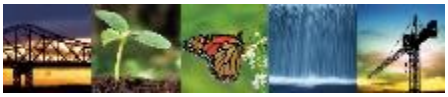


Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

GZA GeoEnvironmental of New York
104 West 29th Street
10th Floor
New York, NY 10001
T: 212.594.8140
F: 212.279.8180
www.gza.com

Via electronic mail

May 16, 2019
File No. 12.0076252.10

Jessica LaClair
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7013

Re: Sub-slab Vapor Investigation Work Plan – Building 338
Former IBM East Fishkill Facility, Hopewell Junction, NY
NYSDEC Site No. 314054, EPA ID NYD000707901

Dear Ms. LaClair,

GZA GeoEnvironmental of New York (GZA) has prepared this Sub-slab Vapor Investigation Work Plan (SVIWP) for Building 338 of the Former IBM East Fishkill Facility in Hopewell Junction, NY (Site). The Site is currently owned by i.park East Fishkill, LLC/i.park East Fishkill I, LLC (i.park). i.park is proposing a change of use from industrial to commercial for the Site. Previously completed indoor air testing indicated the potential need for an active sub-slab depressurization system (SSDS) in Building 338 should it become re-occupied. The objective of this work plan is to conduct a soil vapor investigation to evaluate the potential for soil vapor intrusion impacts within Building 338. The Site is currently owned by i.park East Fishkill, LLC/i.park East Fishkill I, LLC (i.park-Client). i.park is proposing a change of use from industrial to commercial for the Site, as discussed in this work plan.

If you have any questions regarding the above, please contact Meredith Hayes at 973.774.3332 or meredith.hayes@gza.com, or David Winslow at 973.774.3307 or david.winslow@gza.com.

Very truly yours,

GZA GEOENVIRONMENTAL OF NEW YORK

Meredith Hayes
Senior Project Manager

Ernest Hanna, P.E.
Consultant/Reviewer

David Winslow, P.G., Ph.D.
Senior Vice President

Known for excellence.
Built on trust.

SUB-SLAB VAPOR INVESTIGATION WORK PLAN – BUILDING 338

Former IBM East Fishkill Facility
2070 Route 52
Hopewell Junction, NY
NYSDEC Site No. 314054
EPA ID No. NYD000707901

May 16, 2019
File No. 12.0076252.10

PREPARED FOR:
i.Park84, LLC
485 West Putnam Avenue
Greenwich, CT 06830

GZA GeoEnvironmental of New York
104 West 29th Street, 10th Floor | New York, NY, 10001
212-594-8140

31 Offices Nationwide
www.gza.com

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 BACKGROUND INFORMATION 1

3.0 ENVIRONMENTAL SETTING 2

3.1 SOIL AND BEDROCK CONDITIONS 2

3.2 GROUNDWATER CONDITIONS 2

4.0 PREVIOUS INVESTIGATIONS 3

4.1 BUILDING 338 3

5.0 FIELD INVESTIGATION ACTIVITIES 3

5.1 INTERIOR INSPECTION 3

5.2 SAMPLING SCOPE AND LOCATIONS 4

5.3 SUB-SLAB VAPOR SAMPLING PROCEDURES 4

5.4 INDOOR AND BACKGROUND AIR SAMPLING PROCEDURES 5

6.0 INVESTIGATION SUPPORT ACTIVITIES 6

6.1 UTILITY CLEARANCE 6

6.2 QUALITY ASSURANCE/QUALITY CONTROL PROJECT PLAN 6

6.3 HEALTH AND SAFETY 6

6.4 COMMUNITY AIR MONITORING PLAN (CAMP) 6

6.5 DATA VALIDATION 6

7.0 REPORTING 7

8.0 SCHEDULE 7

9.0 REFERENCES 7

TABLE OF CONTENTS

TABLES

TABLE 1 BUILDING CONVERSION LIST

FIGURES

FIGURE 1 SITE LOCATION PLAN
FIGURE 2 SITE PLAN
FIGURE 3 PROPOSED SAMPLE LOCATION MAP
FIGURE 4 DETAIL SHEET

APPENDICES

APPENDIX A NYSDOH INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY FORM
APPENDIX B QUALITY ASSURANCE/QUALITY CONTROL PROJECT PLAN (QAPP)
APPENDIX C HEALTH AND SAFETY PLAN (HASP)

1.0 INTRODUCTION

GZA GeoEnvironmental of New York prepared this Sub-slab Vapor Investigation Work Plan (SVIWP) on behalf of i.park84, LLC to detail the collection of sub-slab soil gas and indoor air samples in order to evaluate the potential for soil vapor intrusion impacts within Building 338 at the Former IBM East Fishkill Facility located at 2070 Route 52, Hopewell Junction, NY (Site). A portion of the Facility is currently owned by i.park East Fishkill, LLC/i.park East Fishkill I, LLC (i.park). The entire Former IBM East Fishkill facility is currently zoned for industrial use under the RCRA Part 373 Permit entered into by i.park East Fishkill, LLC/i.park East Fishkill I, LLC (i.park) and GLOBAL FOUNDARIES US 2 LLC (Global) an owner of other portions of the Former IBM East Fishkill facility, and International Business Machines Corporation (IBM), the former owner and operator of the Former IBM East Fishkill facility. i.park is proposing a change of use from industrial to commercial for the Site area defined for this workplan and surrounding areas. The objective of this SVIWP is to characterize the sub-slab soil vapor and indoor air within Building 338, in order to assess the potential for soil vapor intrusion. It should be noted that this investigation will not evaluate potential exposures to Site-related contaminants via the soil vapor intrusion pathway for future occupants. Potential exposures for future occupants will be evaluated at a later date, once Building 338 is configured for its proposed use and the heating, ventilating and air conditioning (HVAC) system is operating. IBM maintains responsibility for addressing soil/sub-slab vapor and indoor air at the Facility except in portions where i.park has proposed a change in use from industrial to commercial, which includes Building 338. The on-Site groundwater contains chlorinated volatile organic compounds (cVOCs) and is currently being treated by IBM via pump and treat processes, with production wells located throughout the Facility. IBM has conducted soil vapor and indoor air quality assessments throughout the Facility, including Building 338.

This SVIWP is prepared, in accordance with the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation Strategy for Evaluating Sub-slab Vapor Intrusion at Remedial Sites in New York DER-13, issued on October 18, 2006 and New York State Department of Health (NYSDOH) Final Guidance for Evaluating Sub-slab Vapor Intrusion in the State of New York, issued in October 2006 (VI Guidance Document) along with all subsequent updates issued by NYSDOH. The proposed field work includes collection of sub-slab vapor, indoor air, and ambient air samples. This SVIWP is based on our current understanding of Site conditions and may need to be altered as additional information becomes available.

2.0 BACKGROUND INFORMATION

The former IBM East Fishkill facility comprises about 500 acres; including 2.7 million square feet of building space, associated asphalt parking lots and landscaped areas. The Facility is bounded to the south by Interstate Route 84, to the north by Route 52, to the east by a wooded region and John Jay Senior High School and to the west by another wooded region and Lime Kiln Road. The Facility was formerly owned and operated by IBM beginning in 1962 for development and manufacturing of semiconductors, semiconductor packaging and electronic computing equipment. Beginning in 1993, portions of the Facility were leased to a number of independent entities for research, operations including manufacture of semiconductors and flat panel displays, and semiconductor equipment cleaning. IBM sold the Facility in July 2015 to Global. Global sold parts of the facility to i.park and i.park I in 2017. At the time of the sale, the Facility was divided into lots 1-8, with lots 1 and 5 retained by Global, and the remaining lots (2-4, 6-8) sold to i.park. At the time of the sale, Facility building numbers were changed at the request of the Hopewell Junction Township. All references to building numbers in this work plan reflect the historical building numbers; however, the conversion table (**Table 1**) is provided for on-Site reference, as the exteriors of the Facility buildings have been updated with the new building numbers. **Figure 1** depicts

the locations of the Former IBM East Fishkill Facility (Facility). **Figure 2** depicts the Building 338 area and individual lot boundaries.

CVOCs are present in the subsurface at seven areas of concern (AOCs) at the Facility, which are subject to corrective action under the Part 373 Permit for the Facility (IBM 2011). These AOCs are where solvents have been released to the subsurface and does not include Building 338. Based on the prior use and underlying groundwater containing cVOCs, Building 338 was designated for confirmatory soil and indoor air sampling under IBM's RCRA Facility Investigation (RFI) Work Plan dated June 15, 2009 (Sanborn 2009a), which was approved by the NYSDEC and NYSDOH (agencies).

The operations at the former IBM East Fishkill facility must comply with terms and conditions set forth in the 6 NYCRR Part 373 Hazardous Waste Management Permit (IBM 2011), signed by IBM, Global and i.park. The entire Site is currently zoned for industrial use under the permit. The Final Statement of Basis (NYSDEC 2013) for the Facility details the final selected corrective measures for the Facility, which include continued operation of the groundwater extraction and treatment system installed as an interim corrective measure, institutional controls, engineering controls, and Site management. The Final Statement of Basis (NYSDEC 2013) indicates a Facility-wide soil vapor and indoor air investigation by IBM.

Building 338 was historically used by IBM for housing of furnaces, sintering, manufacturing, laboratory procedures, office space, and wastewater treatment located on the ground floor. A variety of chemicals were used for wastewater treatment process within the building. According the to 2009 RFI Workplan, there are no known solid waste management units (SWMUs) within Building 338. Building 338 is approximately 61,700 square feet, located in the southeast portion of the Facility. The building is currently vacant, with no active tenants currently occupying the building.

3.0 ENVIRONMENTAL SETTING

3.1 SOIL AND BEDROCK CONDITIONS

The geology of the area is typified by folded and faulted Paleozoic sedimentary rocks overlain by unconsolidated glacial deposits and more recent alluvial deposits. Locally, the bedrock consists of Ordovician dolomite interbedded with smaller amounts of limestone, sandstone, siltstone and shale.

3.2 GROUNDWATER CONDITIONS

Groundwater flow in the unconsolidated material is typically governed by surface topography, hydraulic conductivity, the presence or absence of an aquitard, proximity to areas of recharge and vertical gradients induced by the Facility's production wells. Depths to overburden groundwater vary from 30 feet in the central part of the Facility to 10 feet on the eastern portions of the Facility. Water table elevations are highest in the spring and lowest in the fall, and long-term records indicate a direct relationship between the water table elevation and rainfall. Recharge of surface water into the upper aquifer is variable due to the extensive development at the Facility.

The general direction of bedrock groundwater flow across the Facility was northward before the IBM production wells were put into production. Measurements show pronounced influence of the production wells causing a downward vertical gradient and the direction of the bedrock groundwater flow under much of the Facility to be onto the Facility towards the pumped wells. Current groundwater flow on Site is expected to be to the west-southwest, towards one of the on-Site production wells, based on recent well gauging events (IBM 2014). Current water levels at the Facility in the bedrock range from flowing artesian conditions to depths of greater than 150 feet below ground surface (bgs).

4.0 PREVIOUS INVESTIGATIONS

4.1 BUILDING 338

The first round of confirmatory indoor air samples was collected in Building 338 by Sanborn Head Engineering, P.C. (Sanborn) in August 2009, in accordance with the 2009 RFI work plan (Sanborn 2009a), which consisted of a series of 8-hour time-weighted-average SUMMA® canister samples. No sub-slab vapor samples were collected during this event. The results of the August 2009 sampling event were provided to the agencies in a November 2009 report (Sanborn 2009b). The primary VOCs of interest, tetrachloroethene (PCE) and trichloroethene (TCE) were not detected above laboratory reporting limits in the confirmatory samples.

By August 2015, Building 338 was vacated and all equipment related to former operations was decommissioned. Based on the change of use, Global requested to change HVAC operating conditions within Building 338. Additional indoor air quality (IAQ) sampling was conducted by Sanborn within Building 338 in August of 2015, using a HAPSITE® portable gas chromatograph/mass spectrometer (GC/MS). IAQ screening was conducted under two conditions: the first with HVAC units running under their original operating conditions (before vacancy), the second under the adjusted operating conditions requested by Global. Results of this IAQ testing indicated that PCE and TCE concentrations increased to detectable levels (29 and 0.88 µg/m^3, respectively) under the proposed HVAC modifications. Due to the fact that Global plans for the building at the time did not require routine occupancy, the proposed changes to the HVAC settings were made upon completion of this testing. IBM and Global agreed to re-evaluate HVAC settings if changes in occupancy were planned in the future. This information is documented in a February 2016 report (Sanborn 2016).

IAQ testing was conducted by Sanborn throughout Building 338 in November of 2018. IAQ samples were collected at the same locations that were previously sampled in August 2009. The samples were collected using 8-hour time-weighted-average SUMMA® canisters. Sanborn collected only indoor air samples during this sampling event. Results indicated levels of carbon tetrachloride and Freon-12 above indoor air background values. However, carbon tetrachloride was detected at similar concentrations and Freon-12 concentrations were below the background levels in the ambient air. TCE was not detected at any of the indoor air samples above laboratory detection limits. PCE was only detected at one location at a concentration of 1.2 µg/m^3 (Sanborn 2019). Therefore, there are no immediate concerns in Building 338 with regards to indoor air quality. Further details of this sampling event are documented in a report by IBM, dated January 23, 2019 (Sanborn 2019).

Although, no immediate concerns were noted based on the November 2018 indoor air sampling results, GZA proposes that sub-slab samples be collected in addition to indoor air samples, in accordance with the NYSDOH Guidance for Soil Vapor Intrusion, issued in October 2006 (NYSDOH, October 2006). GZA proposes these additional actions in order to; identify VOC vapor concentrations beneath the slab, better evaluate vapor intrusion potential within Building 338, and to facilitate comparison to NYSDOH decision matrices (NYSDOH, May 2017).

5.0 FIELD INVESTIGATION ACTIVITIES

5.1 INTERIOR INSPECTION

A pre-sampling inspection will be performed to identify potential vapor intrusion pathways and to identify appropriate sub-slab and indoor air sampling locations. Building 338 will be inspected to evaluate the condition of sub-slab and identify materials currently stored or used in the building (or apparent historic storage or use of volatile chemicals in commercial

processes and/or during building maintenance) that may interfere with the proposed sampling or interpretation of the sampling results. Consideration will be given to factors such as access for installation/sampling purposes, interior Site uses, foundation/floor slab installation and conditions, heating/ventilation/mechanical system operation and utility layout/breaches. NYSDOH's Appendix B-Indoor Air Quality Questionnaire and Building Inventory form will be completed based on the inspection. A copy of the NYSDOH questionnaire can be found in **Appendix A**.

Building 338 is currently vacant, with no active tenants occupying the building. However, workers at the Facility may access the Building 338 and may be present for short periods of time. If workers are identified in Building 338 prior to sampling activities, the respective parties will be notified in advance of sampling to ensure that the occupants avoid the following activities 24 hours prior to sampling wherever possible (per NYSDOH Final Guidance for Evaluating Soil Vapor intrusion in the State of New York, October 2006):

- Opening any windows, fireplace dampers, opening of vents;
- Operating ventilation fans unless special arrangements are made;
- Smoking in the building;
- Painting;
- Using a wood stove, fireplace or other auxiliary heating equipment (i.e. kerosene heater);
- Operating or storing automobile;
- Allowing containers of gasoline or oil to remain within the house or garage area, except for fuel oil tanks;
- Cleaning, waxing or polishing furniture, floors or other woodwork with petroleum or oil-based products;
- Using air fresheners, scented candles or odor eliminators;
- Engaging in any hobbies that use materials containing volatile chemicals;
- Using cosmetics including hairspray, nail polish, nail polish removers, perfume/cologne, etc.;
- Lawn mowing, paving with asphalt, or snow blowing;
- Applying pesticides;
- Using building repair or maintenance products, such as caulk or roofing tar; and
- Bringing freshly dry-cleaned clothing or furnishings into the building.

5.2 SAMPLING SCOPE AND LOCATIONS

The scope of work for the sub-slab vapor and indoor air sampling are described below. The proposed sampling locations are shown on **Figure 3**. Actual locations will be finalized in the field as discussed above. Any significant changes from the locations shown on **Figure 3** will be discussed with NYSDEC and NYSDOH to gain the agencies concurrence prior to sample collection.

5.3 SUB-SLAB VAPOR SAMPLING PROCEDURES

Four permanent sub-slab vapor sampling points (SS-1 through SS-4) will be installed within Building 338. The sub-slab vapor sampling points will be constructed by coring an approximate 3-inch diameter hole through the concrete floor slab and installing a 2-inch-diameter by approximately 1.5-ft-long 20-slot schedule 40 PVC screen equipped with a capped port flush with the floor. The sub-slab vapor sampling point will extend approximately 12-inches below the slab. Installation details for the sampling point is shown on **Figure 4**. Prior to sampling and at least 24 hours after installation of permanent

probes one to three sampler volumes will be purged to check for any leaks. Leak testing will be conducted as discussed below.

Collection of sub-slab vapor samples, recording of weather conditions and other field conditions will be conducted in accordance with Section 2.7.2 of NYSDOH's VI Guidance document. Each probe will be connected via Teflon tubing to a laboratory supplied SUMMA© canister, the sample collection time will be 30-minutes. GZA personnel will ensure that SUMMA© canister flow regulators are turned off before the end pressure reaches zero.

Helium integrity testing will be performed on the sub-slab vapor sampling point following installation to confirm a suitable air tight seal around the slab penetration. Helium integrity testing will involve placing a plastic shroud over the newly installed point and sealing all penetrations with hydrated bentonite or putty. New Teflon sample tubing will be connected to the sample point which will run out through the plastic shroud and it will be connected to a 0.5-liter Tedlar© bag via a peristaltic or Gillian air sampling pump. The soil gas sampler will purge approximately one to three sampler volumes (0.4 liters) by activating the pump to fill the Tedlar© bag to near capacity. During purging, a flow of helium gas will be introduced into the plastic shroud overlying the sub-slab vapor sampling point. The Tedlar© bag will be analyzed in the field using a Marks Model 9822 helium detector to check for short circuiting of outside air into the sampling port. If helium is detected at a concentration of greater than 10 percent, the soil gas point will be resealed with hydrated bentonite. The point will then be retested to ensure that the helium gas concentration is less than 10 percent. Refer to **Figure 4** for details regarding the helium leak test set up.

5.4 INDOOR AND BACKGROUND AIR SAMPLING PROCEDURES

Indoor air samples will be collected in accordance with Section 2.7.3 of NYSDOH's VI Guidance document. GZA will collect one co-located indoor air sample (IA-01 through IA-04) in the vicinity of each of the four sub-slab sample locations during the vapor intrusion assessment.

The indoor air sample will be collected using a laboratory supplied SUMMA© canister. The sampling duration reflect the exposure scenario being evaluated. GZA assumes, after full occupancy of Building 338, that it will be operating for 24 hours. As a result, the indoor air samples will be collected over 24 hours sample collection time. The regulators for the SUMMA© canister will be set to collect it at 24-hour cycle. GZA personnel will ensure that SUMMA© canister flow regulators are turned off before the end pressure reaches zero.

Two background samples will be collected using a laboratory supplied SUMMA© canister, one sample upwind and one sample downwind of Building 338. A duplicate sample will also be collected at one of the background sample locations. Background samples will be placed in undisturbed locations adjacent to Building 338. The sample collection time will be 24-hours as well. GZA personnel will ensure that the SUMMA© canister flow regulators are turned off before the end pressure reaches zero.

When soil vapor/indoor air/ambient air samples are collected, conditions that have the potential to influence the interpretation of results will be documented:

- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

6.0 INVESTIGATION SUPPORT ACTIVITIES

6.1 UTILITY CLEARANCE

Prior to performing subsurface work, a utility clearance survey will be performed in accordance with New York Dig-Safe protocol. The proposed sample locations will be marked on a map and compared to the known utility locations and utility drawings. If the location is deemed acceptable by GZA and i.park, then the location will be screened using surface geophysical techniques such as electromagnetic (EM), ground penetrating radar (GPM) or radiofrequency (RF) techniques prior to installation.

6.2 QUALITY ASSURANCE/QUALITY CONTROL PROJECT PLAN

During the sub-slab vapor intrusion investigation; sub-slab vapor, ambient air, indoor air samples and one duplicate air sample will be collected for VOC analysis using EPA Method TO+15. Air samples will be analyzed at an environmental laboratory accreditation program (ELAP) certified laboratory. **Appendix B** provides details for quality assurance and quality control during investigation activities.

6.3 HEALTH AND SAFETY

Field personnel will be outfitted in the appropriate health and safety equipment, and be educated on Site-specific hazards as outlined in the Site-specific Health and Safety Plan (HASP) prepared for the sampling activities, provided as **Appendix C**.

6.4 COMMUNITY AIR MONITORING PLAN (CAMP)

Ground intrusive work will be conducted in accordance with the instructions provided by the agencies for conducting air monitoring during indoor work.

During GZA's initial Site visit, the on-Site representative will observe and note the location of exhaust vents and discharge points in Building 338, as well as vapor pathways (openings, conduits, etc.) relative to adjoining rooms. The on-Site representative will also note the activity in Building 338 and identify the nearest potentially exposed individuals based on the location of the test point installation locations.

Based on the observations during the Site visit, an exclusion zone will be set up (if necessary) prior to investigation activities to maintain a minimum of 20 feet from exposed individuals (as per DER-10, Appendix 1A). Sub-slab vapor sampling point installations will be the only activities associated with this work plan where there is a potential for dust to be generated. Sub-slab vapor sampling point installations will be brief, and will include the use of a negative-pressure enclosure equipped with a high efficiency particulate air (HEPA) filter to ensure no airborne dust is generated during drilling activities.

6.5 DATA VALIDATION

A Data Usability Summary Report (DUSR) will be prepared in accordance with the DER-10. The data usability evaluation will include reviewing the quality assurance/quality control (QA/QC) information including: (1) chain-of-custody; (2) the summary QA/QC information provided by the laboratory; and (3) the project narrative.

7.0 REPORTING

Upon completion of the field activities, GZA will summarize the findings from this investigation in a Soil Vapor Intrusion Investigation Summary Report. The report will include:

- An executive summary
- Description of field activities performed
- A summary of pertinent field observations and field measurements
- A complete copy of the Indoor Air Quality Questionnaire and Building Inventory form
- Laboratory data summarized in tabular format and compared to applicable criteria
- A DUSR for the laboratory data collected during the investigation
- Daily field reports
- Conclusions and recommendations.

The sub-slab soil vapor and indoor air results will be evaluated, and further actions will be discussed with i.park, IBM and NYSDEC. A design for a sub-slab depressurization system (SSDS) or other appropriate mitigation method will be prepared following these discussions, if needed.

8.0 SCHEDULE

A schedule for implementation of the work described in this work plan is provided below. The schedule will be initiated upon NYSDEC approval of this work plan. Updates to the schedule based on a change in Site conditions, subcontractor availability, or other factors will be communicated to NYSDEC.

Mobilization to Site	Five days following NYSDEC approval of this work plan
Field activities	Two days
Laboratory analysis	10 days
Prepare Sub-slab Vapor Investigation Report	15 days

9.0 REFERENCES

Division of Environmental Remediation, New York State Department of Environmental Conservation (NYSDEC), 2013. Final Statement of Basis – IBM East Fishkill Facility, East Fishkill Dutchess County.

International Business Machines Corporation (IBM), 2011. New York State Department of Environmental Conservation 6 NYCRR Hazardous Waste Management Permit Renewal Application.

IBM and Sanborn, Head Engineering, P.C., June 2009 (2009a), Work Plan RCRA Facility Investigation (RFI) VOC Source Assessment, Former IBM East Fishkill Facility, Hopewell Junction, NY.

IBM and Sanborn, Head Engineering, P.C., November 2009 (2009b), Confirmatory Sampling Results, Buildings 330C and 338, VOC Source Assessment, Former IBM East Fishkill Facility, Hopewell Junction, NY.

IBM and Sanborn, Head Engineering, P.C., February 2016, Report of HVAC Adjustment and Indoor Air Quality Testing, Buildings 330C and 338, Former IBM East Fishkill Facility, Hopewell Junction, NY.

IBM And Sanborn, Head Engineering, P.C., January 2019, Indoor Air Quality Testing Results, Building 338, Former IBM East Fishkill Facility, Hopewell Junction, NY.

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

New York State Department of Health (NYSDOH), May 2017, Soil Vapor/Indoor Air Decision Matrices A, B and C.

Tables

TABLE 1

BUILDING CONVERSIONS LIST

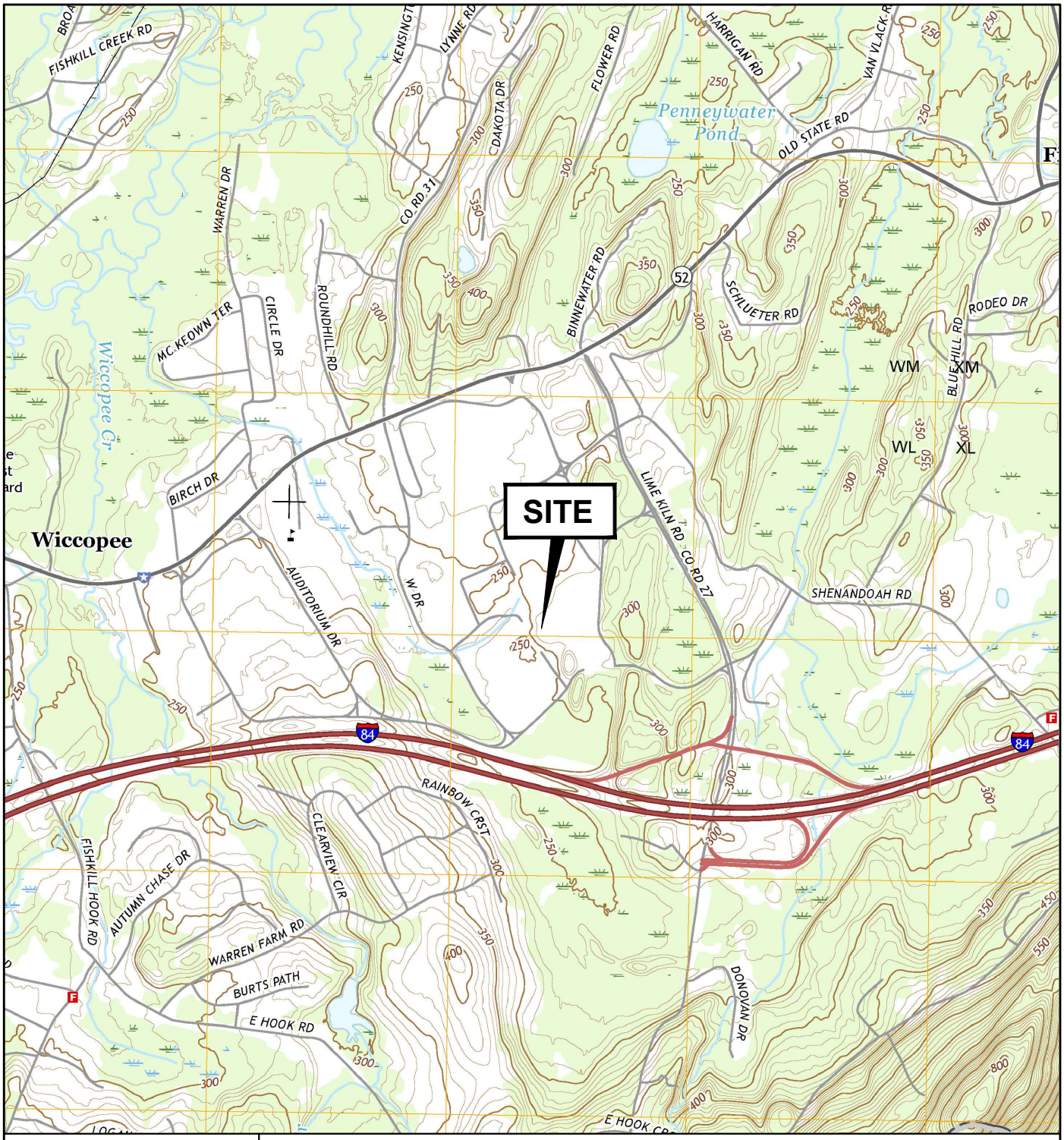
Building 338 Soil Vapor Intrusion Investigation Workplan

2070 Route 52

Hopewell Junction, New York 12533

Old Building Number	New Building Number
310	220
320	200
320A	210
330D	700
330C	755

Figures



NEW YORK

QUADRANGLE LOCATION

SOURCE:
USGS TOPOGRAPHIC MAP: HOPEWELL JUNCTION, NY (2016).
CONTOUR INTERVAL 10 FT., NAVD-1988, ORIGINAL
SCALE 1:24,000 (1" = 2,000 FT.).

N
W E
S

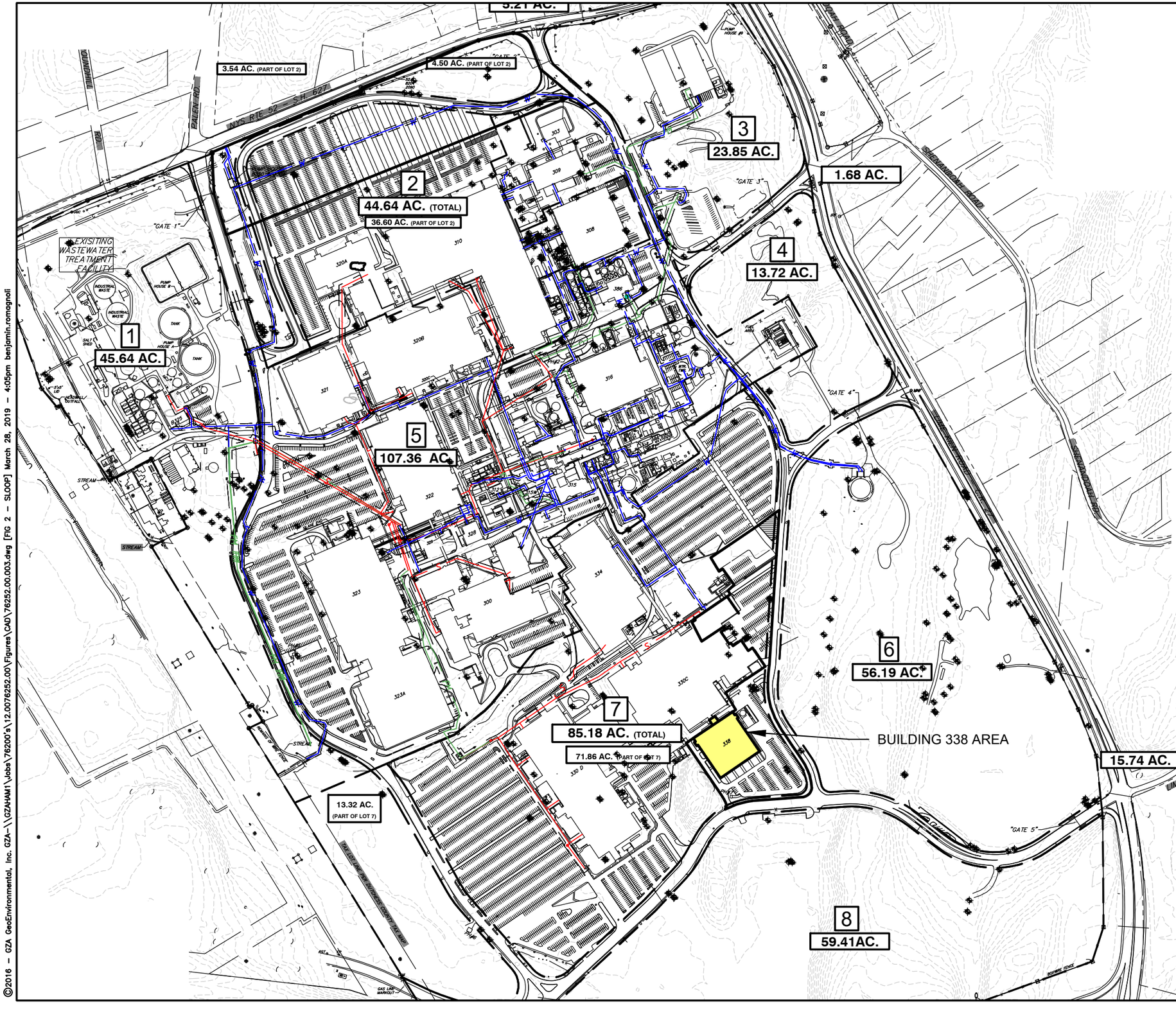
SUB-SLAB VAPOR INVESTIGATION WORK PLAN - BUILDING 338

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
I.PARK84, LLC.
GREENWICH, CT

SITE LOCATION PLAN

PROJ MGR: BP	REVIEWED BY: DW	CHECKED BY: BR	FIGURE 1
DESIGNED BY: BR	DRAWN BY: PB	SCALE: 1" = 2,000'	
DATE: MARCH 2019	PROJECT NO. 12.0076252.00	REVISION NO.	SHEET NO. 1 OF 4



N

LEGEND:

BUILDING BOUNDARY

SOURCE:
SURVEY BASE MAP AND LOT LINES PROVIDED BY CHAZEN ENGINEERING, LAND SURVEYING & LANDSCAPE ARCHITECTURE CO., D.P.C. - FINAL SUBDIVISION PLAT EXISTING CONDITIONS, REVISION 13, 06/29/17

0 250 500 1,000
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

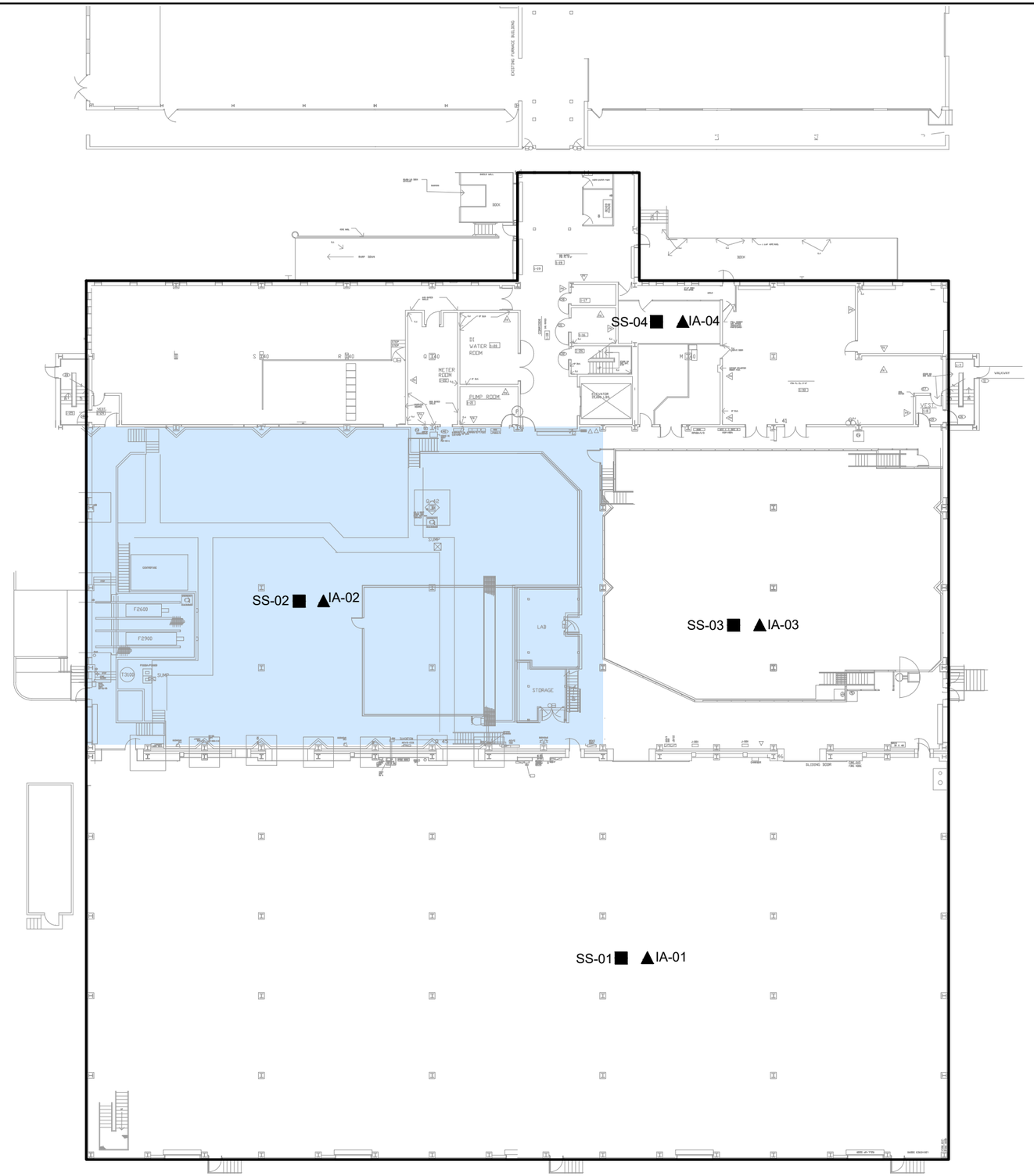
SUB-SLAB VAPOR INVESTIGATION WORKPLAN - BUILDING 338

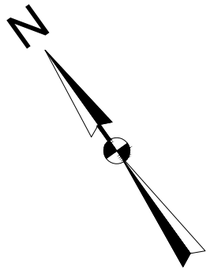
SITE PLAN

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
I.PARK84, LLC.
GREENWICH, CT

PROJ MGR: MH	REVIEWED BY: DW	CHECKED BY: BR	FIGURE 2
DESIGNED BY: BR	DRAWN BY: PB/MT	SCALE: 1" = 500'	
DATE: MARCH, 2019	PROJECT NO. 12.0076252.10	REVISION NO.	SHEET NO.





NOTE: AMBIENT AIR SAMPLES WILL BE COLLECTED FROM UPWIND AND DOWNWIND LOCATIONS

LEGEND:

- BUILDING 338 FOOTPRINT
- PROPOSED GYM FOOTPRINT
- ■ PROPOSED SUB-SLAB SAMPLE LOCATION
- ▲ PROPOSED INDOOR AIR SAMPLE LOCATION

0 200' 400' 800'

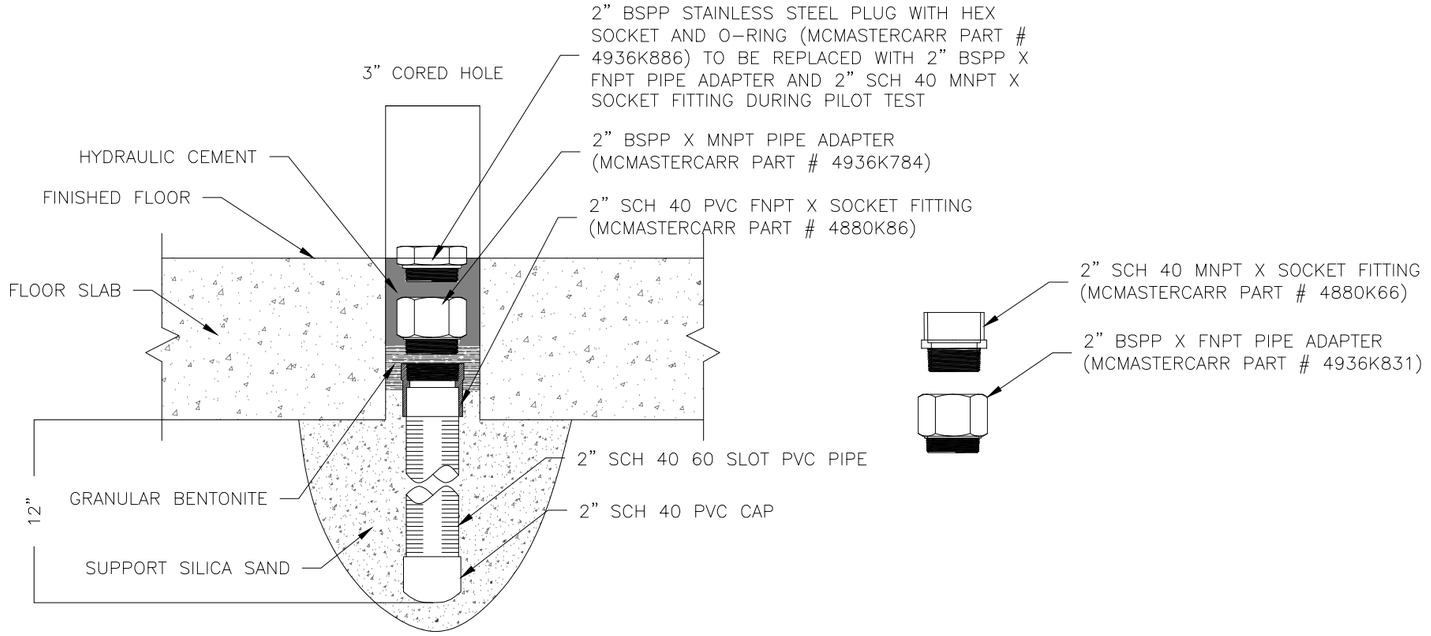
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

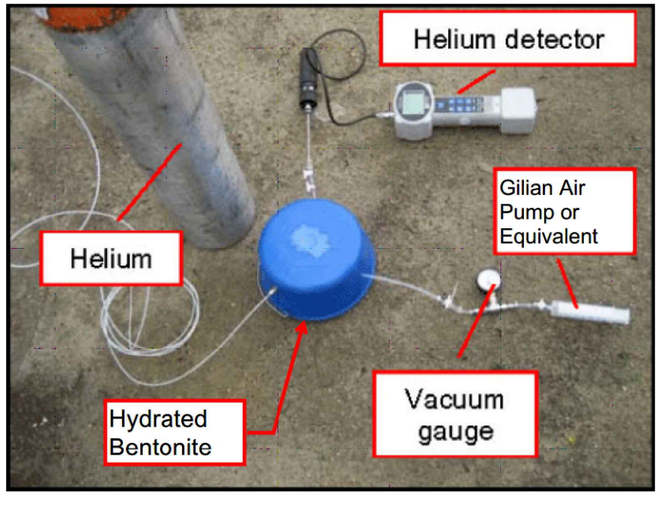
SUB-SLAB VAPOR INVESTIGATION WORK PLAN - BUILDING 338

PROPOSED SAMPLE LOCATION MAP

PREPARED BY:	PREPARED FOR:		
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	I.PARK84, LLC. GREENWICH, CT		
PROJ MGR: BP	REVIEWED BY: BR	CHECKED BY: BP	FIGURE 3
DESIGNED BY: BR	DRAWN BY: MT	SCALE: 1" = 400'	SHEET NO.
DATE: MARCH, 2019	PROJECT NO. 12.0076252.10	REVISION NO.	



DETAIL 1: SUBSLAB VAPOR EXTRACTION POINT



DETAIL 2: TYPICAL LEAK DETECTION SETUP

NO.	ISSUE/DESCRIPTION	BY	DATE

SUB-SLAB VAPOR INVESTIGATION WORKPLAN - BUILDING 338

DETAIL SHEET

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: I.PARK84, LLC. GREENWICH, CT	
PROJ MGR: BP	REVIEWED BY: BR	CHECKED BY: BP	FIGURE 4
DESIGNED BY: BR	DRAWN BY: MT	SCALE: 1" = 400'	
DATE: MARCH, 2019	PROJECT NO. 12.0076252.10	REVISION NO.	SHEET NO.

Appendix A

Appendix B
Indoor air quality questionnaire and building inventory

As discussed in Section 2.11, products in buildings should be inventoried every time indoor air is sampled to provide an accurate assessment of the potential contribution of volatile chemicals. In addition, the type of structure, floor layout and physical conditions of the building being studied should be noted to identify (and minimize) conditions that may interfere with the proposed testing.

Toward this end, a blank copy of the NYSDOH Center for Environmental Health's Indoor Air Quality Questionnaire and Building Inventory is provided in this appendix. Also provided is an example that demonstrates how the form should be completed properly.

This page is intentionally blank.

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.

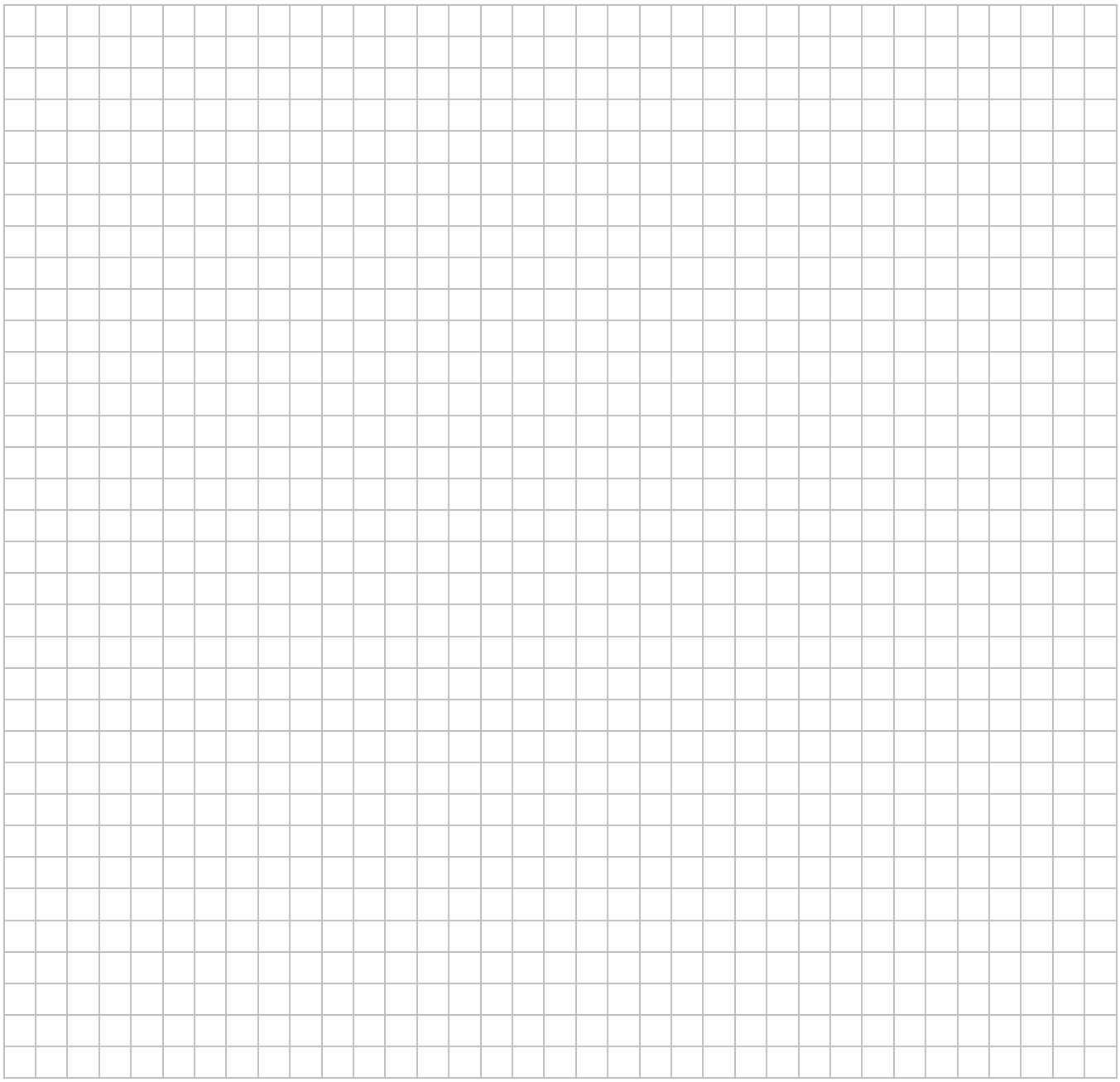
Basement:

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.

OSR – 3 Example 1 Correct

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 Mary Jones Date/Time Prepared 10/22/04 10:00am

Preparer's Affiliation XYZ Consulting Phone No. 518-555-1212

Purpose of Investigation Thomasville Soil Vapor Intrusion Investigation (Site#32141)

1. OCCUPANT:

Interviewed: (Y)/ N

Last Name: Smith First Name: Carol

Address: 25 Main Street Thomasville, New York 25230

County: Albany

Home Phone: 518-556-2222 Office Phone: 518-556-2400

Number of Occupants/persons at this location 2 Age of Occupants 36, 10

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

Interviewed: Y (N)

Last Name: White First Name: Frank

Address: 64 Mountain Road Bainbridge, New York 26390

County: Dutchess

Home Phone: 845-876-1301 Office Phone: 845-227-2430

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

(Residential)	School	Commercial/Multi-Use
Industrial	Church	Other: _____

Example Correct 2

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? NA

If the property is commercial, type?

Business Type(s) NA

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

Other characteristics:

Number of floors 1 Building age 20 years

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

Basement air flows up to 1st floor through plumbing waste line and domestic water line floor penetrations

Airflow near source

Yes, furnace/oil tank area open to rest of basement

Outdoor air infiltration

Outdoor air enters at loose bilco doorway openings, and at sill plate near furnace.

Infiltration into air ducts

Basement air flows into bottom of hot air unit and in loose cold air return joints.

Example Correct

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: 6 (feet)

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

Floor drain in laundry area

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: gas

Boiler/furnace located in:	(Basement)	Outdoors	Main Floor	Other _____
Air Conditioning:	Central Air	(Window units)	Open Windows	None

Example Correct 4

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.

Cold air return ductwork on ceiling in basement. Cold air return joints appear loose.

7. OCCUPANCY

Basement / Is lowest level occupied? Full time Occasionally (Seldom) Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	Storage and laundry
1st Floor	living area and bedrooms
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 etc.) (Y) N / NA Please specify lawnmower, car

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? w/in week - windex, tilex

i. Have cosmetic products been used recently? (Y) N When & Type? yesterday - hairspray

Example Correct

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? carpet in dining room

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

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

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, automechanic or autobody shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist etc.)

If yes, what types of solvents are used? hair salon dyes, alcohols, peroxides, acetone

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: June 2000
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: not applicable

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

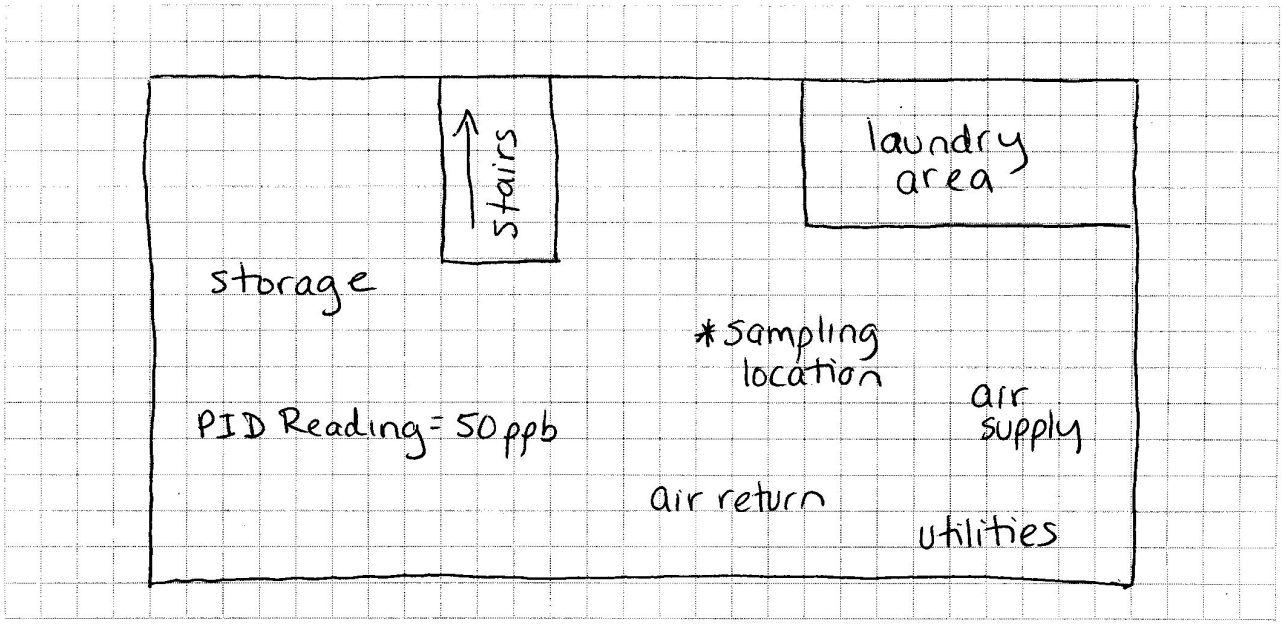
d. Relocation package provided and explained to residents? Y / N

Example Correct

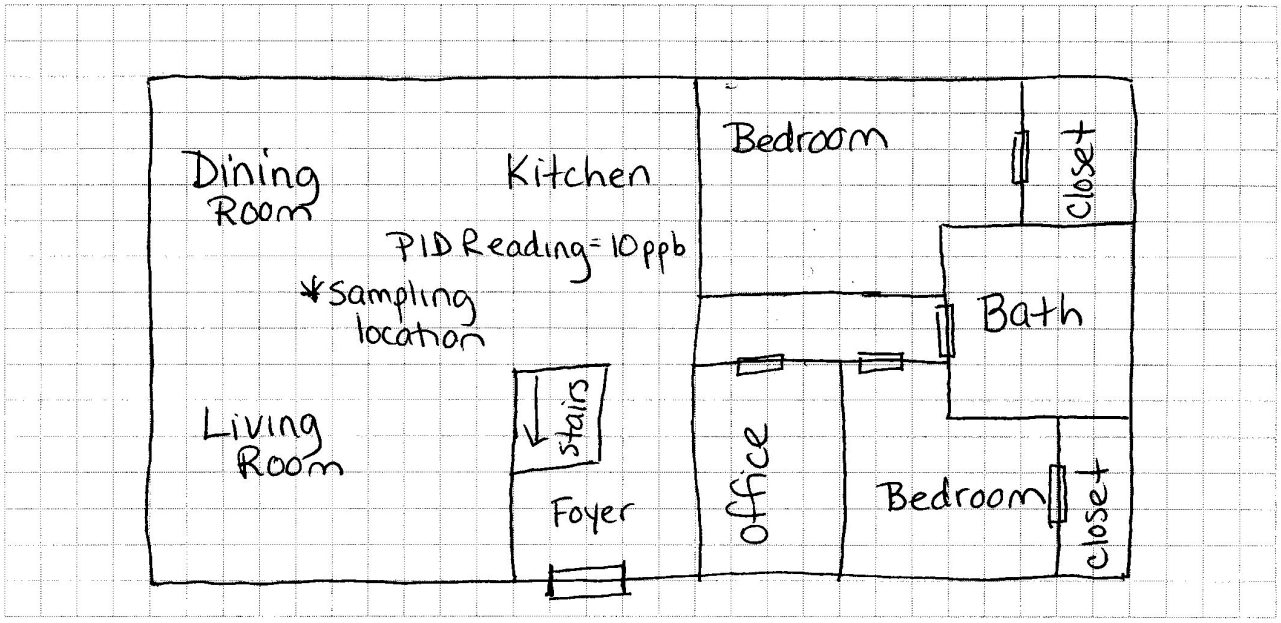
11. FLOOR PLANS

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:

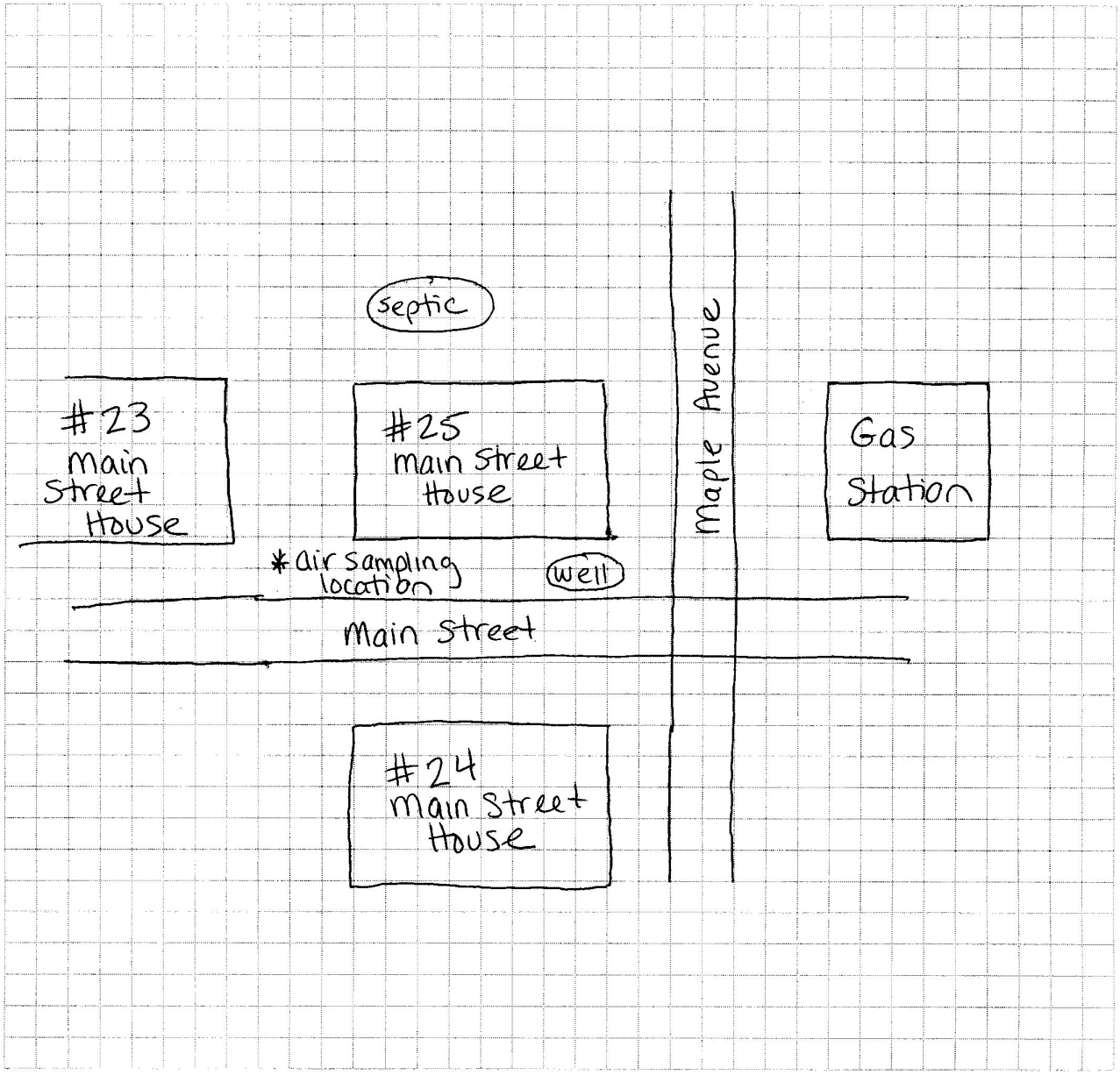


Example Correct

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.



N

Wind direction = NE

Example Correct 8

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: RAE photoionization detector

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

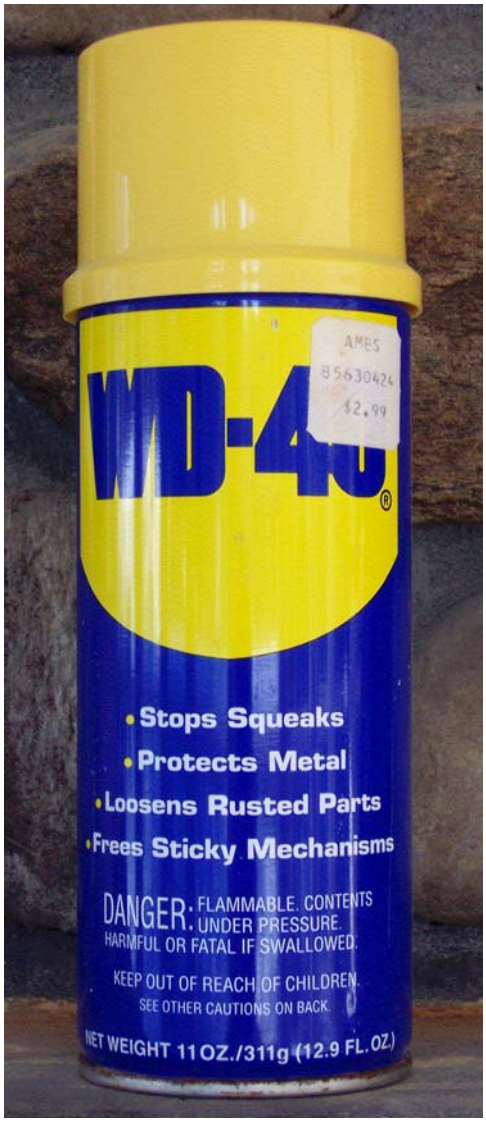
Location	Product Description	Size (oz.)	Condition*	Chemical Ingredients	Field Instrument Reading	Photo** Y / N
Kitchen	WD-40	12oz	UO	See photo	10 ppb	Y
garage	mineral spirits	24oz	U	benzene, toluene	15 ppb	N
garage	American Semi-Gloss latex paint	64oz	U	titanium dioxide, ethylene, glycol, aluminum hydroxide, 2,2,4-trimethyl 1-1,3-pentanediol isobutyrate, Vinyl acetate	2 ppb	N
garage	Krylon Semi-gloss oil paint	64oz	D	butane, propane, titanium dioxide, xylene, ethylbenzene, acetone, MEK, butanol, MIK	10 ppb	N
garage	Rustoleum	12oz	U	talc, calcium carbonate, titanium dioxide, xylene, ethylbenzene, acetone, liquified petroleum gases, pentaerythritol	4 ppb	N
garage	Deep 6 Double Strength Insect Repellent	8oz	D	propane, isobutane, N,N-Diethyl-meta-toluamide	0.5 ppb	N
				Di-n-propyl isocinchomeronate		
basement	12 cans latex paint	128oz	U	talc, titanium dioxide, Kaolin clay, 2,24-trimethyl-1,3 pentanediol isobutyrate, vinyl acetate	0	N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**

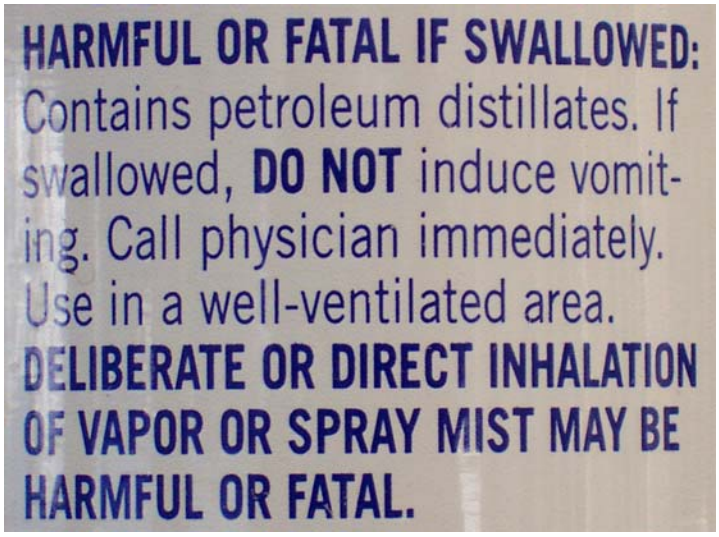
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Attachment — 25 Main Street, City

WD-40 FRONT



WD-40 INGREDIENTS



This page is intentionally blank.

Appendix B

Known for excellence.
Built on trust.

Quality Assurance/Quality Control Project Plan (QAPP)

Sloop Brewery/Building 338 Vapor Intrusion Sampling
Former IBM East Fishkill Facility
2070 Route 52,
Hopewell Junction, NY

NYSDEC Site No. 314054
EPA ID No. NYD000707901

March 19
File No. 12.0076252.10

PREPARED FOR:
i.Park84, LLC
485 West Putnam Avenue
Greenwich, CT 06830

GZA GeoEnvironmental, Inc.
55 Lane Road | Fairfield, NJ, 07004
973-774-3300

31 Offices Nationwide
www.gza.com

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY 1

3.0 QA OBJECTIVES FOR DATA MANAGEMENT 1

4.0 SAMPLING PLAN 4

4.1 SUBSLAB SOIL VAPOR SAMPLING 4

4.2 INDOOR AND BACKGROUND AIR SAMPLING 4

4.3 QUALITY CONTROL SAMPLE COLLECTION 5

4.4 SAMPLE PRESERVATION AND CONTAINERIZATION 5

4.5 EQUIPMENT DECONTAMINATION 5

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY 6

5.1 SAMPLE COLLECTION DOCUMENTATION 6

5.1.1 Field Notes 6

5.1.2 Chain-of-Custody Records 7

5.1.3 Sample Labeling 7

5.2 SAMPLE CUSTODY 9

5.2.1 Field Custody Procedures 9

5.2.2 Laboratory Custody Procedures 10

6.0 CALIBRATION PROCEDURES 11

6.1 FIELD INSTRUMENTS 11

6.2 LABORATORY INSTRUMENTS 11

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES 11

8.0 DATA REDUCTION, VALIDATION, AND REPORTING 12

8.1 DATA EVALUATION/VALIDATION 12

8.1.1 Field Data Evaluation 12

8.1.2 Data Usability 12

TABLE OF CONTENTS

8.2 IDENTIFICATION AND TREATMENT OF OUTLIER 13

9.0 INTERNAL QUALITY CONTROL 13

10.0 CORRECTIVE ACTION 13

10.1 IMMEDIATE CORRECTIVE ACTION 14

TABLES

TABLE 1 SOIL VAPOR CRITERIA TABLE

TABLE 2 ANALYTICAL PARAMETERS, METHODS, PRESERVATION, HOLDING TIME AND CONTAINER REQUIREMENTS

TABLE 3 TYPICAL LABORATORY DATA QUALITY OBJECTIVES: SOIL GAS SAMPLES

1.0 INTRODUCTION

This Quality Assurance/Quality Control Project Plan (QAPP) presents the organization, objectives, planned activities, and specific quality assurance/quality control (QA/QC) procedures associated with the subslab depressurization (SSDS) workplan at Sloop Brewery (Building 330C) and the soil vapor intrusion (SVI) assessment at Building 338, part of the Former IBM East Fishkill Facility development in Hopewell Junction, New York.

The Plan describes specific protocols for field sampling, sample handling and storage, chain-of-custody, laboratory analysis, and data handling and management. Preparation of the plan was based on EPA Quality Assurance Project Plan guidance documents, including:

- EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5, March 2001); and
- Guidance for Quality Assurance Project Plans (EPA QA/G-5, December 2002).

The data generated from the analysis of samples will be used to characterize subslab, indoor and ambient air in the Sloop Brewery area (portion of Building 330C) and in Building 338. If the potential parameters to be analyzed, including their respective quantitation limits (QLs), and data quality levels (DQLs), is shown in **Table 1**.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

A qualified person will coordinate and manage the Site sampling and analysis program, data reduction, QA/QC, data validation, analysis, and reporting. A qualified environmental professional (QEP), as defined by the New York State Department of Environmental Conservation (NYSDEC) will direct the sampling activities and coordinate laboratory and drilling activities.

A qualified person will insure that the QA/QC plan is implemented and will oversee data validation. A qualified person will provide oversight and technical support for the sampling and analytical procedures followed in this project. This individual has the broad authority to approve or disapprove project plans, specific analyses, and final reports. The QEP is independent from the data generation activities. In general, the QA officer will be responsible for reviewing and advising on all QA/QC aspects of this program.

Laboratories used will be New York State Department of Health (NYSDOH) environmental laboratory accreditation program (ELAP) certified laboratories. The laboratories will communicate directly with the sampler regarding the analytical results and reporting and will be responsible for providing all labels, sample containers, shipping coolers, and laboratory documentation.

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

The analytical data will be provided by the laboratory using the New York State Department of Environmental Conservation (NYSDEC) Category B deliverable format. Analytical data collected for disposal characteristics that may be requested by off-site soil or wastewater disposal facilities will be provided in the format that the facility requests.

All analytical measurements will be made so that the results are representative of the media sampled and the conditions measured. Data will be reported in consistent units for soil vapor and air samples in micrograms per cubic meter ($\mu g/m^3$) for soil vapor and air samples. **Table 2** presents the proposed samples, sampling and analytical parameters, analytical methods, sample preservation requirements and containers.

Quantitation Limits (QLs) are laboratory-specific and reflect those values achievable by the laboratory performing the analyses. Data Quality Levels (DQLs) are those reporting limits required to meet the objectives of the program (i.e., program action levels, cleanup standards, etc.). Data Quality Objectives (DQOs) define the quality of data and documentation required to support decisions made in the various phases of the data collection activities. The DQOs are dependent on the end uses of the data to be collected and are also expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

The analytical methods to be used at this site provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial alternatives and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies are capable of achieving the DQOs, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, and completeness.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet DQOs. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this Plan. **Table 3** presents the precision and accuracy requirements for each parameter to be analyzed.

The QA objectives are defined as follows:

- ***Accuracy*** is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

  Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements, and through the collection of equipment blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

  The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards," materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in matrix spikes (MSs), matrix spike duplicates (MSDs) and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds. **Table 3** summarizes the laboratory accuracy requirements.

- ***Precision*** is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

  Precision in the field is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). Field duplicates will be collected at a frequency of one per twenty investigative

samples per matrix per analytical parameter, with the exception of the TCLP parameters and parameters associated with wastewater samples. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability. Field duplicate RPDs must be < 30 for soil samples and < 30 for aqueous samples. These criteria apply only if the sample and/or duplicate results are >5x the quantitation limit; if both results are < 5x the quantitation limit, the criterion will be doubled. Due to the uncertainty of available representative soil gas volume, field duplicates will not be collected for this matrix.

Precision in the laboratory is assessed through the calculation of RPD for duplicate samples. For organic soil, sediment and water analyses, laboratory precision will be assessed through the analysis of MS/MSD samples and field duplicates. For the inorganic analyses, laboratory precision will be assessed through the analysis of matrix duplicates and field duplicates. For soil gas analyses, laboratory precision will be assessed through the analysis of matrix duplicates. MS/MSD samples or matrix duplicates will be performed at a frequency of one per twenty investigative samples per matrix per parameter. **Table 3** summarizes the laboratory precision requirements.

- ***Completeness*** is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

  Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent.

  Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent.

- ***Representativeness*** is a qualitative parameter that expresses the degree to which data accurately and precisely represent either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data. In addition, field duplicate samples will provide an additional measure of representativeness at a given location.

  Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed and that proper sampling, sample handling, and sample preservation techniques are used.

  Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample holding times.

- ***Comparability*** expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed and that proper sampling techniques are used. Maximization of comparability with previous data sets is expected because the sampling design and field protocols are consistent with those previously used.

  Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts.

4.0 SAMPLING PLAN

Environmental sampling will include subslab, indoor and ambient air. Air samples will be collected using laboratory provided SUMMA® canisters.

4.1 SUBSLAB SOIL VAPOR SAMPLING

Soil vapor extraction (SVE) wells will be installed via rotary methods to a maximum of one foot below the building baseslab. SVE wells will consist of 2-inch, schedule 40, 60-slot polyvinyl chloride (PVC) pipe. Support silica sand will be used to fill the annular space around the extraction well.

Subslab soil vapor samples will be collected from SVE wells. Prior to sampling, the SVE wells will be purged at a flow rate not greater than 0.2 liters/minute to evacuate one to three sampler volumes using a vacuum pump (Gilian Air pump or equiavalent). During purging, helium will be used as a tracer gas to evaluate the potential for infiltration of outdoor air into the sample. Helium integrity testing will be performed on each subslab vapor extraction point following installation to confirm air tight seals around the slab penetration. Helium integrity testing will involve placing a plastic shroud over the newly installed extraction point and sealing all penetrations with hydrated bentonite or putty. New Teflon sample tubing will be connected to the sample point which will run out through the plastic shroud and it will be connected to a 0.5-liter Tedlar© bag via a peristaltic or Gillian air sampling pump. The Tedlar© bag will be analyzed in the field using a Marks Model 9822 helium detector to check for short circuiting of outside air into the sampling port. If helium is detected at a concentration of greater than 10 percent, the soil gas point will be resealed with hydrated bentonite. The point will then be retested to ensure that the helium gas concentration is less than 10 percent.

Following the purging period, each probe will be connected to an evacuated laboratory-supplied SUMMA® canister. SUMMA® canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laboratory. After connecting the SUMMA® canister to the soil gas probe, a regulator valve on the canister will be opened and the vacuum will slowly draw the sample into the canister over a period of 20 minutes. The samples will not be drawn at greater than 0.2 liters per minute. Quantitation limits for all analytes range between 1.6 ppbV and 4.0 ppbV, depending on the compound. After collecting the soil gas sample, the valve will be closed and disconnected from the soil gas probe. The soil-gas samples will be transported to a NYSDOH ELAP certified laboratory for TO-15 analysis.

When soil vapor samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

4.2 INDOOR AND BACKGROUND AIR SAMPLING

Indoor air samples will be collected in accordance with Section 2.7.3 of NYSDOH's VI Guidance document. GZA will collect one co-located indoor air sample in the vicinity of each subslab sample locations.

The indoor air sample will be collected using a laboratory supplied SUMMA© canister. The sampling duration reflect the exposure scenario being evaluated. GZA assumes, after full occupancy the buildings (330C and 338) will be operating for 24 hours. As a result, the indoor air samples will be collected over 24 hours sample collection time. The flow controllers for the SUMMA© canister will be set to collect it at 24-hour cycle. GZA personnel will ensure that SUMMA© canister flow regulators are turned off before the end pressure reaches zero.

Two background samples will be collected using laboratory supplied SUMMA© canisters. One sample will be collected upwind and one sample downwind of the respective building. A duplicate sample will also be collected at one of the background sample locations, as described below. Background samples will be placed in undisturbed locations adjacent to the respective building. The sample collection time will be 24-hours. GZA personnel will ensure that the SUMMA© canister flow regulators are turned off before the end pressure reaches zero.

4.3 QUALITY CONTROL SAMPLE COLLECTION

QC samples will include field duplicates.

Field duplicates are an additional aliquot of the same sample submitted for the same parameters as the original sample. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be collected by co-locating a second SUMMA® canister at one of the background air sampling locations. Field duplicates will be submitted at a frequency of one per 20 samples for all air samples.

4.4 SAMPLE PRESERVATION AND CONTAINERIZATION

The analytical laboratory will supply the sample containers for the chemical samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's Specifications and Guidance for Contaminant-Free Sample Containers. Certificates of analysis are provided with each bottle lot and maintained on file to document conformance to EPA specifications. The containers will be pre-preserved, where appropriate (see **Table 2**).

Table 3 presents a summary of QC sample preservation and container requirements.

4.5 EQUIPMENT DECONTAMINATION

Re-usable Teflon®, stainless steel, and aluminum sampling equipment shall be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface
- Tap water rinse
- Wash and scrub with Alconox and water mixture
- Tap water rinse
- Distilled/deionized water rinse
- Air dry

Cleaned equipment shall be wrapped in aluminum foil if not used immediately after air-drying.

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

5.1 SAMPLE COLLECTION DOCUMENTATION

5.1.1 Field Notes

Field team members will keep a field logbook to document all field activities. Field logbooks will provide the means of recording the chronology of data collection activities performed during the remediation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

The logbook will be a bound notebook with water-resistant pages. Logbook entries will be dated, legible, and contain accurate and inclusive documentation of the activity. The title page of each logbook should contain the following:

- Person to whom the logbook is assigned
- The logbook number
- Project name and number
- Site name and location
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark that is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook should include, but may not be limited to, the following:

- Chronology of activities, including entry and exit times
- Names of all people involved in sampling activities
- Level of personal protection used
- Any changes made to planned protocol
- Names of visitors to the site during sampling and reason for their visit
- Sample location and identification
- Changes in weather conditions
- Dates (month/day/year) and times (military) of sample collection

- Measurement equipment identification (model/manufacturer) and calibration information
- Sample collection methods and equipment
- Sample depths
- Whether grab or composite sample collected
- How sample composited, if applicable
- Sample description (color, odor, texture, etc.)
- Sample identification code
- Tests or analyses to be performed
- Sample preservation and storage conditions
- Equipment decontamination procedures
- QC sample collection
- Unusual observations
- Record of photographs
- Sketches or diagrams
- Signature of person recording the information

Field logbooks will be reviewed on a daily basis by the Field Team Leader. Logbooks will be supported by standardized forms.

5.1.2 Chain-of-Custody Records

Sample custody is discussed in detail in **Section 5.2** of this Plan. Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in **Section 5.2.2** of this Plan.

On a regular basis (daily or on such a basis that all holding times will be met), samples will be transferred to the custody of the respective laboratories, via third-party commercial carriers or via laboratory courier service. Sample packaging and shipping procedures, and field chain-of-custody procedures are described in **Section 5.2.1** of this Plan.

5.1.3 Sample Labeling

Immediately upon collection, each sample will be labeled with a pre-printed adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier.

A. The following identification scheme will be used:

Subslab soil vapor samples will be assigned sequential numbers. For soil vapor samples collected from the SVE wells, sample numbers will be assigned as follows:

SS-#

Indoor air samples will also be assigned sequential numbers, matching their co-located subslab soil vapor samples. For indoor air, samples will be assigned as follows:

IA-#

Background (ambient) air samples will be assigned sequential numbers. For background air, samples will be assigned as follows:

AA-#

Example:

Sample SS-4 = subslab soil vapor collected from location number 4.

Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

A. The analysis required will be indicated for each sample.

   Example: TO-15

C. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

   Example: 03-22-12

D. Time will be the time the sample was collected, using military time.

   Example: 14:30

E. The sampler's name will be printed in the "Sampled By" section.

An example sample label is presented below:

Job No:	XXXXXXXXX
Client:	Name
Sample No:	SS-01
Matrix:	Soil Vapor
Date Taken:	3/22/12
Time Taken:	14:30
Sampler:	B. Smith
Analysis:	TO-15

Job No._____
Client:_____
Sample Number_____
Date_____ Sample Time _____
Sample Matrix_____
Grab or Composite (explain)_____
Preservatives_____
Analyses_____
Sampler Signature_____

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples or the QEP.

5.2 SAMPLE CUSTODY

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample or evidence file is considered to be under a person's custody if:

- the item is in the actual possession of a person
- the item is in the view of the person after being in actual possession of the person
- the item was in the actual physical possession of the person but is locked up to prevent tampering
- the item is in a designated and identified secure area

5.2.1 Field Custody Procedures

Samples will be collected following the sampling procedures documented in **Section 4.0** of this Plan. Documentation of sample collection is described in **Section 5.1** of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures are intended to ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.
- All canisters will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample numbering system is presented in **Section 5.1.3** of this Plan.
- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.

- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.

- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.

- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. If third party commercial carriers are used for transfer to the laboratory, shipping containers will be secured with strapping tape and custody seals prior to shipment. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.

- If the samples are sent by third party commercial carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory courier or sample custodian, and signature of the laboratory courier or sample custodian on chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

5.2.2 Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact,

- Examine all sample containers for damage,

- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,

- Compare samples received against those listed on the chain-of-custody,

- Verify that sample holding times have not been exceeded,

- Examine all shipping records for accuracy and completeness,

- Determine sample pH (if applicable) and record on chain-of-custody forms,

- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,

- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the QEP,

- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

6.0 CALIBRATION PROCEDURES

6.1 FIELD INSTRUMENTS

Field instruments will be calibrated according to the manufacturer's specifications. Calibration procedures performed will be documented in the field logbook and will include the date/time of calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings.

6.2 LABORATORY INSTRUMENTS

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies (summarized in **Table 2** of this Plan). The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for this program. If site conditions were to warrant field analysis, the responsible contractor will prepare an addendum establishing the field analytical procedures. Analyses of all samples will be performed by NYSDOH ELAP certified laboratories. **Table 2** summarizes the analytical methods to be used during the remediation.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Appropriate QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation will be provided by the analytical laboratory.

For all analyses, the laboratory will report results that are below the laboratory's reporting limit; these results will be qualified as estimated (J) by the laboratory. The laboratory may be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses; this will be requested by the sampler on an as-needed basis. A Data Usability Summary Report (DUSR) will be prepared and will be included in the subsequent reports.

8.1 DATA EVALUATION/VALIDATION

8.1.1 Field Data Evaluation

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the Field Team Leader will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.
- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.
- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the Plan, and that any deviations were documented and approved by the appropriate personnel.

8.1.2 Data Usability

A Data Usability Summary Report (DUSR) will be prepared in accordance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

The data usability evaluation will include reviewing the quality assurance/quality control (QA/QC) information including: (1) chain-of-custody; (2) the summary QA/QC information provided by the laboratory; and (3) the project narrative.

For each data package the following questions will be evaluated:

- Is the data package complete as defined under the requirements for the NYSDEC ASP Category B, USEPA CLP deliverables or other standards/guidance?
- Have all holding times and preservation requirements been met?
- Do the quality control (QC) data fall within the laboratory and project established limits and specifications?

8.2 IDENTIFICATION AND TREATMENT OF OUTLIER

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Dixon's test for extreme observations is an easily computed procedure for determining whether a single very large or very small value is consistent with the remaining data. The one tailed t test for difference may also be used in this case. It should be noted that these tests are designed for testing a single value. If more than one outlier is suspected in the same data set, other statistical sources may be consulted and the most appropriate test of hypothesis will be used and documented, if warranted.

Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions. In many cases, two data sets may be reported, one including, and one excluding the outlier.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

9.0 INTERNAL QUALITY CONTROL

The subcontracting laboratories' Quality Assurance Project Plans will identify the supplemental internal analytical quality control procedures to be used. At a minimum, this will include:

- Laboratory control samples
- Instrument calibrations
- Instrument tunes for SW-846 8260B and 8270C and EPA Method TO-15 analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes for EPA Method TO-15 analyses
- Quantitation limit determination and confirmation by analysis of low-level calibration standard

Field quality control samples will include:

- Field duplicate samples as outlined in **Table 3**

10.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of the QEP. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the Plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or the Program Manager. The corrective action will usually involve recalculation, reanalysis, or resampling.

10.1 IMMEDIATE CORRECTIVE ACTION

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Plan), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The Field Team Leader will approve the corrective action and notify the Program Manager. The Program Manager will approve the corrective measure. The Field Team Leader will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field logbook. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals

No staff member will initiate corrective action without prior communication of findings through the proper channels.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the QEP will be notified. The QEP will notify the Program Manager, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to the Program Manager. If the corrective action does not rectify the situation, the laboratory will contact the Program Manager, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, the contractor will apply formalized long-term corrective action, if necessary.

Tables

TABLE 1

SOIL VAPOR CRITERIA TABLE

Quality Assurance Project Plan - Building 330C and 338 Air Sampling

2070 Route 52

Hopewell Junction, New York 12533

Volatile Organics Compounds in Air	CAS No.	NYSDOH Soil Vapor Intrusion Guidance Criteria[1]				Toxicity[2]	Decision Matrix[3]
		1	2	3	4		A, B or C
1,1,1-Trichloroethane	71556	2.5	20.6	-	-	L	B
1,1,2,2-Tetrachloroethane	79345	0.4	-	-	-	M	TD
1,1,2-Trichloroethane	79005	0.4	<1.5	-	-	H	TD
1,1-Dichloroethane	75343	0.4	<0.7	-	-	L	TD
1,1-Dichloroethene	75354	0.4	<1.4	-	-	M	A
1,2,4-Trichlorobenzene	120821	0.5	<6.8	-	-	NA	TD
1,2,4-Trimethylbenzene	95636	9.8	9.5	-	-	NA	TD
1,2-Dibromoethane	106934	0.4	<1.5	-	-	H	TD
1,2-Dichlorobenzene	95501	0.5	<1.2	-	-	M	TD
1,2-Dichloroethane	107062	0.4	<0.9	-	-	H	TD
1,2-Dichloropropane	78875	0.4	<1.6	-	-	M	TD
1,3,5-Trimethybenzene	108678	3.9	3.7	-	-	M	TD
1,3-Butadiene	106990	-	<3.0	-	-	H	TD
1,3-Dichlorobenzene	541731	0.5	<2.4	-	-	M	TD
1,4-Dichlorobenzene	106467	1.2	5.5	344	-	M	TD
1,4-Dioxane	123911	-	-	-	-	M	TD
2,2,4-Trimethylpentane	540841	5	-	-	-	M	TD
2-Butanone	78933	16	12	-	-	M	TD
2-Hexanone	591786	-	-	-	-	NA	TD
3-Chloropropene	107051	-	-	-	-	M	TD
4-Ethyltoluene	622968	-	3.6	-	-	NA	TD
4-Methyl-2-pentanone	108101	1.9	6	-	-	M	TD
Acetone	67641	115	98.9	45.8	-	L	TD
Benzene	71432	13	9.4	10	-	H	TD
Benzyl chloride	100447	-	<6.8	-	-	H	TD
Bromodichloromethane	75274	-	-	-	-	M	TD
Bromoform	75252	-	-	-	-	M	TD
Bromomethane	74839	0.5	<1.7	-	-	M	TD
Carbon disulfide	75150	-	4.2	-	-	M	TD
Carbon tetrachloride	56235	1.3	<1.3	1.1	-	H	A
Chlorobenzene	108907	0.4	<0.9	-	-	M	TD
Chloroethane	75003	0.4	<1.1	-	-	L	TD
Chloroform	67663	1.2	1.1	6.34	-	H	TD
Chloromethane	74873	4.2	3.7	-	-	M	TD
cis-1,2-Dichloroethene	156592	0.4	<1.9	-	-	M	A
cis-1,3-Dichloropropene	10061015	0.4	<2.3	-	-	NA	TD
Cyclohexane	110827	6.3	-	-	-	L	TD
Dibromochloromethane	124481	-	-	-	-	NA	TD

TABLE 1

SOIL VAPOR CRITERIA TABLE

Quality Assurance Project Plan - Building 330C and 338 Air Sampling

2070 Route 52

Hopewell Junction, New York 12533

Volatile Organics Compounds in Air	CAS No.	NYSDOH Soil Vapor Intrusion Guidance Criteria[1]				Toxicity[2]	Decision Matrix[3]
		1	2	3	4		A, B or C
Dichlorodifluoromethane	75718	10	16.5	-	-	NA	TD
Ethanol	64175	1300	210	-	-	L	TD
Ethyl Acetate	141786	-	5.4	-	-	M	TD
Ethylbenzene	100414	6.4	5.7	7.62	-	M	TD
Freon-113	76131	2.5	3.5	-	-	L	TD
Freon-114	76142	0.4	<6.8	-	-	NA	TD
Heptane	142825	18	-	-	-	M	TD
Hexachlorobutadiene	87683	0.5	<6.8	-	-	M	TD
Isopropanol	67630	-	-	-	-	M	TD
Methyl tert butyl ether	1634044	14	11.5	36	-	M	TD
Methylene chloride	75092	16	10	7.5	60	NA	B
n-Hexane	110543	14	10.2	-	-	M	TD
o-Xylene	95476	7.1	7.9	7.24	-	M	TD
p/m-Xylene	179601231	11	22.2	22.2	-	M	TD
Styrene	100-42-5	1.4	1.9	5.13	-	M	TD
Tertiary butyl Alcohol	75-65-0	-	-	-	-	NA	TD
Tetrachloroethene (PCE)	127184	2.5	15.9	6.01	30	H	B
Tetrahydrofuran	109999	0.8	-	-	-	M	TD
Toluene	108883	57	43	39.8	-	L	TD
trans-1,2-Dichloroethene	156605	-	-	-	-	NA	TD
trans-1,3-Dichloropropene	10061026	NC	<1.3	-	-	NA	TD
Trichloroethene	79016	0.5	4.2	1.36	2	H	A
Trichlorofluoromethane	75694	12	18.1	-	-	L	TD
Vinyl bromide	593602	-	-	-	-	H	TD
Vinyl chloride	75014	0.4	<1.9	-	-	H	C

Notes:

[1] NYSDOH Soil Vapor Intrusion Guidance Criteria (October 2006):

1: Table C-1 2003 Upper Fence Study of Volatile Organic Chemicals in air of Fuel Oil Heated Homes for Indoor Air

2: Table C-2 2001 USEPA BASE 90th Percentile for Indoor Air

3: Table C-5 2005 Health Effects Institute 95th Percentile for Indoor Air

4: NYSDOH Air Guidance Value (AGV)

[2] Toxicities from DAR-1 Appendix C/SCG/ACG

(H) HIGH Toxicity Contaminant.

(M) MODERATE Toxicity Contaminant.

(L) LOW Toxicity Contaminant.

[3] NYSDOH Soil Vapor Intrusion Decision Matrices (Updated May 2017)

Acronyms:

CAS - Chemical Abstracts Service

NA - Not applicable

TABLE 1

SOIL VAPOR CRITERIA TABLE

Quality Assurance Project Plan - Building 330C and 338 Air Sampling

2070 Route 52

Hopewell Junction, New York 12533

Volatile Organics Compounds in Air	CAS No.	NYSDOH Soil Vapor Intrusion Guidance Criteria[1]				Toxicity[2]	Decision Matrix[3]
		1	2	3	4		A, B or C

ND - Non-detect

NYSDOH - New York State Department of Health

TD - To be determined based on the NYSDOH Decision Matrices (Updated May 2017)

TABLE 2

ANALYTICAL PARAMETERS, METHODS, PRESERVATION, HOLDING TIME AND CONTAINER REQUIREMENTS

Quality Assurance Project Plan - Building 330C and 338 Air Sampling

2070 Route 52

Hopewell Junction, NY 12533

Sample Matrix	Analytical Parameters	Sample Type	No. of Samples[1]	EPA Analytical Method	Sample Preservation	Holding Time[2]	Sample Container
Soil Gas	VOCs	Grab	TBD	EPA Method TO-15	None	14 days to analysis	(1) Evacuated 6-Liter SUMMA® canister

Notes:

[1] Actual number of samples may vary depending on field conditions, sample material availability, and field observations. See Sloop Brewery SSDS Pilot Test Work Plan and Building 338 SVI Work Pan for estimates.

[2] Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times.

Acronyms:

EPA - Environmental Protection Agency

VOC - Volatile Organic Compound

TBD - To Be Determined

TABLE 3

TYPICAL LABORATORY DATA QUALITY OBJECTIVES

Quality Assurance Project Plan - Building 330C and 338 Air Sampling

2070 Route 52

Hopewell Junction, NY 12533

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs	EPA Method TO-15	Soil Gas	Surrogates % Rec.	Surrogates:	Matrix Duplicates	Matrix Duplicates
			4-Bromofluorobenzene 78-124	All samples, standards, QC samples	RPD £30	One per 20

Acronyms:

EPA - Environmental Protection Agency

RPD - Relative percent difference

VOC - Volatile Organic Compound

Appendix C

GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

1. CLIENT/SITE/PROJECT INFORMATION		
Client: i.Park84, LLC		
Site Address: Sloop Brewery/Building 338 areas, Former IBM East Fishkill Facility, 2070 Route 52, Hopewell Junction, NY		
Site Description (be sure to list pertinent site features, chemicals used at the facility, and other potential hazard sources): The areas are indoor spaces associated with a large industrial-zoned complex. The Site has a TCE/PCE plume in the groundwater that is being actively remediated by IBM via pump-and-treat methods. Indoor areas consist of both vacant and active spaces.		
Work Environment (active manufacturing, office, vacant site, undeveloped property, etc.): Work environment will consist entirely of indoor work. Work will be conducted throughout the indoor portions of the Sloop Brewery and Building 338. Sloop Brewery is an active brewery, open to the public and Building 338 is currently vacant.		
Job/Project #: 12.0076252.10	Estimated Start Date: 3/20/2019	Estimated Finish Date: 3/20/2020
Site is Covered by the Following Regulations:	OSHA HAZWOPER Standard ☒	Mine Safety and Health Administration ☐
	OSHA Construction Regulations ☐	

2. EMERGENCY INFORMATION		
Hospital Name: St. Lukes Cornwall Hospital		Hospital Phone: 845-561-4400
Hospital Address: 70 Dubois Street, Newburgh, NY 12550		Directions and Street Map Attached: ☒ Yes
Local Fire #: 911 or 845-226-1652	Local Ambulance #: 911 or	Local Police #: 911 or 845-221-2111
WorkCare Incident Intervention Services:	**For non-emergencies, if an employee becomes hurt or sick call 888-449-7787**	
Other Emergency Contact(s):	Meredith Hayes Work: 973-774-3332 Cell: 631-682-0632	
Site-Specific Emergency Preparedness/Response Procedures/Concerns: Conduct daily tailgate safety meetings.		

- All EHS Events (incidents, first aid, near misses, unsafe acts/conditions, fires, chemical spills, property damage, and extraordinary safe behaviors) must be reported immediately to the Project Manager, and within 24hours to the EHS Event Reporting Portal at http://www.kelleronline.com. Username gempl1 Password 4Incidents*, or to the GZA People-Based Safety iPhone app.
- In the event of a chemical release greater than 5 gallons, site personnel will evacuate the affected area and relocate to an upwind location. The GZA Field Safety Officer and client site representative shall be contacted immediately.
- Site work shall not be conducted during severe weather, including high winds and lightning. In the event of severe weather, stop work, lower any equipment (drill rigs), and evacuate the affected area.

3. SCOPE OF WORK	
General project description, and phase(s) or work to which this H&S Plan applies[1].	An SSDS pilot test will be conducted within the Sloop Brewery area. A soil vapor intrusion assessment will be conucted within Building 338.
Specific Tasks Performed by GZA:	GZA staff will conduct drilling operations through the slab, including 1 SVE well installed just below the slab and vapor monitoring point installations, if necessary. GZA will collect sub-slab and indoor air samples. GZA will also install permanent vapor monitoring points as necessary. GZA will also conduct the pilot test, which involves operating a shop-vac-type blower.
Concurrent Tasks to be Performed by GZA-hired Subcontractors (List Subcontractors by Name):	Sub-contractor will perform GPR within the Building areas to clear proposed locations.
Concurrent Tasks to be Performed by Others:	None

[1] Copy from or reference proposal or applicable design plan as appropriate.

Any OSHA PERMIT-REQUIRED CONFINED SPACE entry? ☐ YES ☒ NO IF YES, ADD CONFINED SPACE ENTRY PERMIT FOR THAT PORTION OF THE WORK	Any INDOOR fieldwork? ☒ YES ☐ NO IF YES, EXPLAIN:

4. SUB-SURFACE WORK, UNDERGROUND UTILITY LOCATION				
Will subsurface explorations be conducted as part of this work (drilling or excavation)?	☒ Yes ☐ No			
Will GZA personnel be required to use a hand-auger as part of this work?	☐ Yes ☒ No			
Site property ownership where underground explorations will be conducted on:	Public Access Property ☒ Yes ☐ No Private Property ☐ Yes ☒ No			
Have Necessary Underground Utility Notifications for Subsurface Work Been Made?	☐ Yes ☒ Yet to be conducted			
Specify Clearance Date & Time, Dig Safe Clearance I.D. #, And Other Relevant Information: The Client has provided GZA with a utility map, which is included in the sample location map. Prior to drilling operations, GZA will perform a visual recon of potential subsurface utilities and interview the Site manager.				
IMPORTANT! For subsurface work, prior to the initiation of ground penetrating activities, GZA personnel to assess whether the underground utility clearance (UUC) process has been completed in an manner that appears acceptable, based on participation/ confirmation by other responsible parties (utility companies, subcontractor, client, owner, etc.), for the following:				
Electric:	☐ Yes	☐ No	☐ NA	☐ Other_____
Fuel (gas, petroleum, steam):	☐ Yes	☐ No	☐ NA	☐ Other_____
Communication:	☐ Yes	☐ No	☐ NA	☐ Other_____
Water:	☐ Yes	☐ No	☐ NA	☐ Other_____
Sewer:	☐ Yes	☐ No	☐ NA	☐ Other_____
Other:_____	☐ Yes	☐ No	☐ NA	☐ Other_____
Comments:				

GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

5. HAZARD ASSESSMENT (CHECK ALL THAT APPLY AND ADDRESS EACH HAZARD IN SECTION 6)

A. GENERAL FIELDWORK HAZARDS

☐ Confined Space Entry (Add Confined Space Entry Permit)	☒ Overhead Hazards (i.e. falling objects, overhead power lines)
☐ Abandoned or vacant building/Enclosed Spaces	☒ Portable Hand Tools or Power Tools
☒ Significant Slip/Trip/Fall Hazards	☐ Significant Lifting or Ergonomic Hazards
☐ Unsanitary/Infectious Hazards	☐ Electrical Hazards (i.e. Equipment 120 Volts or Greater, Work Inside Electrical Panels, or Maintenance of Electrical Equipment)
☐ Poisonous Plants	☐ Other Stored energy Hazards (i.e. Equipment with High Pressure or Stored Chemicals)
☐ Biting/Stinging Insects	☐ Fire and/or Explosion Hazard
☐ Feral Animal Hazards	☒ Elevated Noise Levels
☐ Water/Wetlands Hazards	☐ Excavations/Test Pits
☐ Remote Locations/Navigation/Orientation hazards	☐ Explosives or Unexploded Ordinance/MEC
☐ Heavy Traffic or Work Alongside a Roadway	☐ Long Distance or Overnight Travel
☐ Weather-Related Hazards	☐ Personal Security or High Crime Area Hazards
☒ Motor vehicle operation Hazards	☐ Working Alone
☒ Heavy Equipment Hazards	☐ Ionizing Radiation or Non-Ionizing Radiation
☐ Structural Hazards (i.e. unsafe floors/stairways/roof)	☒ Chemical/Exposure Hazards (See Part B for Details)
☐ Demolition/Renovation	☐ Other:
☒ Presence of Pedestrians or the General Public	

B. CHEMICAL/EXPOSURE HAZARDS (CONTAMINANTS ARE CONTAINED IN X SOIL, WATER, GROUNDWATER)

☐ No chemical hazards anticipated	☐ Methane
☐ Hydrogen Sulfide (H2S)	☐ Chemicals Subject to OSHA Hazard Communication (attach Safety Data Sheet for each chemical GZA brings to the site)
☐ Cyanides, Hydrogen Cyanide (HCN)	☐ Containerized Waste, Chemicals in Piping & Process Equipment
☐ Carbon Monoxide	☐ Emissions from Gasoline-, Diesel-, Propane-fired Engine, Heater, Similar Equipment
☐ Herbicides, Pesticide, Fungicide, Animal Poisons	☒ General Work Site Airborne Dust Hazards
☒ Metals, Metal Compounds: RCRA 8	☒ Volatile Organic Compounds (VOCs), BTEX
☐ Corrosives, Acids, Caustics, Strong Irritants	☒ Chlorinated Organic Compounds
☒ Polychlorinated Biphenyls (PCBs)	☒ Fuel Oil, Gasoline, Petroleum Products, Waste Oil
☒ Polycyclic Aromatic Hydrocarbons (PAHs)	☐ Asbestos
☐ Compressed Gases	☐ Oxygen Deficiency, Asphyxiation Hazards
☐ Flammable/Combustible Liquids	☒ Other: Silica dust
☐ Radiation Hazards (i.e. radioactive sealed/open source, x-rays, ultra violet, infrared, radio-frequency, etc.)	

6. SITE-SPECIFIC OVERVIEW OF H&S HAZARDS/MITIGATIONS (NOTE: Based on Hazard Assessment, Section 5)

Describe the major hazards expected to be present at the jobsite, and describe the safety measures to be implemented for worker protection (refer to items checked in Section 5 above). Use brief abstract statements or more detailed narrative as may be appropriate.

ON-SITE HAZARDS:	HAZARD MITIGATIONS:
Task Hazard Analyses	01.01 – Drilling Observations, 04.07 – Sub Slab Vapor Sampling, 20.11 – Field Sampling

Slip, Trips, and Falls	Inspect work area prior to starting work. Mark out or remove any potential hazards. Keep work area tidy and walkways free of tools.
Soil Sampling/Chemical Hazards	Wear proper PPE, including nitrile gloves. Wash hands before eating and drinking.
General Public	When working near areas Site employees might be working around, use cones and be aware of the pedestrians that may be walking or working near the work area.
Motor Vehicle Operation Hazards	Be aware of motor vehicle operations in the work area. Cone off locations where working. Wear high-visiblity clothing.
Portable Hand/Power Tools	Make sure all tools are grounded prior to use. Ensure power tool operator is familiar with the equipment. Keep all guards in place. Wear correct apparel when operating any power tools, do not weat loose clothing or hand jewelry. Inspect electrical cords for damage prior to use.
Lifting	Wear proper footwear (Steel toed boots or equivalent). Lift from the hips and not with the back.
Airborne Dust/Silica Dust	During all activities where concrete will be drilled, utilize a HEPA-filtered vacuum attached to collect all generated airborne silica dust.
Elevated Noise Levels	Wear hearing protection during operation of rotary drill.

7. AIR MONITORING ACTION LEVELS – Make sure air monitoring instruments are in working order, calibrated before use, and 'bump-checked' periodically throughout the day and/or over multiple days of use

Is air monitoring to be performed for this project? Yes ☐ No ☒

ACTION LEVELS FOR VOCS AND PARTICULATE HAZARDS (Action levels apply to occupied work space in general work area)

☐ Applicable, See Below. ☒ Not Applicable

Parameter	Response Actions for Elevated Airborne Hazards
VOCs	N/A
Particulates	N/A

ACTION LEVELS FOR INHALATION OF TOXIC/HAZARDOUS SUBSTANCES (Action levels are for sustained breathing zone concentrations)

☐ Applicable, See Below. ☒ Not Applicable

Air Quality Parameters (Check all that apply)	Remain in Level D or Modified D	Response Actions for Elevated Airborne Hazards
☐ VOCs	0 to	From ppm to 25 ppm: Proceed to Level C, or Ventilate, or Discontinue Activities If greater than 25 ppm: Discontinue Activities and consult EHS Team
☐ Carbon Monoxide	0 to	At greater than ppm, exit area, provide adequate ventilation, proceed to Level B, or discontinue activities.
☐ Hydrogen Sulfide	0 to	At greater than ppm, exit area, provide adequate ventilation, proceed to Level B, or discontinue activities
☐ Dust	0 to	
☐	0 to	

SPECIAL INSTRUCTIONS/COMMENTS REGARDING AIR MONITORING (IF APPLICABLE)

8. HEALTH AND SAFETY EQUIPMENT AND CONTROLS

AIR MONITORING INSTRUMENTS

- ☐ PID Type: MiniRae Lite Lamp Energy: 10 eV
- ☐ FID Type:
- ☐ Carbon Monoxide Meter
- ☐ Hydrogen Sulfide Meter
- ☐ O_2/LEL Meter
- ☐ Particulate (Dust) Meter
- ☐ Calibration Gas Type isobutylene
- ☐ Others:

OTHER H&S EQUIPMENT & GEAR

- ☐ Fire Extinguisher
- ☒ Caution Tape
- ☒ Traffic Cones or Stanchions
- ☐ Warning Signs or Placards
- ☐ Decon Buckets, Brushes, etc.
- ☐ Portable Ground Fault Interrupter (GFI)
- ☐ Lockout/Tagout Equipment
- ☐ Ventilation Equipment
- ☐ Others:

PERSONAL PROTECTIVE EQUIPMENT

- ☐ Respirator – Type
- ☐ Respirator - Cartridge Type:
- ☒ Hardhat
- ☒ Outer Gloves Type: Nitrile
- ☐ Inner Gloves Type:
- ☒ Steel-toed boots/shoes
- ☐ Coveralls – Type
- ☐ Outer Boots – Type
- ☒ Eye Protection with side shields
- ☐ Face Shield
- ☒ Traffic Vest
- ☐ Personal Flotation Device (PFD)
- ☐ Fire Retardant Clothing
- ☐ EH (Electrical Hazard) Rated Boots, Gloves, etc.
- ☒ Noise/Hearing Protection
- ☐ Others:

Discuss/Clarify, as Appropriate:

9. H&S TRAINING/QUALIFICATIONS FOR FIELD PERSONNEL

- ☒ Project-Specific H&S Orientation (Required for All Projects/Staff)
- ☒ OSHA 40-Hour HAZWOPER/8 Hour Refreshers
- ☒ Hazard Communication (for project-specific chemical products)
- ☒ First Aid/CPR (required for HAZWOPER for at least one individual on site)
- ☒ Current Medical Clearance Letter (required for HAZWOPER)
- ☐ OSHA 10-hour Construction Safety Training
- ☐ Fall Protection Training
- ☐ Trenching & Excavation
- ☐ Lockout/Tagout Training
- ☐ Electrical Safety Training
- ☐ Bloodborne Pathogen Training
- ☐
- ☐
- ☐
- ☐
- ☐

Discuss/Clarify, as needed:

10. PERSONNEL AND EQUIPMENT DECONTAMINATION (SECTION ONLY REQUIRED FOR HAZWOPER SITES)

Describe personnel decontamination procedures for the project site, including "dry decon" (simple removal of PPE)	Perform dry decon as necessary.

11. PROJECT PERSONNEL - ROLES AND RESPONSIBILITIES

GZA ON-SITE PERSONNEL:

Name(s)	Project Title/Assigned Role	Telephone Numbers
Ben Romagnoli	Site Supervisor	Work: 973-774-3341 Cell: 315-382-6774
Ben Romagnoli	Field Safety Officer	Work: 973-774-3341

		Cell: 315-382-6774
Ben Romagnoli	First Aid Personnel	Work: 973-774-3341 Cell: 315-382-6774
Ben Romagnoli	GZA Project Team Members	Work: 973-774-3341 Cell: 315-382-6774

Site Supervisors and Project Managers (SS/PM): Responsibility for compliance with GZA Health and Safety programs, policies, procedures and applicable laws and regulations is shared by all GZA management and supervisory personnel. This includes the need for effective oversight and supervision of project staff necessary to control the Health and Safety aspects of GZA on-site activities.

Field Safety Officer (FSO): The FSO is responsible for implementation of the Site Specific Health and Safety Plan.

First Aid Personnel: At least one individual designated by GZA who has current training and certification in basic first aid and cardiopulmonary resuscitation (CPR) must be present during on-site activities involving multiple GZA personnel at HAZWOPER sites.

GZA Project Team: Follow instructions relayed by the HASP and GZA manager on-site.

OTHER PROJECT PERSONNEL:

Name	Project Title/Assigned Role	Telephone Numbers
David Winslow	Principal-in-Charge	Work: 973-774-3307 Cell: 347-242-7107
Meredith Hayes	Project Manager	Work: 973-774-3332 Cell: 631-682-0632
Lauren Schoenemann	Health and Safety Coordinator (HSC)	Work: 973-774-3308 Cell: 201-274-4622
Richard Ecord	GZA EHS Director	Work: 781-278-3809 Cell: 404-234-2834

Principal-in-Charge: Responsible of overall project oversight, including responsibility for Health and Safety.

Project Manager: Responsible for day-to-day project management, including Health and Safety.

Health and Safety Coordinator: General Health and Safety guidance and assistance.

GZA EHS Director: H &S technical and regulatory guidance, assistance regarding GZA H&S policies and procedures.

12. PLAN ACKNOWLEDGEMENT AND APPROVALS

GZA Project Site Worker Plan Acknowledgement

I have read, understood, and agree to abide by the information set forth in this Safety and Accident Prevention Plan. I will follow guidance in this plan and in the GZA Health and Safety Program Manual. I understand the training and medical monitoring requirements covered by the work outlined in this plan and have met those requirements.

GZA Employee Name	GZA Employee Signature	Date

Subcontractor Site Worker Plan Acknowledgement

GZA has prepared this plan solely for the purpose of protecting the health and safety of GZA employees. Subcontractors, visitors, and others at the site must refer to their organization's health and safety program or site-specific HASP for their protection. Subcontractor employees may use this plan for general informational purposes only. Subcontractor firms are obligated to comply with safety regulations applicable to their work, and understand this plan covers GZA activities only.

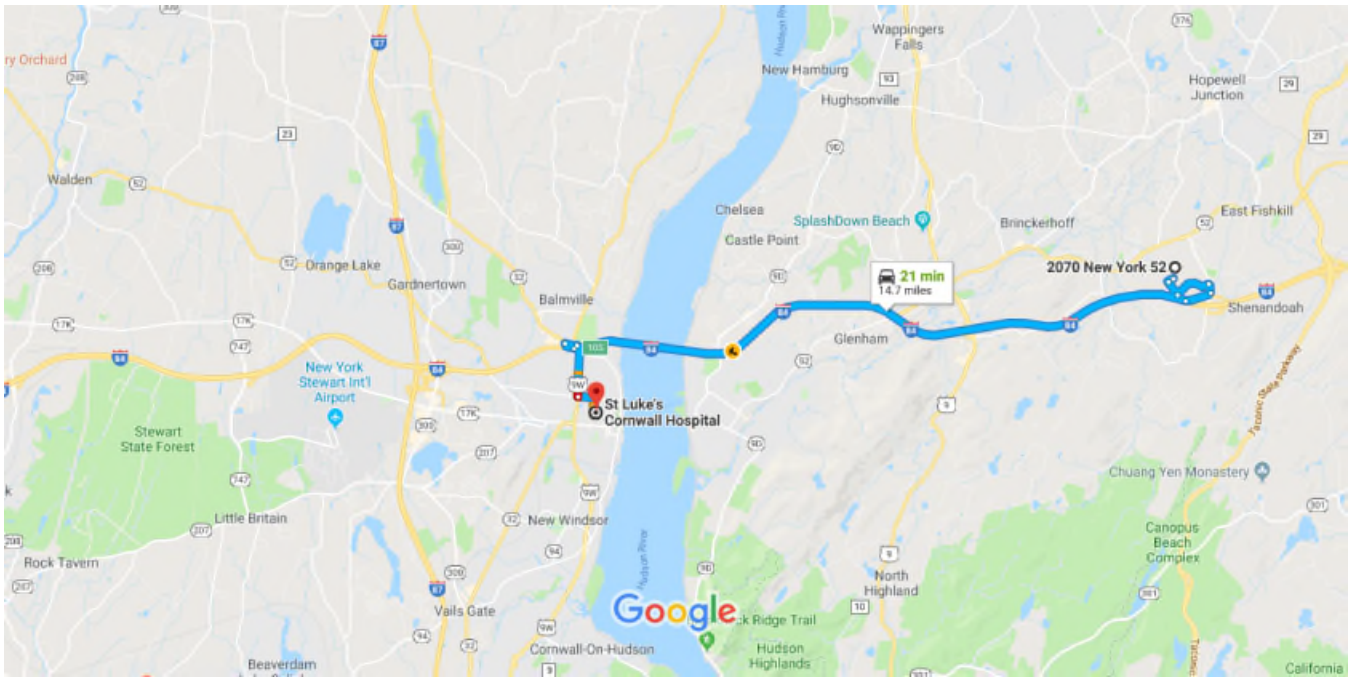
Subcontractor Employee Name	Subcontractor Employee Signatures	Date

GZA HASP Approval Signatures		
The following individuals indicate their acknowledgement and/or approval of the contents of this Site Specific H&S Plan based on their understanding of project work activities, associated hazards and the appropriateness of health and safety measures to be implemented. A signed copy of this document must be present at the project site at all times work is being performed.		
GZA Author/Reviewer Role	Signature	Date
HASP Preparer		**3/14/19**
EHS Reviewer		**3/16/19**
Principal in Charge		**3/14/19**

Google Maps

2070 NY-52, Hopewell Junction, NY to St Luke's Cornwall Hospital

Drive 14.7 miles, 21 min



Map data ©2019 Google 2 mi

2070 NY-52

Hopewell Junction, NY 12533

Get on I-84 from South Dr

3 min (1.7 mi)

1. Head southwest on Development Dr toward West Dr
   Restricted usage road

0.1 mi

2. Turn left onto West Dr
   Restricted usage road

0.3 mi

3. Turn left onto South Dr
   Restricted usage road

0.6 mi

4. Turn right onto Lime Kiln Rd
   Partial restricted usage road

0.2 mi

5. Use the right 2 lanes to take the I-84 W ramp

0.5 mi

Follow I-84 to NY-32 S/N Plank Rd in Balmville. Take exit 10S from I-84

11 min (11.3 mi)

6. Merge onto I-84

11.1 mi

7. Take exit 10S for NY-32 toward US-9W S/Newburgh

0.2 mi

Take US-9W S/Robinson Ave and Dubois St to your destination in Newburgh

6 min (1.7 mi)

8. Turn right onto NY-32 S/N Plank Rd (signs for Route 9w S)

0.2 mi

9. Use the right 2 lanes to turn right onto US-9W S/Robinson Ave

0.9 mi

10. Turn left onto South St

0.3 mi

11. Turn right onto Dubois St

0.3 mi

12. Turn left

246 ft

13. Turn left

Destination will be on the left

125 ft

St Luke's Cornwall Hospital

70 Dubois St, Newburgh, NY 12550

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Review Related THA's – 21.1 – General Outdoor Field Work		
Observation of Deploying of Traffic Protection Equipment by Drilling Contractor (e.g., cones, signs, etc.)	Personal injury due to vehicle traffic, Collisions, injuries	Wear high visibility vest at all times when out of vehicle.
		Park in designated parking locations or select off-road areas that are firm and free of hazards. Directly inspect parking location on foot if necessary.
		Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking personal or GZA vehicle and/or equipment.
		If parking outside of a designated parking area, demarcate vehicle with traffic cones or equivalent.
		Use emergency flashers or other appropriate vehicle warning system when placing equipment.
		Observe if police detail or other required traffic control system (if necessary) is in place.
		Stay within the confines of the work area and do not venture outside of the demarcated work area into traffic.
		If you observe that contractor may back into structures, vehicles, fences, etc., notify contractor immediately with pre-determined signals. Do not cross the path of the heavy equipment.
		Stand clear of moving Drill Rig.
Observation of Mobilizing Drill Rig To Job Site and positioning at borehole by Drilling Contractor	Struck by drill rig	Before drilling begins, confirm that drill rig has been parked properly and securely by the drilling contractor.
		Wear high visibility vests. Make sure that the driver can see you and is aware of your location at all times.
		Inform the driller if it is observed that the rig is being moved with the mast raised and/or tools and other equipment on the rig are not secured and can fall over and potentially hurt personnel.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
	Overhead utility	Look overhead to assess if any utilities are present and confirm with driller that they are aware of the overhead utility location and to take appropriate actions to prevent contact with the overhead utilities and to minimize any arc flash hazards. Review GZA's Electrical Safe Work Practices Program 03-3003.
Observation of drilling operations and monitoring well installations	Underground utilities	Confirm that underground utility clearance procedures have been completed in accordance with GZA Policy # 04-0301 *Responsibility for Utility Clearance of Exploration Locations* for clearing utility locations prior
	Moving machinery, rotating parts, cables, ropes, etc.	Do not wear loose fitting clothing.
		All GZA personnel working in proximity to a drill rig will be familiarized with the location and operation of emergency kill switches prior to equipment start-up. Maintain safe distance from rotating auger, drill casing, rods and cathead at all times. Observe operations from a safe distance. Persons shall not pass under or over a moving stem or auger Check that "kill" switches are present and working. Confirm with driller that daily inspection of rig has been performed prior to commencing work and no conditions were noted with the rig that would affect its proper operation.
		Do not touch or operate or assist with any rig operations and maintenance work.
		Make eye contact with operator before approaching equipment.
		Be alert and take proper precautions regarding slippery ground surfaces and similar hazards near rotating auger.
		Do not engage the driller or helper when drill is in operation. Work out prearranged signals to get their attention before approaching them.
		Confirm prior to drilling operations that driller and helper communicate and coordinate their actions and movements.
		GZA personnel are not allowed to be on the drill rig or operate a rig.

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Wear steel toed boots, hardhat and side-shielding safety glasses/goggles.
	Falling objects, debris	Stand clear of stacked drill rods. If stack appears unstable inform driller.
	Noise	Wear appropriate hearing protection.
	Roadway/traffic hazards	Be alert at all times; never step outside traffic cones.
		Wear high visibility vests at all times.
		Be familiar with escape routes at each location.
		Follow project Traffic Control Plan. Be alert at all times and never step outside the traffic cones. Use a Police detail when necessary.
	Slips, trips and falls	Maintain clean and sanitary work area free of tripping/slipping hazards.
		All borings, excavations, or partially completed groundwater monitoring wells will be adequately covered and/or barricaded if left unattended for any period of time to prevent injury.
		Store any hand tools used for sampling in their proper storage location when not in use.
		Provide adequate space for each employee to work safely with sound footing.
		Do not perform work if adequate lighting is not available.
		Maintain an exit pathway away from the rig at all times.
	Cuts, bruises, shocks, lacerations, sprains and strains during tool use	When working with a driller, do not assist the drilling crew with their work.
		Use properly maintained tools; do not use damaged tools.
		Wear the proper Personal Protective Equipment based on the task being performed.
		Store and carry tools correctly.
		Use the correct tool for the job.
		Do not use electrical tools with damaged cords or other electrical components.
		Observe proper electrical safety practices. Do not use electrical tools in wet areas.
		Coordinate activities with driller. Allow driller to open sampling equipment (i.e., split spoons, Geoprobe sleeves, etc.)
	Fire hazards	Be familiar with emergency procedures and where fire extinguishers are present on site.

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Inform GZA subcontractor if you observe improper storage of used rags and unsafe storage of flammable/combustible liquids brought on site.
		GZA and its subcontractors, suppliers and vendors shall not smoke in the work area in GZA project sites. Smoking can only be in designated smoking areas away from work areas and potential fire hazard locations.
		Confirm with driller that a fire extinguisher present with rig and will be available at all times and that inspection tag is not expired.
		If driller is welding or cutting on site confirm there are no flammables or combustible materials near the vicinity of welding machines or torches (such as debris, fuels, grass/weeds, etc.). Review Site requirements for obtaining "Hot Work Permit".
		Stand well clear of welding/cutting/burning areas.
		When drilling activities encounter the presence of gas or electric, the drill crew shall immediately curtail drilling activity, shut down the drill rig and contact the Project Manager.
	Exposure to Hazardous Substances/Chemicals	Become familiar with hazards associated with hazardous commercial products used in drilling (fuels, silica sand, grout, cement, bentonite, etc.). Review Safety Data Sheets (SDSs) for such products and participate in daily safety tailgate meetings.
		Do not handle drilling chemicals.
		Wear appropriate personal protective equipment.
		Review hazards of chemicals that may have been used or currently are being used on site.
		Refer to the site specific HASP for chemical hazards and the necessary precautions required for sampling.
		Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Assess whether procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate air monitoring, personal protective clothing and respiratory protection, as needed. If contamination is identified at the Site only personnel trained and medically qualified to work on hazardous sites will be permitted to proceed with the work.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling		
Analysis By: Andrew Whitsitt	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: October 2, 2011 **Revised: June 14, 2012**	**Date: June 14, 2012**	**Date: June 26, 2012**

Task 4.1
DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Sampling Soil	Exposure to chemicals	Refer to the site specific HASP for chemical hazards and the necessary precautions required for sampling.
		Understand potential hazards associated with handling sample collection preservatives.
		Review and have SDS available for chemicals being brought on site, including that of sample preservatives.
		Wear appropriate PPE identified in the HASP
		Wash hands before eating and drinking. Eating and drinking are prohibited in areas of soil contamination/work area.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Sub-Slab Vapor Sampling		
Analysis By: Guy Dalton	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: September 29, 2011 **Revised: June 22, 2012**	**Date: June 22, 2012**	**Date: June 26, 2012**

Task 4.7
Sub-Slab Vapor Sampling

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Review Related THA's – 4.1 Drilling Observations, Monitoring Well Installation Observations and Soil Sampling 4.5 Soil-Gas Sampling 4.6 Temporary/Permanent Sampling Equipment Operation 21.1 General Outdoor Field Work NOTE - As a sampling THA, this THA assumes the subsurface vapor sampling well(s) or port(s) have already been installed.		
Screening Work Zone Atmosphere	Exposure to Hazardous Substances	Review site specific Health and Safety Plan and implement work practices and procedures specified.
		Monitor breathing air in work zone for hazardous atmospheres (e.g., low oxygen, elevated VOCs, H_2S, CO, etc.) and do not proceed unless it is determined that no hazardous conditions exist.
		Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Procedures and contingencies must be in place for characterizing hazards and protecting workers by use of appropriate personal protective clothing and respiratory protection, as needed.
		Wash hands prior to eating or drinking.
	Working Alone	If working alone on site, sign out or call into the office to leave site specific information where you are working, the anticipated duration/hours of work on site. Do this for each site if multiple in one day. Review GZA's *Working Alone* Policy 03-1009.
		Call office when off site.
		Store hand tools in their proper storage location when not in use.
	Slips, trips and falls	Provide adequate space for each employee to work safely with sound footing.
		Provide adequate lighting.
Constructing Sampling Train	Electrical shocks, cuts, bruises, from Tool-Related use	Do not use electrical tools with damaged cords or other electrical components.
		Observe proper electrical safety practices. Review GZA's Electrical Safe Work Practices Program 03-3003

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Sub-Slab Vapor Sampling		
Analysis By: Guy Dalton	**Reviewed By: Guy Dalton**	**Approved By: Jayanti Chatterjee , CIH**
Date: September 29, 2011 **Revised: June 22, 2012**	**Date: June 22, 2012**	**Date: June 26, 2012**

Task 4.7
Sub-Slab Vapor Sampling

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
		Tools must be properly maintained; do not use damaged tools.
		Wear proper Personal Protective Equipment.
		Store and carry tools correctly.
		Use the correct tool for the job.
		Protect “off hand” from gouges, hammer blows, cutting tools, etc. Position your “off hand” to prevent injury in case of slip of the tool.
		If using 12-volt DC pump to purge sampling train, inspect power cord and battery terminal connectors, which must be free of defects or damage.
		If using 120-volt AC pump to purge sampling train, verify that the ground fault circuit interrupter (GFCI) is functioning properly and cords and connectors are free of defects
Evaluating Leaks in Sampling Train	Working with Pressurized Cylinders (Helium)	Use caution when screwing in pressure regulator and valve (if this wasn’t already done by the helium vendor). Take care not to hit the regulator and valve once it is installed and do not drop the cylinder. Cylinder should remain on the ground surface at all times or (ideally) fixed to a cylinder dolly.

GZA GEOENVIRONMENTAL, INC.
JOB HAZARD ANALYSIS WORKSHEET

Job: Field Sampling

Analysis By: Christie Wagner	**Reviewed By: Jayanti Chatterjee, CIH**	**Approved By: Jayanti Chatterjee, CIH**
Date: November 4, 2011 **Revised: July 12, 2012**	**Date: July 12, 2012**	**Date: July 12, 2012**

Task 20.11
Field Sampling

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Review Related THA's – 21.1 General Outdoor Field Work		
Pre work task for site visit	Adverse Weather Conditions	Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.
		Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).
		Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.
		Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.
Conduct visual inspection of site	Dangerous Terrain	Be aware of the site terrain, watch for holes and rocks that can be tripping hazards
		Learn to identify and watch for plants such as thorn bushes and poision ivy that can either scratch you or give you a rash.
Collecting sample	Muscle strain from lifting heavy objects	Use proper lifting techniques. Use appropriate mechanical assistance and tools when possible. Wear work gloves and steel toed boots.
	Exposure to unknown sample	Be sure to treat effluent samples as unknowns and wear the proper PPE.
		If there are any unusual odors/fumes coming from a sample, especially those that cause reactions in the eyes or nose, leave the area and inform a supervisor immediately.

GZA GeoEnvironmental, Inc.