations slightly exceeding the published background levels in one sub-slab vapor sample. In the absence of established AGVs for these compounds, the detected concentrations were compared to relevant guideline values. None of these compounds exceed the relevant guideline values.

Comparison of the sub-slab vapor sample results to the Decision Matrices indicate that monitoring or mitigation would not be the recommended action, regardless of the indoor air concentrations.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the SVI, D&B concludes that vapor intrusion is not a concern and the Site is suitable for continued use as a public school facility. D&B recommends that any suspect asbestos-containing material, lead-based paint, and/or polychlorinated biphenyl-containing building components affected by any future renovations, repairs or demolition be identified and properly managed during such activities in accordance with all applicable regulations and NYCSCA policies and procedures. In addition, D&B recommends that the source of the water infiltration be eliminated with all water damaged and any mold impacted areas abated. Finally, if consideration is given to purchasing the property in the future or if future development requires significant soil disturbance, then a comprehensive Phase II Environmental Site Investigation should be completed.

6.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

D&B Engineers and Architects, P.C. (D&B) has performed a Soil Vapor Investigation of Public School 86 Annex (X886) located at 124 Eames Place in Bronx, New York. The Soil Vapor Investigation was performed in general accordance with NYSDOH guidance and the Scope of Work dated June 16, 2016, with the exceptions noted earlier.

D&B Engineers and Architects, P.C.

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7.0 REFERENCES

D&B Engineers and Architects, P.C., *Phase I Environmental Site Assessment of Public School 86 Annex (X886) – (Lease Renewal), 124 Eames Place, Bronx, New York, 10468*, June 16, 2016.

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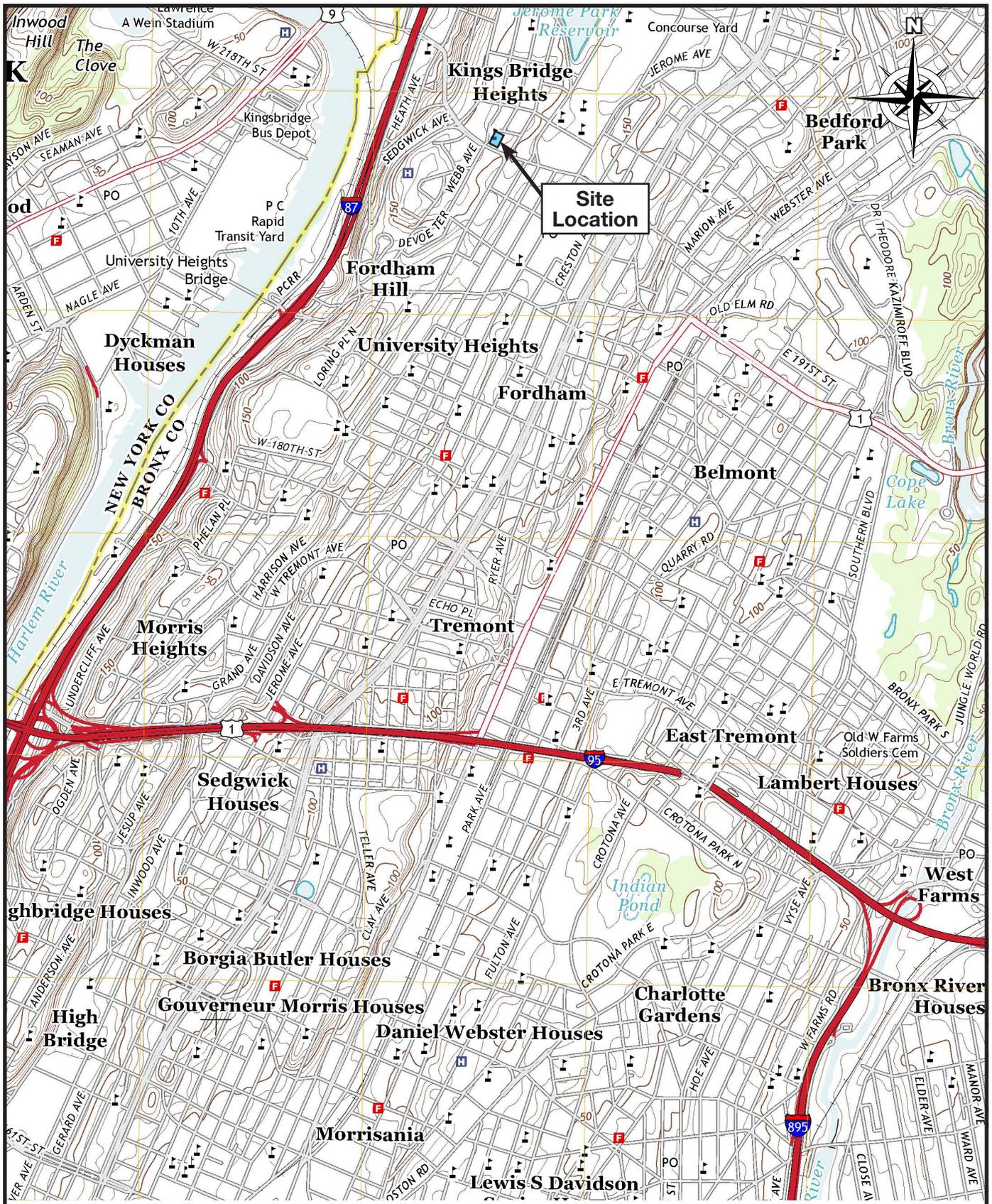
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Tetrachloroethene (PERC) in Indoor and Outdoor Air, September 2013 Fact Sheet, New York State Department of Health.

Trichloroethene (TCE) in Indoor and Outdoor Air, August 2015 Fact Sheet, New York State Department of Health.

New Jersey Department of Environmental Protection Vapor Intrusion Technical Guidance (Version 4), August 2016.

FIGURES



SOURCE: UNITED STATES GEOLOGICAL SURVEY (USGS), 7.5" TOPOGRAPHIC QUADRANGLE CENTRAL PARK, NY-NJ, 2013



NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

P.S. 86 ANNEX
124 EAMES PLACE, BRONX, NY 10468
SITE LOCATION MAP



FIGURE 1