AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474

Date: May 19, 2023

Rafi Alam, PM
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 11th Floor
Albany, NY 12233

Ref: 69-02 Queens Boulevard
Site No. C241235
Queens, NY 11377
Soil Vapor Intrusion Workplan

Dear Mr. Alam,

This work plan has been prepared to conduct a post-construction soil vapor intrusion evaluation for 69-02 Queens Boulevard. As part of the Site Management Plan requirements, a soil vapor intrusion evaluation for Track 1 and Track 4 portions of the Site must be performed prior to initial occupancy. The post-construction soil vapor intrusion evaluation will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion within the new buildings.

Workplan:
A total of nine air samples will be collected as follows:

1. Track 1: One indoor air sample (IA-T1) and one sub-slab sample (SS-T1)
2. Track 4: One indoor air sample (IA-T4) and one sub-slab sample (SS-T4)
3. School: One indoor air sample in the cellar (IA-C), one indoor air sample in a classroom and one indoor air sample in the stairwell on the second floor (IA-CR and IA-S), and one indoor air sample in the cafeteria on the third floor (IA-CAF)
4. Courtyard: One outdoor air sample (OA)

Samples will be collected in 6-liter Summa® canisters over a 24-hour period in accordance with NYSDOH protocols. The indoor and outdoor canisters will be placed in raised positions to simulate breathing zone conditions in accordance with NYSDOH procedures. The canisters will be transported to Phoenix Labs under chain of custody. These samples will be analyzed for volatile organic compounds by USEPA method TO-15. A sampling report will be generated upon receipt of the results.

The Track 4 portion of the Site includes a 48” thick mat slab and a 20-mil vapor barrier underneath the slab as an engineering control for the protection of human health and the environment. Due to these existing conditions, it is anticipated that core drilling through the slab and vapor barrier will present challenges that may compromise the vapor barrier and void the warranty. As an alternative, we are proposing the use of the existing monitoring wells for sub-slab vapor sampling. The current monitoring well MW11R is 9’ deep (from grade) with a 5-foot screen. As per the last purge log, March 15, 2023,

the water elevation was 2.75'. The existing low water height as well as the height of the screen in the well should provide enough clearance to allow for sub-slab vapor sampling.

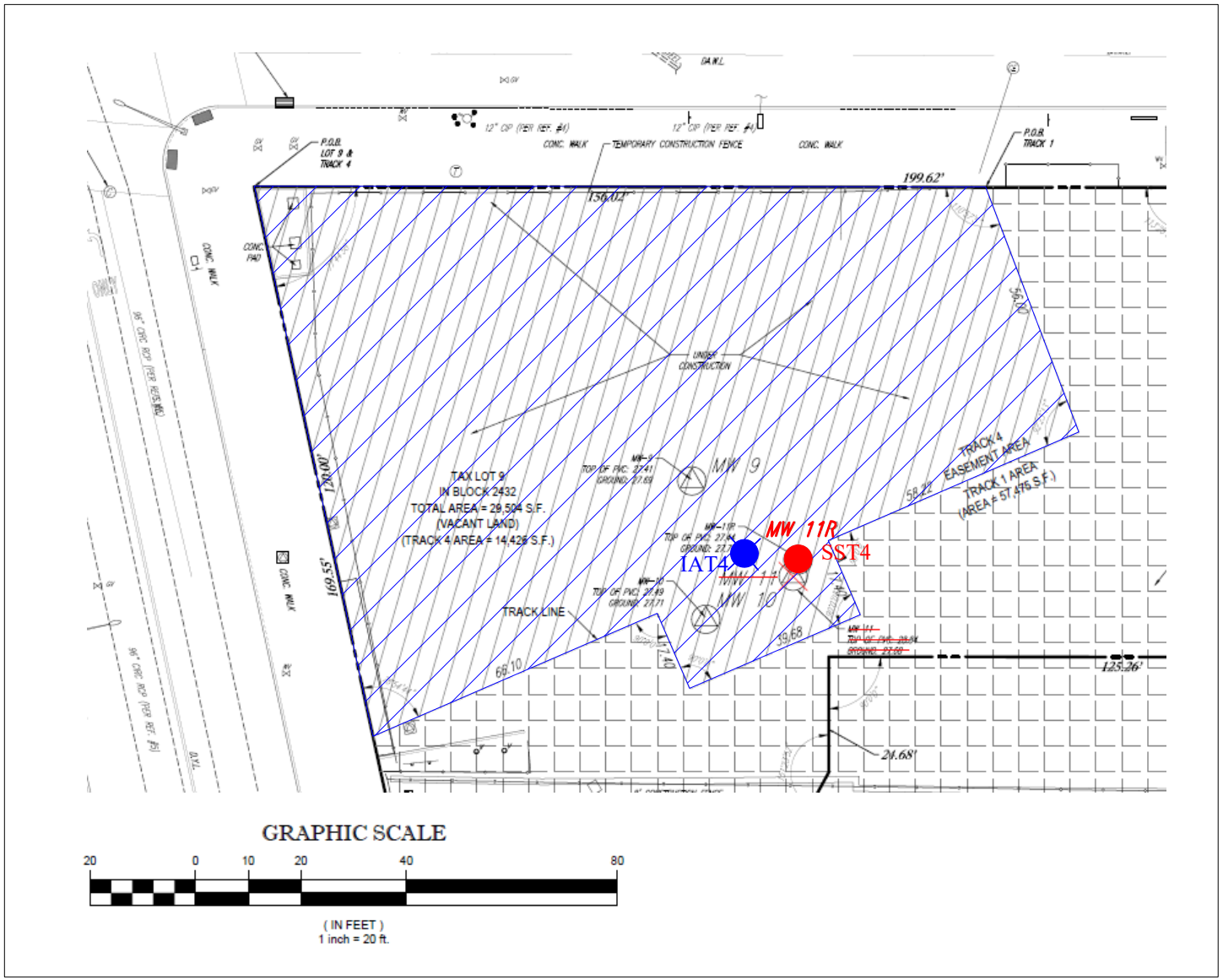
As indicated above and in the Attachments, all work will be implemented in accordance with this IAEWP, the Quality Assurance Project Plan (QAPP) and the Health and Safety Plan (HASP).

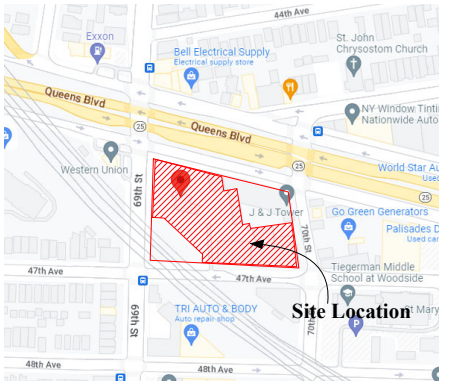
Thanks,

Ariel Czemerinski, PE
AMC Engineering, PLLC

cc: Zachary Kadden, Shalom Silverman – QB Development Owner LLC

Enclosures





Legend:

- Sub-slab Vapor Sample Location
- Indoor Air Sample Location
- Track 4 Portion of Site

AMC ENGINEERING PLLC
18-36 42nd Street
Astoria, NY 11105
718 545-0474

PROJECT

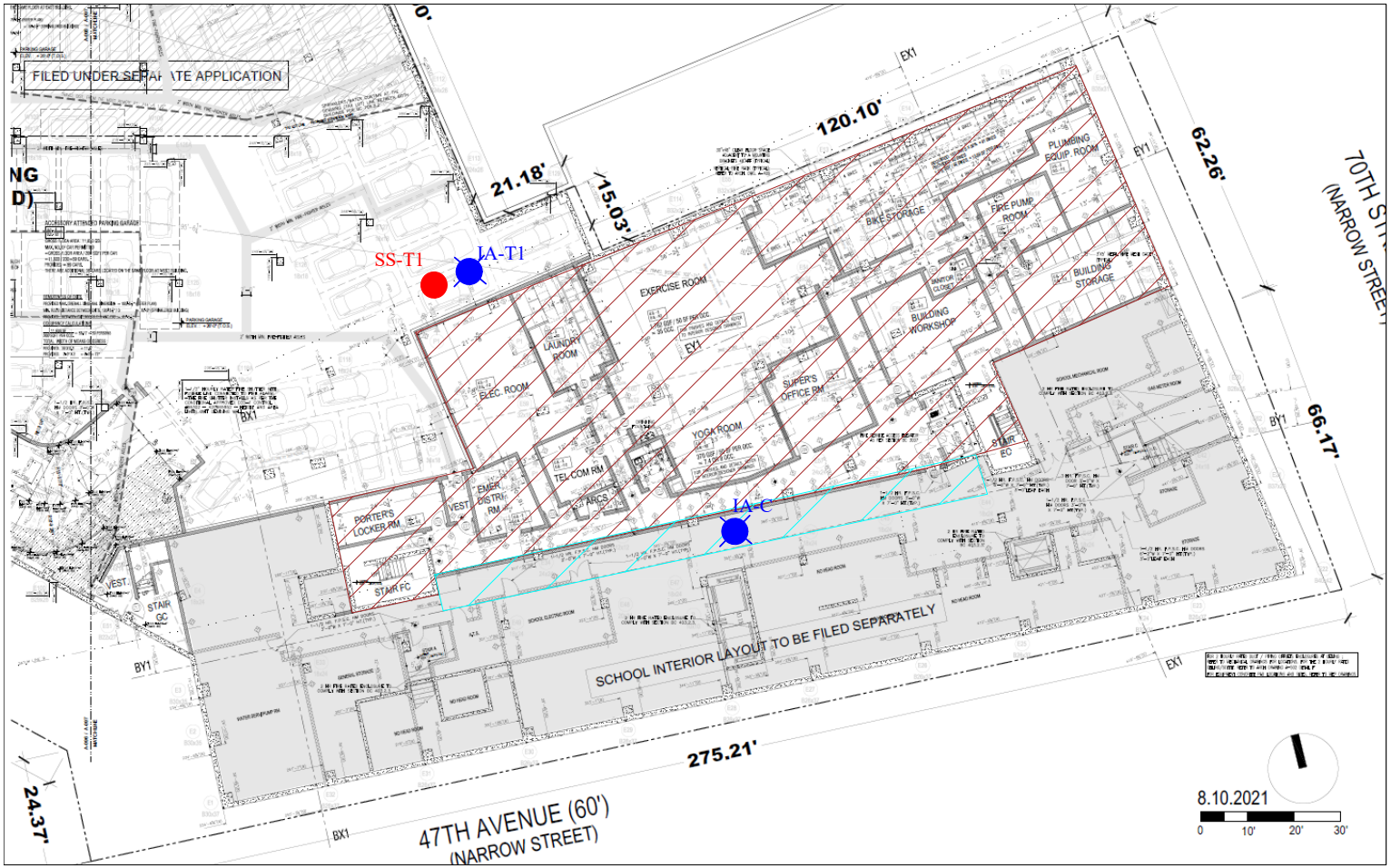
69-02 Queens Boulevard
Queens, NY 11206

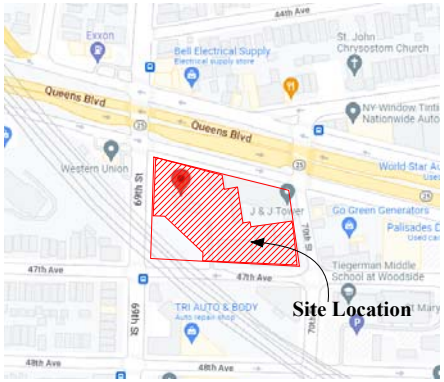
TITLE:

SVI Sampling
Location Plan

SEAL & SIGNATURE:

DATE: MAY 15, 2023
PROJECT No:
DRAWING BY: AH
CHK BY:
DWG No:
Figure 1





Legend:

- Sub-slab Vapor Sample Location
- Indoor Air Sample Location
- Track 1 Residential Building
- School Hallway

AMC ENGINEERING PLLC
18-36 42nd Street
Astoria, NY 11105
718 545-0474

PROJECT

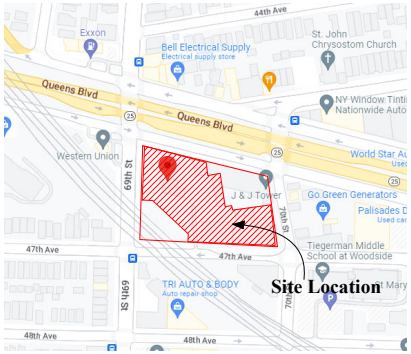
69-02 Queens Boulevard
Queens, NY 11206

TITLE:

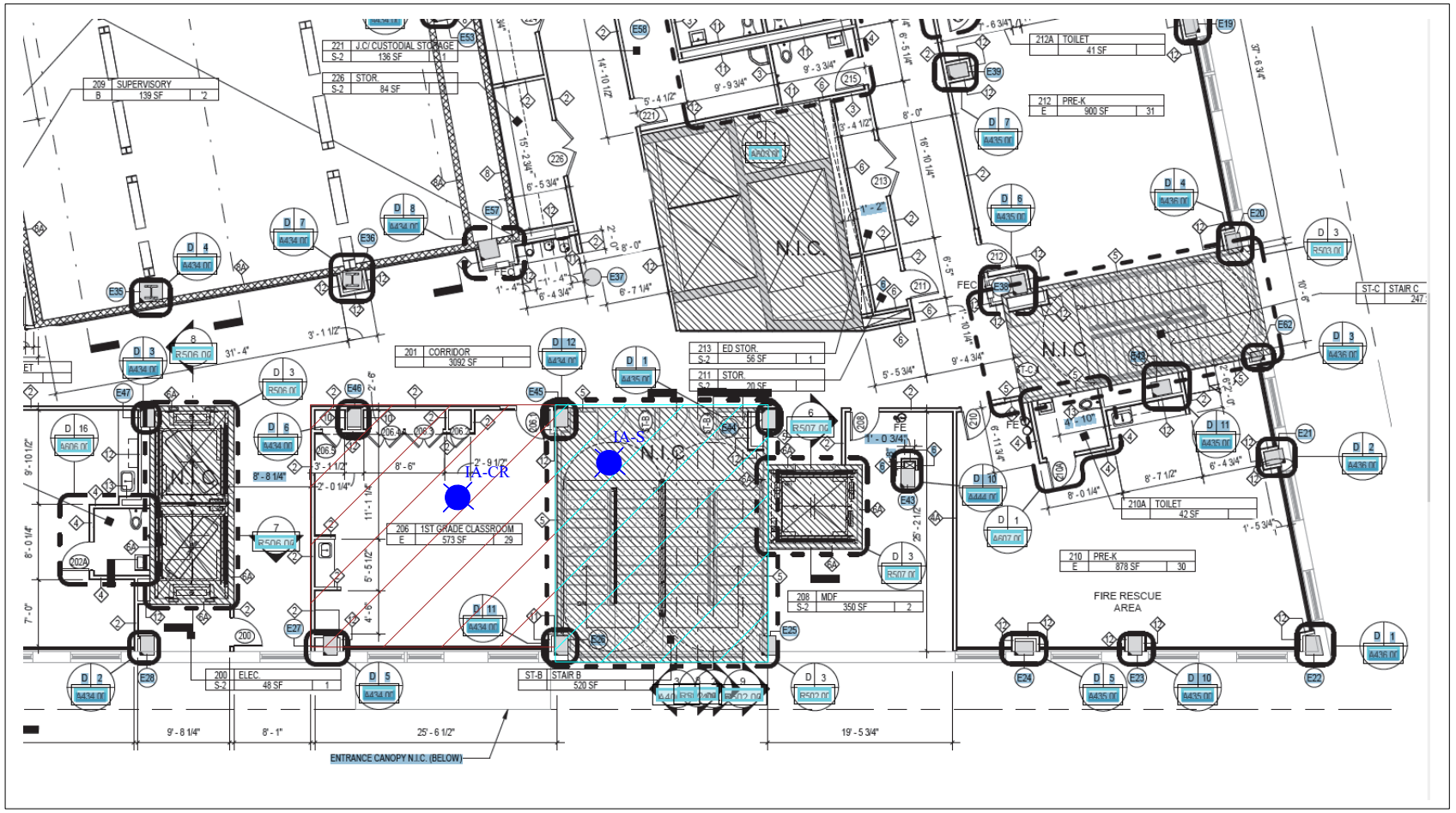
SVI and Indoor Air Sampling Location Plan

SEAL & SIGNATURE:

DATE: MAY 15, 2023
PROJECT No:
DRAWING BY: AH
CHK BY:
DWG No:
Figure 2



SECOND FLOOR



Legend:

- Indoor Air Sample Location
- Classroom
- Stairwell

AMC ENGINEERING PLLC
18-36 42nd Street
Astoria, NY 11105
718 545-0474

PROJECT

69-02 Queens Boulevard
Queens, NY 11206

TITLE:

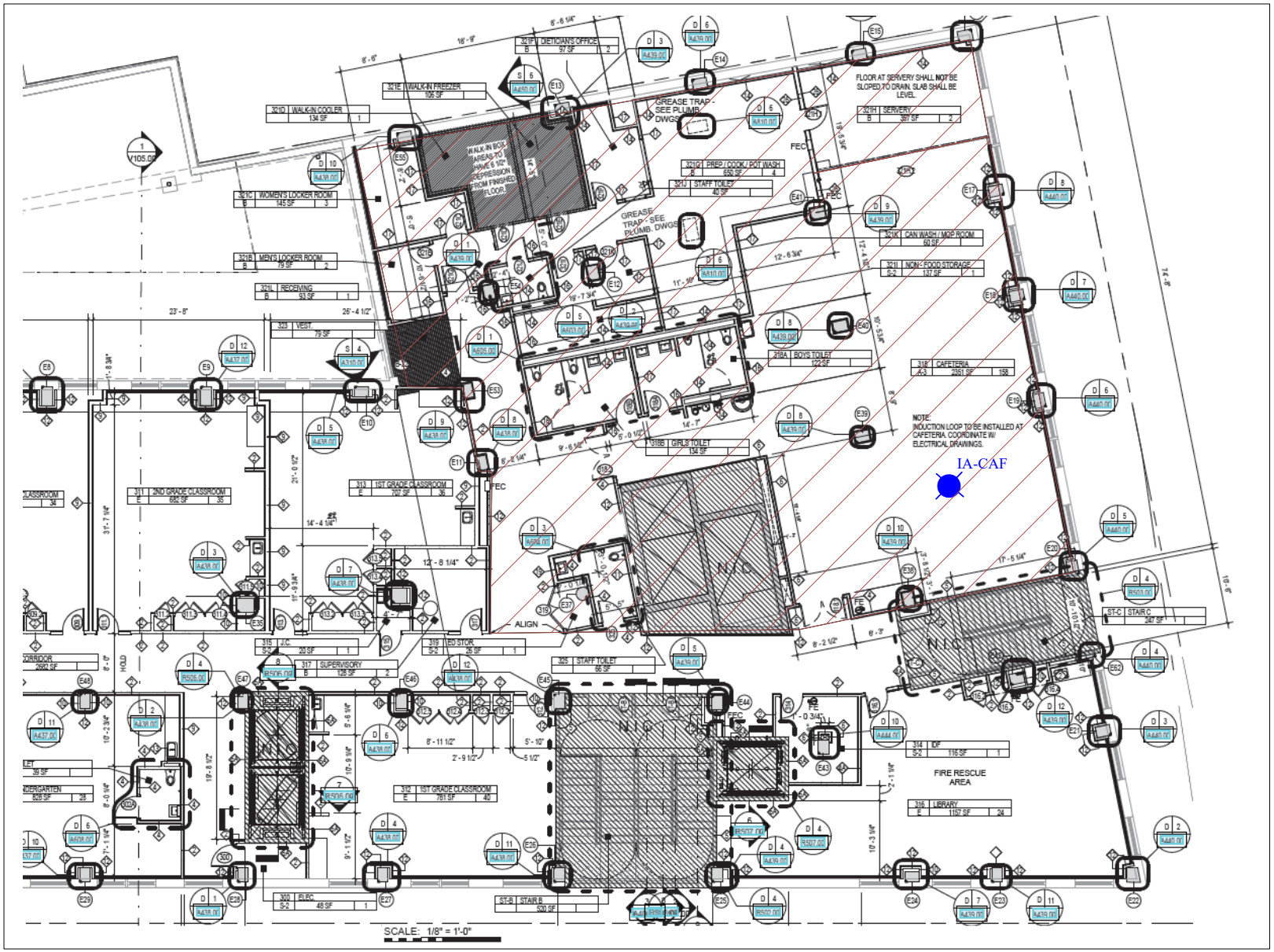
School:
Indoor Air Sampling
Location Plan

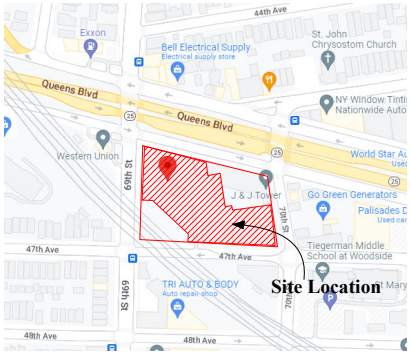
SEAL & SIGNATURE:

DATE: MAY 16, 2023
PROJECT No:
DRAWING BY: AH
CHK BY:
DWG No:

Figure 3

THIRD FLOOR





Legend:

- Indoor Air Sample Location
- Cafeteria

AMC ENGINEERING PLLC
18-36 42nd Street
Astoria, NY 11105
718 545-0474

PROJECT

69-02 Queens Boulevard
Queens, NY 11206

TITLE:

School:
Indoor Air Sampling
Location Plan

SEAL & SIGNATURE:

DATE: MAY 16, 2023
PROJECT No:
DRAWING BY: AH
CHK BY:
DWG No:
Figure 4

Attachment A

HEALTH & SAFETY PLAN

Health and Safety Plan (HASP)

69-02 Queens Boulevard
Queens, NY 11377

Prepared for:

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by:

AMC Engineering, PLLC
18-36 42nd Street
Astoria, NY 11105

Health and Safety Plan Expiration Date: December 2023

Site no: C241235

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474
Info@amc-engineering.com

Table of Contents

LIST OF ACRONYMS

Acronym	Definition
AMC	AMC Engineering, PLLC
APR	Air Purifying Respirator
ASR	Air Supplied Respirator
CAMP	Community Air Monitoring Plan
CHASP	Construction Health and Safety Plan
EMDP	Excavated Materials Disposal Plan
HASP	Health and Safety Plan
HEPA	High Efficiency Particulate Air
HSM	Health Safety Manager
IDLH	Immediately Dangerous to Life or Health
LEL	Lower Explosive Limit
NIOSH	National Institute for Occupational Safety and Health
NYC DOT	New York City Department of Transportation
NYC SCA	New York City School Construction Authority
NYS DEC	New York State Department of Environmental Conservation
NYS DOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PID	Photoionization Detector
PPE	Personal Protective Equipment
SCBA	Self Contained Breathing Apparatus
SSI	Sub-Surface Investigation
SSO	Site Safety Officer
VOC	Volatile Organic Compound

STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Indoor Air Evaluation at 69-02 Queens Boulevard, Queens New York.

This HASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.

1.0 INTRODUCTION

This document describes the health and safety guidelines developed by AMC Engineering (AMC) for the implementation of an Indoor Air Evaluation (IAE) at the site located at: 69-02 Queens Boulevard, Queens, NY to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during subsurface investigation activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this HASP, including the attachments, addresses safety and health hazards related to subsurface sample collection activities and is based on the best information available. The HASP may be revised by AMC at the request of the Client and/or the New York State Department of Environmental Conservation (NYSDEC) or New York State Department of Health (NYSDOH) upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by the owner's project manager, site safety officer and/or the AMC health and safety consultant.

1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e- 3).

Additionally, all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

1.2 Medical Monitoring Requirements

Field personnel and visitors entering the exclusion zone or decontamination zone must have completed appropriate medical monitoring required under OSHA 29 CFR 1910.120(f) if respirators or other breathing related PPE is needed. Medical monitoring enables a physician to monitor each employee's health, physical condition, and his fitness to wear respiratory protective equipment and carry out on-site tasks.

1.3 Site Safety Plan Acceptance, Acknowledgement and Amendment

The project superintendent and the site safety officer are responsible for informing personnel (employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Attachment A.**

Site conditions may warrant an amendment to the HASP. Amendments to the HASP are acknowledged by completing forms included in **Attachment B.**

1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Construction Health and Safety Plan are:

Name	Title	Contact Numbers
Ariel Czemerinski	Project Manager & Site Safety Officer	718-545-0474
Anjeza Harrington	Environmental Engineer	718-545-0474

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this HASP. The site safety officer will conduct daily (tail gate or toolbox) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this HASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.
2. Coordinating site safety decisions with the project manager.
3. Designating exclusion, decontamination and support zones on a daily basis.
4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this HASP.
5. Maintaining the work zone entry/exit log and site entry/exit log.
6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

2.0 SITE BACKGROUND AND SCOPE OF WORK

The Site is located in the Woodside section of Queens County (Figure 1) and is comprised of two irregular-shaped tax parcels identified as Block 2432, Lots 8 and 9. The Site is located between Queens Boulevard to the north, 70th Street to the east, 47th Avenue to the south and 69th Street to the west (Figure 2). The Site is approximately 1.65 acres (71,862 sf). (see Figure 2 – Site Layout Map).

The redevelopment project for the Site consists of the construction of a new 15-story mixed residential/commercial building and one 12 story residential building totaling approximately 547,668 gross square feet. The Project would comprise approximately 409,787 gsf of mixed-income residential space, of which approximately 30 percent (144 dwelling units) would be allocated as permanently affordable for residents with incomes averaging 80 percent Area Median Income (AMI). There will also be approximately 10,896 gsf of ground floor retail space and approximately 45,853 gsf of at-grade accessory parking Street (246 parking spaces). Additionally, approximately 81,483 gsf will be utilized as community space for a K-5, 476 student school.

The Site is zoned R7X with a C2-3 commercial overlay.

The area surrounding the property is highly urbanized and predominantly consists of commercial (retail) businesses along the Queens Boulevard corridor with community buildings, mixed-use (retail / office / contractor / residential) buildings south of the corridor and predominantly residential homes on the north side.

Soil borings on the site have not encountered bedrock and it is presumed to lie more than 100 feet below ground surface. Unconsolidated sediments overlie the bedrock and consist of Pleistocene-aged sand, gravel, and silt clays deposited by glacial-fluvial activity. Nonnative fill materials consisting of dredge spoils, rubble and/or other materials have historically been used to reinforce and extend shoreline areas and to raise and improve the drainage of low-lying areas.

Subsurface soil at the Site consists of a mixture of a fill material consisting of bricks and other rubble in a silty-soil matrix. The thickness of the fill material varies in depth from approximately 5 to 8 feet, and in some areas to approximately 10 feet. The historic fill material is underlain by a native silty-clay and fine sand. Groundwater is present under water table conditions at a depth of approximately 7 to 9 feet below the surface. Based upon on-site measurements, groundwater flow is to the north-northwest.

The elevation of the property is approximately 41 feet above mean sea level. The topography within the immediate area slopes gradually to the southeast. Groundwater is present under water table conditions at a depth of approximately 10.5 to 19.5 feet below the surface. Based upon on-site measurements, groundwater flow was determined to flow to the south-southeast (Figure 3A) during the Remedial Investigation.

2.1 Previous Investigations

Phase II

Summary of Previous Investigations

August 2018 – Phase I Environmental Site Assessment (EBC)
Based on the results of the site inspection, records review and interviews, it was determined that there were several RECs identified for the subject property. These RECs are summarized as follows:

- The historic use of Lot 9 as an auto repair shop and gasoline filling station from 1932 until 2015;
- The former presence of 8 USTs on Lot 9, with no documentation regarding their removal;
- The current presence of one UST on Lot 44, with no documentation provided including no recent tank tightness testing; and
- One active NYSPILLS case (Spill No. 9304343) on Lot 9.

The Phase I concluded the following:

Lot 9 has been the subject of several previous environmental investigations and remedial activity. A total of approximately 5,270.8 tons of petroleum-impacted soil have been removed from the area with on-going quarterly groundwater monitoring. EBC identified several historic recognized environmental condition (HRECs), environmental concerns (ASTM Non-Scope issues)/Business Environmental Risks (BERs). The HRECs, environmental concerns/BERs and EBC's recommendations are summarized as follows:

- The presence of one closed LTANKS case (Spill No. 0312172) and five closed NYSPILLS cases (Spill Nos. 0312172, 0404768, 9811087, 0901267, 0404766) on Lot 9 represent a HREC for which no further action is required.
- Historical fill (noted at varying depths) with elevated SVOCs and metals was noted in the Phase II investigation conducted by EBC in February and April 2018.
- Lot 21, Tax Block 2432, 69-20 Queens Boulevard, and Lot 9, Tax Block 2432, 69-02 Queens Boulevard are listed on the E-Designation database as having a HazMat, Noise and Air restriction (E-163), which was determined during the Maspeth/Woodside Rezoning completed by the City in June 2006 (CEQR 060294ZMQ).
- A visual inspection of painted surfaces conducted during the site inspection indicated the interior paints were generally in fair condition. The building exterior walls were finished with painted aluminum siding and painted and unpainted brick. The lead contents of the paints are unknown; however, due to the age of the subject property buildings, the presence of LBP is possible.
- Observed suspect asbestos-containing materials included vinyl tiles, ceiling tiles and pipe insulation within the subject property buildings on Lots 41 and 44. In addition, due to the age of the subject property buildings, it is likely that inaccessible building materials may contain asbestos.

March 2019 – Phase II Subsurface Investigation Report (EBC)
Field work for the Subsurface Investigation was performed February and April 2018. Field work consisted of the installation of fourteen soil borings (B1 through B14) and five monitoring wells. The depth to groundwater ranged from 15 to 16 feet below surface.

Thirteen soil samples were analyzed for SVOCs, pesticides, metals and TCLP lead. Five groundwater samples were collected from the monitoring wells and submitted for VOC analysis.

The Report concluded the following:
The shallow soil sample retained from B3 exhibited an odor and staining. Several VOCs were detected in groundwater samples collected at the Site. No petroleum-related VOCs were identified.

The soil samples collected from the historic fill layer contained elevated concentrations of SVOCs and metals above the intended residential use of the Site. In addition, some of the soil failed the TCLP analysis for lead which will result in a hazardous classification for at least some of the fill. All soil removed from the Site for excavation will require proper classification, handling and disposal under an approved Remedial Action Work Plan, Construction Health and Safety Plan and Community Air Monitoring Plan. Soil of this quality is not suitable for disposal at most facilities in NYC and on Long Island and will require transport to facilities in NJ, PA or DE.

April 2019 – Soil Gas / Subslab Vapor Sampling (EBC)
On March 29, 2019, two sub-slab soil gas implants (SSl and SS2) and three soil vapor implants (SG1, SG2, SG3) were installed and five soil vapor samples were collected for chemical analysis. The samples were collected to evaluate the potential for vapor intrusion into the planned Tower II building at the site, which is the location of a planned school. The NYC School Construction Authority requested the evaluation.

Soil vapor samples collected during the Soil Vapor Intrusion Assessment showed low concentrations of petroleum-related VOCs (BTEX) and chlorinated VOCs (CVOCs). The total concentration of BTEX ranged from 22.13 µg/m³ to 45.90 µg/m³. Total CVOCs ranged from 1.57 µg/m³ to 3.81 µg/m³. Tetrachloroethene (PCE), trichloroethene (TCE), carbon tetrachloride and vinyl chloride were not reported at elevated concentrations in any of the samples.

Petroleum related VOCs were generally reported at low concentrations within the sub-slab soil gas and soil vapor samples. Elevated levels of heptane and hexane were reported in the SG2 sample. Heptane and hexane represent lighter end petroleum VOCs typically associated with gasoline; however, elevated levels of other gasoline components were not reported in the sample.

Low levels of CVOCs including carbon tetrachloride, PCE and vinyl chloride were detected in four of the five samples, but at concentrations well below applicable regulatory criteria.

Remedial Investigation Report (EBC, July 2019, Revised December 10, 2019)
A supplemental investigation was performed from November 2019 through December 2019, under the NYSDEC-approved Remedial Investigation Work Plan. During the remedial investigation, samples of soil and groundwater were collected and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides and PCBs, and the 21

PFAS compounds by EPA Method 537 modified. Soil vapor samples were collected and analyzed for VOCs. Based on investigations conducted to date, the primary contaminants of concern are metals, petroleum related VOCs and SVOCs in soil, and petroleum-related VOCs in groundwater. Results are summarized below. PCBs, pesticides and emerging contaminants were not detected above SCGs.

Soil - Several petroleum related VOCs were detected in the subsurface that exceeded their applicable protection of groundwater soil cleanup objectives (PGSCOs); 1,2,4- trimethylbenzene was detected up to 110 parts per million (ppm) (PGSCO is 3.6 ppm) and m&p-xylenes were detected up to 110 ppm (PGSCO for total xylenes is 1.6 ppm).

Several SVOCs detected in the subsurface exceeded their respective Unrestricted Use SCOs (UUSCOs): benzo(a)anthracene was detected up to 12 ppm (UUSCO is 1 ppm); benzo(a)pyrene up to 10 ppm (UUSCO is 1 ppm); benzo(b)fluoranthene up to 11 ppm (UUSCO is 1 ppm); chrysene up to 11 ppm (UUSCO is 1 ppm); indeno(1,2,3-c,d)pyrene up to 8.2 ppm (UUSCO is 0.5 ppm); and benzo(k)fluoranthene up to 7.7 ppm (UUSCO is 0.8 ppm). Several metals exceeded their respective UUSCOs, including barium up to 1,340 ppm (UUSCO is 350 ppm), arsenic up to 19.6 ppm (UUSCO is 13 ppm), copper up to 305 ppm (UUSCO is 50 ppm), lead up to 7,780 ppm (UUSCO is 63 ppm). Lead was also detected at a concentration above the hazardous waste regulatory threshold in three soil borings, with a maximum Toxicity Characteristic Leaching Procedure (TCLP) concentration of 107 ppm (hazardous waste threshold for lead is 5 ppm).

Based on the sampling results, there is no indication that these contaminants have migrated offsite in soil.

Groundwater - Several petroleum related VOCs were detected in on-site groundwater at levels exceeding their respective groundwater quality standards (GWQS); 1,2,4- trimethylbenzene up to 500 parts per billion (ppb), (GWQS is 5 ppb), 1,3,5- trimethylbenzene up to 120 ppb (GWQS is 5 ppb), ethylbenzene up to 200 ppb (GWQS is 5 ppb), o-xylene up to 190 ppb (GWQS is 5 ppb). Several SVOCs were also detected; 2,4- Dimethylphenol up to 34 ppb (GWQS is 1 ppb), naphthalene up to 82 ppb (WGQS is 10 ppb), benzo(a)anthracene up to 0.04 (GWQS is 0.002 ppb).

Based on the sampling results, there is no indication that these contaminants have migrated offsite in groundwater.

Compounds detected above AWQS are posted on Figure 6.

Soil Vapor - Based upon the remedial investigation results, petroleum-related VOCs such as benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected in soil vapor samples. The level of total BTEX compounds ranged from about 7.15 micrograms per cubic meter (µg/m3) to 14.82 µg/m3. Chlorinated VOCs (CVOCs) were reported in all of the soil vapor samples at relatively low concentrations, with carbon tetrachloride ranging from about 0.26 µg/m3 to 0.51 µg/m3, tetrachloroethene (PCE) ranging from 0.58 µg/m3 to 37.1 µg/m3, and trichloroethene (TCE) reported in five samples ranging from 0.24 µg/m3 to 27.6 µg/m3. During the Phase II investigation, heptane and hexane were detected in soil vapor at elevated concentrations of 7,040 µg/m3 and 21,600 µg/m3, respectively.

Based on the soil vapor sampling results, soil vapor intrusion does not appear to be a concern for off-site buildings.

Soil vapor detections are posted on Figure 5.

Sub-Slab Soil Vapor - Based upon the remedial investigation and Phase II investigation results, BTEX and CVOCs were reported in all of three sub-slab vapor samples at relatively low concentrations. Total BTEX compounds ranged from about 8.29 µg/m3 to 45.9 µg/m^3. PCE reported in all samples ranging from 1.62 µg/m3 to 4.34 µg/m3 and TCE reported in one sample at 0.24 µg/m^3.

Based on the sub-slab vapor sampling results, soil vapor intrusion does not appear to be a concern for off-site buildings.

Summary of the Remedial Investigation

A Remedial Investigation was completed at the Site from November 2019 through December 2019, and documented in a Remedial Investigation Report dated July 2019 (revised December 10, 2019). The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and any other impacted media; to identify the source(s) of the contamination; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Work Plan to address the contamination.

Activities completed under the RI:

- The installation of 18 soil borings (19B1 - 19B18) across the Site and six soil borings (2PB1-2PB3, and 3PB1-3PB3) around two lead hotspots, to collect 62 soil samples for laboratory analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCBs, 21 PFAS compounds by EPA method 537 modified, and metals;
- The installation of nine groundwater monitoring wells (19MW1 through 19MW9) and the collection of nine groundwater samples for laboratory analysis of VOCs, SVOCs, pesticides, PCBs, 21 PFAS compounds by EPA method 537 modified, and total and dissolved metals;
- The collection of nine soil gas samples for laboratory analysis of VOCs from nine soil gas sampling locations.

The results of sampling performed during this RI identified historic fill material across the Site to a depth 7 feet below grade. Depending on location, the historic fill material contains one or more metals including copper, mercury, lead and zinc, pesticides and polycyclic aromatic hydrocarbons (PAHs) above Unrestricted Use and / or Restricted Residential SCOs. Lead classified as hazardous was identified in two hotspot areas to a depth of 12 feet below grade.

Petroleum related VOCs were detected above NYSDEC Ambient Water Quality Standards (AWQS) at a single location 19MW9 located in the west central area of the former gas station. Total petroleum VOCs in groundwater at this location was reported as 1,241 µg/L. SVOCs above

AWQS were also limited to 19MW9 and included naphthalene, which was reported as both a VOC and an SVOC, at 82 µg/L and 2,4-dinitrotoluene at 34 µg/L.

Petroleum-related VOCs were generally low in soil vapor samples and were consistent with typical levels reported in commercial areas of NYC.

Chlorinated VOCs in soil vapor included tetrachloroethene (PCE), which was detected in all of the samples at concentrations ranging from 0.58 µg/m3 to 37.1 µg/m3, and trichloroethene (TCE), which was detected in five samples at concentrations ranging from 0.24 µg/m3 to 27.6 µg/m3. The highest detections of both compounds were reported in subslab samples located near the southwest property line.

2.2 Description of Remedial Action

Site activities included within the Remedial Action that are included within the scope of this CHASP include the following:

Implementation of the remedy for the Track 4 portion of the Site included the following:

1. Excavation of non-hazardous historic fill material to a depth of 4 to 5 ft with additional excavation to a depth of approximately 12 to 15ft below grade for construction of the cellar slab;
2. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
3. Appropriate off-Site disposal of all material removed from the Track 4 portion of the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
4. Import of ¾" RCA for use as backfill below the concrete building slab in compliance with: (1) chemical limitations and other specifications listed in the RAWP, and (2) all Federal, State, and local rules and regulations for handling and transport of material;
5. ISCO treatment of groundwater in the vicinity of MW9;
6. Installation of a vapor barrier below the building slab and behind cellar walls to grade;
7. A post-construction soil vapor intrusion evaluation will be performed within the new building and will consist of the collection and laboratory analysis indoor air samples. The post-construction soil vapor intrusion evaluation will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion within new building;
8. Construction of a site cover system consisting of:
    a. Concrete cellar slab - A 30 to 48 inch thick concrete cellar level mat slab underlain with a waterproofing membrane and a layer of ¾" RCA.
9. Development and implementation of a Site Management Plan for long term management of remaining contamination at the Site which includes plans for: (1) Institutional Controls, (2) inspections and (3) reporting; and
10. An Environmental Easement recorded against the Site will ensure implementation of the SMP.

3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

3.1 Physical Hazards

3.1.1 Tripping Hazards
Areas of risk associated with on-site activities can be presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

3.1.2 Climbing Hazards
During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform to any applicable NIOSH and OSHA requirements or climbing activities.

3.1.3 Cuts and Lacerations
Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

3.1.4 Lifting Hazards
Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

3.1.5 Utility Hazards
Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

3.1.6 Traffic Hazards
All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

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

1. Prevention
   a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
   b. Work in Pairs. Individuals should avoid undertaking any activity alone.
   c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
   d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment
   a. Heat Rash (or prickly heat):
      Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.
      Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.
      Treatment: Remove source of irritation and cool skin with water or wet cloths.

   b. Heat Cramps (or heat prostration)
      Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.
      Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.
      Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.

   c. Heat Stroke
      Cause: Same as heat exhaustion. This is also an extremely serious condition.
      Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.
      Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing.

3.2.2 Cold Exposure

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

3.3 Chemical Hazards

The primary routes of exposure to identified contaminants in groundwater to on-site investigation and remediation workers are through inhalation, ingestion and absorption.

3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 $\mu g/m^3$ over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently greater than 150 $\mu g/m^3$ over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

3.3.3 Organic Vapors

Elevated levels of VOCs were detected in both soil and groundwater samples collected during previous investigations at the site. Therefore, excavation activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and / or the Community Air Monitoring Plan.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work clothes, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

4.2 Level C

Level C PPE shall be donned when sustained concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), by more than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection, engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

5.2 Work Stoppage Responses

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

a. The SSO will be consulted immediately
b. All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
c. Monitoring will be continued until intrusive work resumes.

5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	Continue excavating Level D protection Continue monitoring every 10 minutes
1-5 ppm above background, sustained reading	1-10%	Continue excavating Go to Level C protection or employ engineering controls
5-25 ppm above background, sustained reading	10-20%	Continue monitoring every 10 minute Discontinue excavating, unless PID is only action level exceeded. Level C protection or employ engineering controls Continue monitoring for organic vapors 200 ft downwind Continuous monitoring for LEL at excavation pit

Notes:
Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less than 5 ppm.

6.0 SITE CONTROL

6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site logbook. **It is expected that for investigation and excavation activities identification of an exclusion zone, decontamination zone, and support zone will not be necessary.**

Tasks requiring OSHA 40-hour Hazardous Waste Operations and Emergency Response Operations training are carried out in the exclusion zone. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating and drinking, are permitted only in the support zone. No smoking is permitted on premises. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

7.1 Emergency Equipment On-site

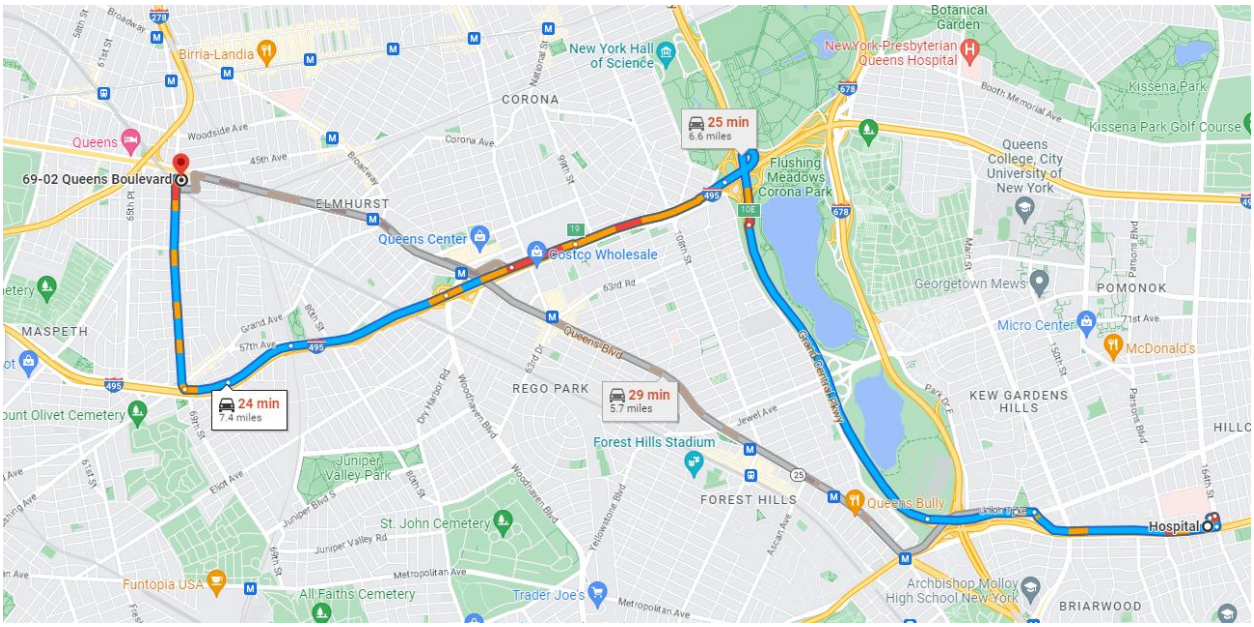
Private telephones:	Site personnel.
Two-way radios:	Site personnel where necessary.
Emergency Alarms:	On-site vehicle horns*.
First aid kits:	On-site, in vehicles or office.
Fire extinguisher:	On-site, in office or on equipment.

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

7.2 Emergency Telephone Numbers

General Emergencies	911
NYC Police Department	911
New York City Police Department – 110th Precinct	
94-41 43rd Avenue	
Queens, NY 11373	(718) 476-9311
NYC Fire Department	911
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Regional Materials Management Engineer	
	(718) 482-4896
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
Project Manager	
Joe Panico	(732) 379-4990

Nearest Hospital in case of Emergency
NYC Health + Hospitals/Elmhurst
79-01 Broadway
Elmhurst, Queens 11373
(718) 334-4000



7.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;

- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;

- Determine the cause of incidents and make recommendations to prevent recurrence; and

- Ensure that all required reports have been prepared. The following key personnel are planned for this project:

Name	Title	Contact Numbers
Ariel Czemerinski	Project Manager & Site Safety Officer	718-545-0474

7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (identified in 7.2) and information on the chemical(s) to which they may have been exposed (gasoline).

7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use firefighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

7.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A

spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

7.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.

All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book

Attachment A: SITE SAFETY ACKNOWLEDGEMENT FORM

BRIEFING SIGN-IN SHEET

Date: Person Conducting Briefing:

Project Name and Location:_____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc...):

2. OTHER ISSUES (HASP changes, attendee comments, etc...):

3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8 9.	18. 19.
10.	20.

Attachment B: SITE SAFETY PLAN AMENDMENT FORM

Site Safety Plan Amendment #

Site Name:

Reason for Amendment

Alternative Procedures

Required Changes in PPE

Project Superintendent (signature) **Date**

Health and Safety Consultant (signature) **Date**

Site Safety Officer (signature) **Date**

Attachment B

QUALITY ASSURANCE PROJECT PLAN (QAPP)

Quality Assurance Project Plan (QAPP)

69-02 Queens Boulevard
Queens, NY

Prepared for:

New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Prepared by:

AMC Engineering, PLLC
18-36 42nd Street
Astoria, NY 11105

Site no: C241235

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (718) 545-0474
Info@amc-engineering.com

Table of Contents

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared in accordance with DER-10 to detail procedures to be followed during the course of the sampling and analytical portion of the project, as required by the work plan.

To ensure the successful completion of the project, each individual responsible for a given component of the project must be aware of the quality assurance objectives of his/her particular work and of the overall project. The Project Manager, Ariel Czemerinski will be directly responsible to the client for overall project conduct and quality assurance/quality control (QA/QC) for the project. The Project Manager will be responsible for overseeing all technical and administrative aspects of the project and for directing QA/QC activities and coordinate with field sampling crews and subcontractors. Jonathan Yi will serve as the Quality Assurance Officer (QAO) and in this role may conduct:

- Field and sampling audits;
- Interface with the analytical laboratory to resolve problems; and
- Interface with the data validator and/or preparer of the DUSR to resolve problems.

Reporting directly to the Project Manager will be the Field Operations Officer, Anjeza Harrington, who will serve as the on-Site qualified environmental professional who will record observations and be responsible for the collection and handling of all samples.

1.1 Organization

Project QA will be maintained under the direction of the Project Manager, in accordance with this QAPP. QC for specific tasks will be the responsibility of the individuals and organizations and organizations listed below, under the direction and coordinated of the Project Manager.

GENERAL RESPONSIBILITIES	SCOPE OF WORK	RESPONSIBILITY OF QUALITY CONTROL
Field Operations	Monitoring of Remedial Activities, sample collection and handling	A. Harrington, AMC Engineering
Project Manager	Implementation of the Remedial Action according to the RAWP	Ariel Czemerinski, AMC Engineering
Laboratory Analysis	Analysis of air samples by NYSDEC ASP methods Laboratory	NYSDEC-approved
Data Review	Review for completeness and compliance	3rd party validation

2.0 QUALITY ASSURANCE PROJECT PLAN OBJECTIVES

2.1 Overview

Overall project goals are defined through the development of Data Quality Objectives (DQOs), which are qualitative and quantitative Statements that specify the quality of the data required to support decisions; DQOs, as described in this section, are based on the end uses of the data as described in the work plan.

In this plan, Quality Assurance and Quality Control are defined as follows:

- Quality Assurance - The overall integrated program for assuring reliability of monitoring and measurement data.
- Quality Control - The routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

2.2 QA / QC Requirements for Analytical Laboratory

Samples will be analyzed by a New York State Department of Health (NYSDOH) certified laboratory. Data generated from the laboratory will be used to evaluate volatile organic compounds (VOCs) in indoor and outdoor ambient air. The QA requirements for all subcontracted analytical laboratory work performed on this project are described below. QA elements to be evaluated include accuracy, precision, sensitivity, representativeness, and completeness. The data generated by the analytical laboratory for this project are required to be sensitive enough to achieve detection levels low enough to meet required quantification limits as specified in NYSDEC Analytical Services Protocol (NYSDEC ASP, 07/2005). The analytical results meeting the required quantification limits will provide data sensitive enough to meet the data quality objectives of this remedial program as described in the work plan. Reporting of the data must be clear, concise, and comprehensive. The QC elements that are important to this project are completeness of field data, sample custody, sample holding times, sample preservation, sample storage, instrument calibration and blank contamination.

2.2.1 Instrument Calibration

Calibration curves will be developed for each of the compounds to be analyzed. Standard concentrations and a blank will be used to produce the initial curves. The development of calibration curves and initial calibration response factors must be consistent with method requirements presented in the most recent version of (NYSDEC ASP 07/2005).

2.2.2 Continuing Instrument Calibration

The initial calibration curve will be verified every 12 hrs by analyzing one calibration standard. The standard concentration will be the midpoint concentration of the initial calibration curve. The calibration check compound must come within 25% relative percent difference (RPD) of the average response factor obtained during initial calibration. If the RPD is greater than 25%, then corrective action must be taken as provided in the specific methodology.

2.2.3 Method Blanks

Method blank or preparation blank is prepared from an analyte free matrix which includes the same reagents, internal standards and surrogate standards as the related samples. It is carried through the entire sample preparation and analytical procedure. A method blank analysis will be performed once for each 12 hr period during the analysis of samples for volatiles. An acceptable method blank will contain less than two (2) times the CRQL of methylene chloride, acetone and 2-butanone. For all other target compounds, the method blank must contain less than or equal to the CRQL of any single target compound. For non-target peaks in the method blank, the peak area must be less than 10 percent of the nearest internal standard. The method blank will be used to demonstrate the level of laboratory background and reagent contamination that might result from the analytical process itself.

2.2.4 Surrogate Spike Analysis

For organic analyses, all samples and blanks will be spiked with surrogate compounds before purging or extraction in order to monitor preparation and analyses of samples. Surrogate spike recoveries shall fall within the advisory limits in accordance with the NY5DEC ASP protocols for samples falling within the quantification limits without dilution.

2.2.5 Sampling Procedures Soil Vapor

The sampling event will include the following:

- Collect two indoor ambient air samples and one duplicate
- Collect one outdoor ambient air samples
- Complete the New York State Department of Health Indoor Air Quality Questionnaire

See **Figure 1** for the proposed locations of the indoor air, and outdoor air sampling locations. The working copy of the New York State Department of Health Indoor Air Quality Questionnaire and Building Inventory is provided in **Attachment D**.

Air sampling will be performed over a 24-hour period to average the exposure condition and the building will be sealed (doors-windows closed) a minimum of 18 hours prior to collecting the samples. Air samples will be collected in accordance with NYSDOH protocols as presented in the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (May 2017).

Indoor and outdoor air samples will be collected in the breathing zone at a height of 5 feet above the floor.

All air samples will be collected with 6-liter Summa canisters equipped with flow controllers calibrated at an appropriate flow rate by the laboratory. The Summa canister identification number, flow regulator identification number and sample ID will be recorded in a bound field notebook. The sample ID will be recorded on the sample tag attached to each canister. Sampling will then be initiated by fully opening the flow control valve on each canister in turn. Immediately after opening

the flow control valve on a canister, the initial vacuum (inches of mercury) and start time will be recorded in the field book and on the sample tag. When the vacuum level in the canister is between 5 and 8 inches of mercury (approximately 24 hours), the flow controller valve will be closed, and the final vacuum and time will be recorded in the field notebook and on the sample tag.

2.3 Accuracy

Accuracy is defined as the nearness of a real or the mean (x) of a set of results to the true value. Accuracy is assessed by means of reference samples and percent recoveries. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). The MS sample is used to determine the percent recovery. The matrix spike percent recovery (% REC) is calculated by the following equation:

$$\%\ REC = \frac{SSR - SR}{SA}\ x\ 100$$

Where,
SSR = spike sample results
SR = sample results
SA = spike added from spiking mix

2.4 Precision

Precision is defined as the measurement of agreement of a set of replicate results among themselves without a Precision is defined as the measurement of agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses. Analytical precision is expressed in terms of RPD. The RPD is calculated using the following formula:

$$RPD = \frac{D^1 - D^2}{(D^1 + D^2)/2}\ x\ 100$$

Where:
RPD = relative percent difference
D^1 = first sample value
D^2 = second sample value (duplicate)

2.5 Sensitivity

The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria and guidance values (SGCs) established for this project.

2.6 Representativeness

Representativeness is a measure of the relationship of an individual sample taken from a particular site to the remainder of that site and the relationship of a small aliquot of the sample (i.e., the one used in the actual analysis) to the sample remaining on site. The representativeness of samples is assured by adherence to sampling procedures described in the Interim Remedial Measure Work Plan.

2.7 Completeness

Completeness is a measure of the quantity of data obtained from a measurement system as compared to the amount of data expected from the measurement system. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers and should be between 70 and 100% of all analyses performed. The objective of completeness in laboratory reporting is to provide a thorough data support package. The laboratory data package provides documentation of sample analysis and results in the form of summaries, QC data, and raw analytical data. The laboratory will be required to submit data packages that follow NYSDEC ASP reporting format which, at a minimum, will include the following components:

1. All sample chain-of-custody forms.
2. The case narrative(s) presenting a discussion of any problems and/or procedural changes required during analyses. Also presented in the case narrative are sample summary forms.
3. Documentation demonstrating the laboratory's ability to attain the contract specified detection limits for all target analytes in all required matrices.
4. Tabulated target compound results and tentatively identified compounds.
5. Surrogate spike analysis results (organics).
6. Matrix spike/matrix spike duplicate/matrix spike blank results.
7. QC check sample and standard recovery results
8. Blank results (field, trip, and method).
9. Internal standard area and RT summary.

2.8 Laboratory Custody Procedures

The following elements are important for maintaining the field custody of samples:

- Sample identification
- Sample labels
- Custody records
- Shipping records
- Packaging procedures

Sample labels will be attached to all sampling bottles before field activities begin; each label will contain an identifying number. Each number will have a suffix that identifies the site and where the sample was taken. Approximate sampling locations will be marked on a map with a description of the sample location. The number, type of sample, and sample identification will be entered into

the field logbook. A chain-of-custody form, initiated at the analytical laboratory will accompany the sample bottles from the laboratory into the field. Upon receipt of the bottles and cooler, the sampler will sign and date the first received blank space. After each sample is collected and appropriately identified, entries will be made on the chain-of-custody form that will include:

- Site name and address
- Samplers' names and signatures

3.0 ANALYTICAL PROCEDURES

3.1 Laboratory Analysis

Samples will be analyzed by the NYSDOH ELAP laboratory for the following parameter: VOCs in air by USEPA Method TO15. If any modifications or additions to the standard procedures are anticipated, and if any nonstandard sample preparation or analytical protocol is to be used, the modifications and the nonstandard protocol will be explicitly defined and documented. Prior approval by AMC Engineering's PM will be necessary for any nonstandard analytical or sample preparation protocol used by the laboratory, i.e., dilution of samples or extracts by greater than a factor of five (5).

4.0 DATA REDUCTION, REVIEW, AND REPORTING

4.1 Overview

The process of data reduction, review, and reporting ensures the assessments or a conclusion based on the final data accurately reflects actual site conditions. This plan presents the specific procedures, methods, and format that will be employed for data reduction, review and reporting of each measurement parameter determined in the laboratory and field. Also described in this section is the process by which all data, reports, and work plans are proofed and checked for technical and numerical errors prior to final submission.

4.2 Data Reduction

Standard methods and references will be used as guidelines for data handling, reduction, validation, and reporting. All data for the project will be compiled and summarized with an independent verification at each step in the process to prevent transcription/typographical errors. Any computerized entry of data will also undergo verification review.

Sample analysis will be provided by a New York State certified environmental laboratory. Laboratory reports will include ASP category B deliverables for use in the preparation of a data usability summary report (DUSR). All results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Analytical results shall be presented on standard NYSDEC ASP-B forms or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Note that when waste characterization samples are analyzed they will be in results only format and will not be evaluated in the DUSR.

Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data. Specifics on internal laboratory data reduction protocols are identified in the laboratory's SOPs.

Following receipt of the laboratory analytical results by AMC Engineering, the data results will be compiled and presented in an appropriate tabular form. Where appropriate, the impacts of QA/QC qualifiers resulting from laboratory or external validation reviews will be assessed in terms of data usability.

4.3 Laboratory Data Reporting

All sample data packages submitted by the analytical laboratory will be required to be reported in conformance to the NYSDEC ASP (7/2005), Category B data deliverable requirements as applicable to the method utilized. All results will be provided in accordance with the NYSDEC

Environmental Information Management System (EIMS) electronic data deliverable (EDD) format. Note that waste characterization samples if analyzed will be in results only format and will not be evaluated in the DUSR.

5.0 CORRECTIVE ACTION

Review and implementation of systems and procedures may result in recommendations for corrective action. Any deviations from the specified procedures within approved project plans due to unexpected site-specific conditions shall warrant corrective action. All errors, deficiencies, or other problems shall be brought to the immediate attention of the AMC Engineering PM, who in turn shall contact the Quality Assurance/Data Quality Manager or his designee (if applicable).

Procedures have been established to ensure that conditions adverse to data quality are promptly investigated, evaluated and corrected. These procedures for review and implementation of a change are as follows:

- Define the problem.
- Investigate the cause of the problem.
- Develop a corrective action to eliminate the problem, in consultation with the personnel who defined the problem and who will implement the change.
- Complete the required form describing the change and its rationale (see below for form requirements).
- Obtain all required written approvals.
- Implement the corrective action.
- Verify that the change has eliminated the problem.

During the field investigation, all changes to the sampling program will be documented in field logs/sheets and the AMC Engineering PM advised.

If any problems occur with the laboratory or analyses, the laboratory must immediately notify the PM, who will consult with other project staff. All approved corrective actions shall be controlled and documented.

All corrective action documentation shall include an explanation of the problem and a proposed solution which will be maintained in the project file or associated logs. Each report must be approved by the necessary personnel (e.g., the PM) before implementation of the change occurs. The PM shall be responsible for controlling, tracking, implementing and distributing identified changes.

Attachment D

NYSDOH HEALTH INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA
Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

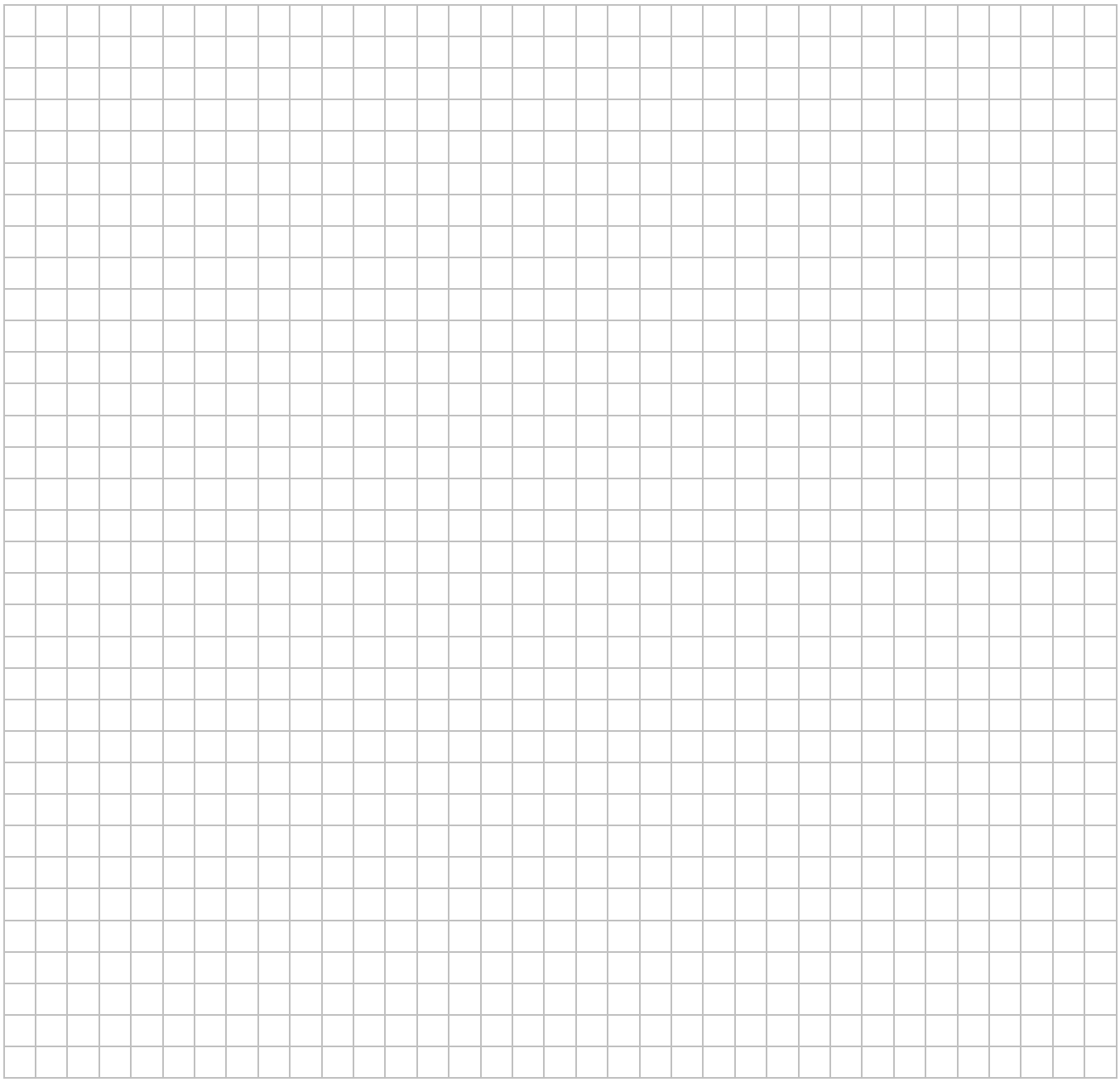
Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.