Site Management Plan Template

Instructions to NYSDEC Project Manager

The NYSDEC Project Manager may delete or indicate as "Not Applicable" sections of this template that do not apply to a specific site before sending it to the Remedial Party. Alternatively, non-applicable sections may be identified in scoping discussions.

Instructions to Remedial Party / Remedial Party Consultant

This document is a template for development of a Site Management Plan (SMP) for remedial projects performed under the management of NYSDEC, Division of Environmental Remediation. This document is intended to expedite development of a site-specific SMP. By providing format and general content guidelines, this template is designed to provide instruction on the format and content required for agency approval; shorten the document preparation time by remedial parties; improve the quality of draft SMP submittals; shorten the review time by NYSDEC; and streamline the process for SMP approval by NYSDEC. This is a generic and non-site-specific document that does not address all possible health or environmental issues of concern to NYSDEC or NYSDOH. It is provided as a supplement to NYSDEC's DER-10 and is not a substitute for the agency review and comment process.

For many sites, portions of the text or entire sections of this template, may not be applicable and should be deleted or indicated as "Not Applicable". Remedial parties should use their best judgment in determining which components of this template are relevant to the site. Many of the sections require that summaries of information from previous documents (e.g., investigation reports, final engineering reports, etc.) be incorporated. The purpose of summarizing this information in this document is to provide a single, concise resource for future owners or site workers to understand the remedial history and nature of site contamination. The emphasis should be on the contamination that remains. The reader should be able to clearly understand the sites remedial history and nature and extent of the contamination remaining in the various environmental media (and perhaps building materials), as well as the corresponding potential human exposure pathways, that are being addressed by the SMP.

This template may also be used to develop an Interim Site Management Plan, through which an interim remedial measure or operable unit is monitored, operated and/or maintained before the remedy for the entire site is complete. In this case, the document should be titled and introduced as an interim plan.

This document contains blue text, green text and highlighted bracketed items. Blue text indicates text that is generally acceptable to NYSDEC for use in the site-specific SMP. While it must be applied to each site in a manner that is suitable for site-specific conditions, use of this blue text with minimal changes will generally facilitate the timely acceptance of the SMP by NYSDEC. Green text provides guidance on the recommended content in each of the specific sections of the SMP **and should be deleted from this template** prior

to submittal. Items highlighted in blue brackets are variable and should be entered in a clear, self-explanatory manner, specific to each case.

It is strongly recommended that the draft SMP submittal to NYSDEC adhere to the following conventions:

- Retain the original blue text color for all blue text that is not changed.
- Use black text for all new text, including any changes to blue text.
- Delete all green text.
- Remove highlights.
- Use track changes redline/strikeout method for all removal and replacement of blue text.
- Submit the redline/strikeout document (with blue text strikeouts in the text and not in the margins) along with a clean copy of the draft SMP to the NYSDEC.

While this approach is not mandatory, it should significantly reduce the review time required by NYSDEC staff and expedite approval of the document.

The following template is a working document and may be modified and improved periodically. Comments and suggestions for improvement are welcome. It is recommended that the remedial party contact the NYSDEC's project manager prior to initiating the preparation of the SMP to ensure the use of the most recent version of this template.

124-22 Queens Boulevard

KEW GARDENS, NEW YORK 11415

SITE MANAGEMENT PLAN

NYSDEC Site Number: C241177

Prepared for:

Luciano LLC

25 Aldgate Drive East

Manhassett, New York 11030

Prepared by:

P.W. Grosser Consulting Engineer & Hydrogeologist, PC

630 Johnson Avenue, Suite 7

Bohemia, New York 11716

631-589-6353

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

NOVEMBER 2020

CERTIFICATION STATEMENT

I , Paul K. Boyce, certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

Paul K Boyce, PE

NYS PE License Number: 074604

November 6, 2020

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124-22 Queens Boulevard

Kew Gardens, New York 11415

SITE MANAGEMENT PLAN

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List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines

SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

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Site Identification: C241177: 124-22 Queens Blvd. Kew Gardens, NY

Institutional Controls:	1. The property may be used for restricted residential use	
Engineering Controls:	1. Cover system with vapor barrier	
	SSDS, SVE System	
Inspections:		Frequency
1. Cover inspection		Annually
Monitoring:		
1. SVE System, SSDS		Quarterly
2. Groundwater Monitoring Wells (Pre ISCO Activity)		Quarterly
3. Groundwater Monitoring Wells (Post ISCO Activity)		Annually
Maintenance:		
2. Blower maintenance		Annually/As Necessary
Reporting:		
1. Treatment System Data and Groundwater Monitoring		Quarterly
2. Periodic Review Report		Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 124-22 Queens Boulevard Site located in Kew Gardens, New York (hereinafter referred to as the "Site"). See **Figure 1**. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. 241177 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Luciano LLC. entered into a Brownfield Cleanup Agreement (BCA) as a volunteer on January 20, 2016 with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in **Figure 2**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in **Appendix D**.

After completion of the remedial work, some residual contamination was remaining at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Queens County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a

violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in **Appendix A** of this SMP.

This SMP was prepared by PW Grosser Consulting Inc.,(PWGC) on behalf of Luciano, LLC in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated June 2020, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.

- 7-day advance notice of any field activity associated with the remedial program.

- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.

- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA, and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix C**.

Table 1: Notifications*

Name	Contact Information
Sadique Ahmed, PE	518-402-9656 Sadique.ahmed@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Kew Gardens, Queens County, New York and is identified as Block 3359 and Lot 21on the New York City Tax Map (see **Figure 3**). The site is an approximately 0.18-acre area and is bounded by a commercial site currently undergoing redevelopment to the north, Queens Boulevard and the subgrade Metropolitan Transit Authority (MTA) E and F train lines to the east with an 8 story government building across Queens Boulevard, an eight-story mixed-use building to the east, and a 20-story hotel building to the west (see **Figure 2**).

The boundaries of the site are more fully described in **Appendix D** –Environmental Easement. The owner of the site parcel at the time of issuance of this SMP is Luciano LLC.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a 13 story mixed-use building with a basement level parking garage. The Site is zoned restricted residential and is currently in the final stages of construction and there are currently no occupants.

The properties adjoining the Site and, in the neighborhood, surrounding the Site primarily include commercial and residential properties. The properties immediately south of the Site include commercial and residential properties; the properties immediately north of the Site include government properties and Queens Boulevard; the properties immediately east of the Site include commercial and residential properties; and the properties to the west of the Site include commercial and residential properties.

2.2.2 Geology and Hydrology

The elevation of the Site is approximately 87 feet above mean sea level. Historical fire insurance maps from as early as 1914 indicate that a pond was situated at the

Site. Delineation sampling during the current investigation found evidence of the depositional environment of the pond.

Onsite soil stratigraphy consisted of coarse-grained sand with mottled orange-gray low plasticity silt along the western boundary of the Site, which is proximate to a steep slope further west. The elevation change of the area indicates that the western property boundary may be the margins of a pond. The mottled silt is also indicative of a lithology experiencing fluctuations in aerobic conditions, which was observed to the west. This is also indicative of a temporal change in the saturation state of soil, which could result from daily or seasonal water table fluctuations. The scarcity of fine-grained material in portions of the western boundary indicates a different depositional environment than the rest of the Site.

A greater amount of fine-grained material indicative of a low energy water body was observed from the central portion of the Site to the east. Black organic low plasticity silt characteristic of biologic activity was present below an inorganic silt and clay layer. Willow Lake approximately 0.4 miles to the north-northwest and Meadow Lake are modern man-made lakes within a former tidal channel that was supplied by Flushing Bay via Flushing Creek. The occurrence of a former pond at the Site may be an extension of the tidally influenced drainage channels to the north. The current elevation of the land surface is probably the result of grading activities.

The USDA Web Soil Survey indicates that two soil types are primarily present at the Site, Urban land-Greenbelt complex and Urban land-till substratum. Identified towards the western portion of the site, is the Urban land-Greenbelt complex and to the east is the Urban land, till substratum. The predominant soil type is classified as Urban Land-till substratum, which consists of cemented material from 0 to 15 inches and is underlain typically by gravelly sandy loam to 79 inches in the vicinity of the Site. The Greenbelt complex and similar soils are 12 percent of the identified map unit, Urban land-Greenbelt complex. The Greenbelt complex is characterized by loam from 0 to 30 inches underlain by sandy loam to 79 inches. The USDA Web Soil Survey was accessed to compile the USDA soil characteristics at https://www.websoilsurvey.nrcs.usda.gov.

Soil boring logs installed during the Remedial Investigation revealed generally silty sand underlain by a lens of fine-grained material consisting predominantly of low plasticity

silt and high plasticity clay. High plasticity clay was observed as shallow as seven feet bgs in one soil boring (SB-8). Organic material underlies the majority of the low plasticity silt and high plasticity clay lenses.

The soil samples observed less than 15 feet bgs are characteristic of lacustrine-derived (lake) deposits. The general contours of the fine-grained material appear to slope downward towards the northeast, which can be interpreted as the contours of the pond formerly situated at the Site. Evidence of intermittent periods of aerobic conditions in a saturated environment as evidenced by an orange-gray mottled silt was encountered in soil borings towards the western portion of the site, which further supports an aquatic depositional setting.

Along the western side of the Site, fine-grain material was scarce, and sediments generally consisted of coarse sands with little silt content indicative of a higher energy depositional setting. The soil boring installed for monitoring well MW-1 contained poorly graded sand, which transitioned to silty sand and was underlain by poorly graded sand of the Upper glacial aquifer formation to the depth of exploration of 80 feet bgs.

According to the USGS Long Island Depth to Water Viewer (March-April 2006), groundwater is expected to be present at approximately 67 feet bgs. Groundwater monitoring conducted by P.W. Grosser Consulting, Inc. (PW Grosser) on August 10, 2018 identified depth to water in the six onsite monitoring wells ranging from 55.35 feet bgs in MW-1 to 68.22 feet bgs in MW-6. A survey of top of casing elevations confirmed that groundwater flow was in a northeasterly direction.

Site specific boring logs are provided in **Appendix E**. A groundwater contour map is shown in **Figure** 4 illustrating groundwater flow direction to the northeast. Groundwater monitoring well construction logs, which include groundwater elevation data, are provided in **Appendix E**.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

ACT Phase I ESA – MARCH 2015

The Phase I ESA prepared by ACT for the Site dated March 23, 2015 identified the following Recognized Environmental Conditions (RECs):

- A portion of the site has been occupied by a drycleaner from at least 1986 through the present.

Based on this REC, ACT recommended that soil vapor sampling be performed at the Site to evaluate whether a vapor encroachment condition exists at the subject property.
The Phase I ESA Report was submitted to NYSDEC with the BCP application and is included as Appendix F.

SOIL VAPOR INTRUSION STUDY – APRIL 2015

Based on the findings of a Phase I ESA, ACT performed a Soil Vapor Intrusion (SVI) Study which was documented in their April 14, 2015 letter report. The scope of work included the collection and analysis of four sub-slab soil vapor samples from within the building. Soil vapor samples were analyzed for volatile organic compounds (VOCs) by United States Department of Environmental Conservation (USEPA) Method TO-15. Sample results were compared to sub-slab vapor / indoor air matrices specified in New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006).

Sub-slab vapor samples exceeded the NYSDOH Soil Vapor / Indoor Air Matrix screening levels for tetrachloroethene (PCE; 240,000 µg/m^3 in SS-2) and trichloroethene (TCE; 1,500 µg/m^3, in SS-2). SS-2 was collected adjacent to the dry-cleaning machine.

Indoor air samples were not collected. However, sub-slab tetrachloroethene (PCE) concentrations exceeded 1,000 µg/m^3 in each of the four soil vapor samples collected. Regardless of indoor air concentrations, PCE concentrations in soil vapor exceeding 1,000 µg/m^3 fall within the mitigation range of NYSDOH Soil Vapor / Indoor Air Matrix B.

Based on the findings of the SVI Study, ACT recommended that a sub-slab depressurization system (SSDS) be installed at the Site, and that the Site be entered into the BCP.

SUBSURFACE INVESTIGATION REPORT – JULY 2015

Based on the findings of the ACT SVI Study dated July 28, 2015, ACT performed a subsurface investigation (SSI) at the site in July 2015 to delineate the extent of subsurface soil impact. The scope of work included the collection and analysis of soil samples from three soil borings installed within the building, in the vicinity of the dry-cleaning equipment. At each boring location, a shallow soil sample (0 to 2 feet bgs) and deep soil sample (up to 10 to 11 feet bgs) were collected. Soil samples were analyzed for VOCs by USEPA Method 8260 and compared to the UUSCOs.

PCE was detected at concentrations exceeding the UUSCO of 1.3 ppm in each of the shallow (0 to 2 feet bgs) soil samples collected. PCE concentrations in these samples ranged from 7.2 ppm to 82 ppm. PCE concentrations in the deep soil samples collected were significantly lower (maximum concentration of 0.096 ppm), and did not exceed the UUSCO. Low concentrations of several other VOCs were detected in soil samples collected from the Site. However, PCE was the only compound detected above the UUSCO.

REMEDIAL INVESTIGATION REPORT – DECEMBER 2018

The Remedial Investigation (RI) was conducted by ACT and included the installation, screening, and sampling of twenty-five (25) soil borings, eight (8) soil vapor probes, and six (6) groundwater monitoring wells at the Site.

An alphanumeric grid system was set up to track the locations of all sampling performed at the site. The grid system consists of ten-foot spacings along the northwest and southwest site boundary. Letters were marked on building walls along the northwest boundary and numbers along the southwest boundary.

Soil borings were advanced utilizing a truck-mounted AMS Powerprobe 9600 direct-push drill rig, a Fraste XL Max sonic drill rig and a portable Geoprobe drill rig. The soil borings were installed utilizing four or five-foot Macrocore soil samplers with dedicated disposable acetate liners to collect continuous soil cores from ground surface to the terminal depth of each soil boring. A sonic drill rig was utilized to collect soil samples from soil borings for monitoring wells MW-1 through MW-6, with the exception of MW-

2, at which soil boring IW-8 was installed and sampled adjacent to the well. Core samples with a diameter of 3 inches were continuously retrieved from ground surface to 80 feet bgs and placed in dedicated sleeves for classification and screening.

Soil samples were screened with a portable Photoionization Detector (PID) to measure concentrations of VOCs. The soil was classified by a geologist utilizing tactile, olfactory and visual observations to examine the lithology.

Samples were placed in coolers with ice during field activities and transported to an environmental analytical laboratory. Proper chain of custody documentation was prepared for the soil samples. Soil samples collected from the site were analyzed for the Target Compound List (TCL) VOCs by USEPA Method 8260. Select soil samples were analyzed for additional parameters including TCL Semi-Volatile Organic Compounds (SVOCs), Target Analyte List Metals, and TCL Pesticides and PCBs. The samples were delivered via courier to York Analytical Laboratories, an ELAP-certified laboratory (NYSDOH Nos. 10854 and 12058).

Non-dedicated sampling equipment was decontaminated with an Alconox solution and rinsed prior to reuse. Equipment blanks were collected at a frequency of one per day. As required by the RI Work Plan, a Community Air Monitoring Plan was implemented during the remedial investigation with a pDR-1500 dust monitor and Photovac 2020 or a RAE Systems ppbRAE PID. Periodic air monitoring for VOCs was performed of the breathing zone during field activities.

First Delineation Sampling Event: December 5 and 6, 2016

On December 5 and 6, 2016, the first phase of delineation sampling consisted of advancing seven soil borings (SB-4 through SB-10) and collecting 28 soil samples and one blind duplicate sample (SB-11 collected from SB-9 (8-10'). The soil borings were located within the previously investigated area of SB-1 through SB-3, with additional step-out borings.

Second Delineation Sampling Event: December 19 and 20, 2016

On December 19 and 20, 2016, step-out delineation soil borings were installed at the perimeter of soil borings, SB-1 through SB-10. The step-out borings consisted of

advancing seven soil borings (SB-12, SB-13, and SB-15 through SB-19) and collecting 31 soil samples.

Third Delineation Sampling Event: February 14, 15, 17, and 21, 2017

On February 14 through 21, 2017, additional delineation soil borings were advanced in accordance with comments from the NYSDEC. Two soil borings (SB-20 and SB-21) and one soil boring converted to a monitoring well (MW-1) were installed to investigate soil quality in the southwestern portion of the Site. In addition, exposed soil in the western portion of the Site was sampled from 0 to 2 inches at soil sample location SB-22 and beneath the bottom of the concrete slab from 0 to 2 inches bgs at soil sample location SB-23.

Soil borings SB-20 and SB-21 were continuously sampled and screened to 16 feet bgs. The soil boring for monitoring well MW-1 was continuously sampled and screened to 80 feet bgs prior to its conversion to groundwater monitoring well MW-1. A total of 16 soil samples were collected. The soil boring becoming MW-1 exhibited a maximum PID reading of 2,800 ppmv at 16 to 18 feet bsl.

Fourth Delineation Sampling Event: August 2, 3, and 4, 2017

Between August 2 and 4, 2017, four soil borings (SB-29, SB-30, SB-31A and SB-32A) were installed to define the extent of shallow soil contamination beneath the site.

The results from these soil borings were incorporated into PW Grosser's September 11, 2017 letter requesting a Contained-In determination by the NYSDEC. The letter defined the horizontal and vertical boundaries of hazardous and non-hazardous soil to a depth of 13 feet bgs.

Additional Monitoring Well Installations Event: April 20 – July 25, 2018

At the request of the NYSDEC and following issuance of NYCTA permitting, three additional monitoring wells (MW-4, MW-5, and MW-6) were installed. Monitoring well MW-3 was also inspected, found to be damaged, and replaced with MW-3R in the same general location as MW-3.

Discrete soil samples were submitted from MW-3R, MW-4, MW-5, and MW-6 at locations with the highest PID readings or at the water table and sent to a NYSDOH

approved laboratory for VOC analysis in accordance with EPA Method 8260. The laboratory results indicated that areas of PCE-contaminated soil above its UUSCO were observed between 43 and 45 feet bgs in MW-4. The laboratory results also indicated that an area of PCE-contaminated soil above its RRSCO was present between 16 and 18 feet bsl in the vicinity of MW-5.

Fifth Delineation Sampling Event: July 13 and September 7, 2018

On July 13, 2018, nine endpoint soil samples (EP-1 through EP-9) were collected in the western portion of the site. These samples further defined the horizontal extent of contaminated soil at basement grade in the western portion of the site. The results indicated that PCE was detected above its RRSCO at only one location (EP-9) adjacent to MW-1.

On September 7, 2018, two additional soil borings (SB-32B and SB-33) were installed to evaluate the vertical extent of contamination in the western portion of the site.

Soil boring SB-32B was located approximately 3 feet south of MW-1 and soil boring SB-33 was located approximately 10 feet to the west of MW-1. Both soil borings were installed and continuously sampled from basement grade to a depth of 12 feet below basement grade (25 feet bgs). The laboratory results indicate that PCE was not detected above its RRSCO more than 10 feet below basement grade (23 feet bgs) in the immediate vicinity of MW-1 (SB-32B) and was not detected above its UUSCO more than 2 feet below basement grade (15 feet bgs) along the western site boundary (SB-33).

SOIL VAPOR INVESTIGATION

On February 14 through 15 and March 3, 2017, a soil vapor survey was conducted at the perimeter of the Site. Soil vapor samples were collected at eight locations around the perimeter with two samples collected from the four property boundary sides. The soil vapor samples were collected from a depth of six feet bgs.

The soil vapor sample points were installed by driving a soil vapor rod with an extendable screen point. The soil vapor rods were retracted approximately 4 inches to expose the subsurface soil vapor screen. Teflon tubing was extended from the soil vapor screen to the surface. The tubing was purged at a rate of 0.040 liters per minute and screened with a PID. The tubing at the surface was connected to a 6-liter laboratory-

cleaned Summa canister at the surface. The Summa canister collected the sample at a rate of approximately 0.025 liters per minute for approximately 4 hours. A vacuum gauge on the canister was monitored until indications of a sufficient sample within the canister was observed. Subsequently, the flow controller to the canister was closed and the soil vapor point was removed from the subsurface. Soil vapor data is indicated on **Figure 7**.

GROUNDWATER INVESTIGATION

Between February 2017 and August 2018, six groundwater monitoring wells were installed, and one was replaced.

On February 14 and 15, 2017, groundwater monitoring wells MW-1 through MW-3 were installed at the site to characterize on-site groundwater quality and flow direction. Monitoring well MW-1 was installed in the western portion of the site, while monitoring wells MW-2 and MW-3 were installed in northeast and southeast portions of the site, respectively. Based upon surface topography, nearby surface water bodies and the USGS Long Island Depth to Water Viewer (March-April 2006), the groundwater gradient was presumed to be towards the north.

On February 22 and 23, 2018, four temporary groundwater monitoring wells were installed in the southeastern portion of the site. The purpose for these wells was to determine the presence of groundwater impacts beneath the former partial basement. The temporary wells were installed utilizing a track-mounted Geoprobe 6600 rig in combination with 3-inch diameter drive rods and a slotted steel well screen.

On April 30, 2018, monitoring well MW-6 was installed in the eastern portion of the site and on July 24 and 25, 2018, monitoring wells MW-4 and MW-5 were installed in the north-central and southwestern portions of the site, respectively. On July 23, 2018, monitoring well MW-3R was installed to replace damaged MW-3 in its general location.

Based on a depth to groundwater at the site of approximately 60 feet bgs, the monitoring wells were installed utilizing a Fraste XL Max sonic drill rig and constructed of 2-inch diameter PVC riser pipe above 15 to 20 feet of 20 mil slotted PVC well screen. Monitoring well MW-1 was installed to a depth of 80 feet bgs and screened from 60 to 80 feet bgs. Monitoring wells MW-2 and MW-3R were installed to a depth of 75 feet bgs and screened from 55 to 75 feet bgs. Monitoring wells MW-4 and MW-5 were installed to a

depth of 65 feet bgs and screened from 50 to 65 feet bgs. Monitoring well MW-6 was installed to a depth of 77 feet bgs and screened from 62 to 77 feet bgs.

The filter pack around each well screen consisted of No. 2 sand placed in the annulus of the soil boring from the base of the boring to 2 feet above the top of the well screen. A 3-foot bentonite seal was placed above the top of the filter pack. Bentonite grout consisting of Portland cement and bentonite was mixed at the surface and placed from the top of the bentonite seal to the surface. The wells were completed with riser pipes capped with J-plugs.

Installation of groundwater monitoring wells MW-1, MW-3R, MW-4, MW-5 and MW-6 was conducted by collecting continuous cylindrical cores of soil from ground surface to the terminal depth of investigation. No soil sampling was conducted during installation of monitoring well MW-2. However, soil sampling was subsequently performed adjacent to MW-2 at boring location IW-8. A portable PID screened the soil column from the ground surface to the terminus of the soil boring.

Groundwater monitoring conducted on August 10, 2018 identified depth to water in the six onsite monitoring wells ranging from 55.35 feet bgs in MW-1 to 68.22 feet bgs in MW-6. A survey of top of casing elevations confirmed that groundwater flow was toward the northeast.

Between March 2017 and July 2018, three rounds of groundwater sampling took place at the site. The first two rounds included MW-1, MW-2, and MW-3 and took place on March 3, 2017 and February 23, 2018. The third round of groundwater sampling took place on July 20, 2018 and included MW-1, MW-2, MW-3R, MW-4, MW-5 and MW-6. Groundwater data is indicated on **Figure 6**.

RI LABORATORY RESULTS

RI Soil Quality

Initially, there were three discrete areas of concern (AOCs) where chlorinated volatile organic compounds (CVOCs) were detected above RRSCOs in soil beneath the site. AOC-1 is located in the vicinity of the former dry-cleaning machine in the north-central portion of the site. AOC-2 is located in the western portion of the site formerly

occupied by an exterior concrete yard and one or more suspected storm drains. AOC-3 was located adjacent to Queens Boulevard in the northeastern portion of the site. AOC-3 has been incorporated into AOC-1 as, upon excavation, impact observed in the AOC-3 area appears related to the former dry cleaning apparatus as well.

PCE concentrations in AOC-1 generally trended along a layer of unsaturated silt and clay from higher concentrations beneath the dry-cleaning machine in the north-central portion of the site to lower concentrations along the southern and eastern property boundaries, the highest PCE concentration in AOC-1 (82 mg/kg) was found in shallow soil sample SB-3 at 0 to 2 feet bgs.

The deepest soil sample in AOC-1 containing PCE above its UUSCO was collected in the soil boring from monitoring well MW-4 where 11 mg/kg of PCE was detected at 43-45 feet bgs.

In AOC-2, the highest PCE concentration (510 mg/kg) was found at 16 to 18 feet bgs in the soil boring for monitoring well MW-1. A review of the boring log for MW-1 indicates that the highest in-field PID reading (2,800 ppmv) was observed at 15 to 16 feet bgs. Soil samples at the 22-foot interval exhibited a PID reading of 120 ppmv, which was the deepest extent of observed PID responses above 100 ppmv.

Soil borings SB-29, SB-30, SB-32B, and SB-33 installed in the vicinity of MW-1 delineated the vertical extent of PCE in soil beneath AOC-2. PCE exceeded its RRSCO in soil samples collected from 13 to 23 feet bgs in SB-29, SB-30, and SB-32B. The highest concentration of PCE was detected in this area at a concentration of 510 mg/kg. PCE was not found above its RRSCO in soil samples collected from these borings below 23 feet bgs.

An area of PCE contamination above its RRSCO was also identified between 16 and 18 feet bgs along the southern property boundary (21 mg/kg in MW-5). Field screening results and laboratory analyses of soil samples collected below that depth from MW-5 and MW-3R indicate the absence of soil contamination along the southern property boundary. The area of impacted soil around MW-5 is only a few feet southeast of AOC-2 and may be the result of lateral unsaturated dispersion.

ACT's Phase I Environmental Site Assessment identified two storm drains in the rear yard. Pieces of cast iron from one of the drains was discovered during subsequent delineation soil sampling. The storm drains could have acted as conduits for the observed PCE impacts in deep soil in the west and southwest portions of the site.

In AOC-3, the highest PCE concentration (35 mg/kg in SB-18) was found in shallow soil samples (0 to 2 feet bgs). Vinyl chloride, a PCE degradation product, was also detected above its UUSCO in soil borings SB-7, SB-17A, and SB-18 at 13 to 15 feet bgs. The highest concentration of vinyl chloride detected was 0.076 mg/kg. Cis-1,2-Dichloroethylene (DCE, 7.6 mg/kg) was also detected above its UUSCO in soil boring SB-7 at 13 to 15 feet bgs.

Two surface soil samples (SB-22 and SB-23) were collected from the rear undeveloped portion of the property. Surface soil sample SB-22 was collected from exposed soil in the western portion of the site from 0 to 2 inches beneath the surface soil. Surface soil sample SB-23 was collected in the southwestern portion of the site beneath the concrete slab from 0 to 2 inches beneath the slab. The surface soil sample, SB-22 exhibited the pesticides 4,4' DDT and 4,4' DDD above UUSCOs. Surface samples exhibited concentrations above the respective UUSCOs for cadmium, copper, nickel, and mercury and the RRSCO for lead in surface soil sample SB-22 and the respective UUSCOs for lead and zinc in SB-23.

RI Soil Vapor Quality

PCE was detected in the eight soil vapor samples during the 2017 sampling event. The highest concentration of PCE in soil vapor (250,000 µg/m^3) was detected in SV-3, located proximate to the former dry-cleaning machine in AOC-1. Soil vapor sample SV-4, located in the rear yard in the vicinity of AOC-2, contained the second highest PCE concentration (200,000 µg/m^3).

TCE was detected in seven of the eight samples at concentrations ranging from 19 to 4,300 µg/m^3. Cis-1,2-Dichloroethylene was detected in six of the eight soil vapor samples at concentrations ranging from 9.9 to 530 µg/m^3. The highest concentrations of TCE and DCE were detected in soil vapor sample SV-8 (4,300 µg/m^3 and 530 µg/m^3, respectively) located along the eastern portion of the site adjacent to Queens Boulevard.

RI Groundwater Quality

During the most recent sampling event in July 2018, PCE was found in the six monitoring wells above its NYSDEC Water Quality Standard (WQS) of 5 µg/L at concentrations ranging from 110 µg/L in MW-1 and MW-5 in the west and southwest portions of the site to 28,000 µg/L in MW-4 adjacent to the former dry cleaning machine along the northern property boundary.

Other CVOCs, including TCE and DCE were detected in groundwater samples from four monitoring wells above their WQS of 5 ug/L. TCE concentrations ranged from 13 ug/L in MW-5 to 2,500 ug/L in MW-2 and DCE concentrations ranged from 47 ug/L in MW-4 to 1,900 ug/L in MW-2. Vinyl chloride (VC) was found in three of the six monitoring wells above its WQS of 2 µg/l including MW-2 (340 µg/L), MW-3R (95 µg/L) and MW-6 (1,300 µg/L).

Concentrations of TCE, DCE, and VC in groundwater is an indication that anaerobic biodegradation of PCE is taking place beneath the site. The presence of these degradation products in monitoring wells MW-2, MW-3R, and MW-6, which are cross-gradient of MW-4, may be the result of lateral dispersion and degradation from the source area around MW-4. The low levels of PCE along with the absence of degradation products in MW-1 and MW-5 indicates that these areas are hydraulically upgradient of MW-4 as well as geologically isolated from the overlying soil contamination in AOC-2.

Further analyses conducted on groundwater samples from monitoring well MW-1 indicated that it was not impacted by SVOCs, Pesticides, or PCBs above their respective NYSDEC WQS. Antimony, magnesium, manganese, and sodium were detected above their respective NYSDEC WQS. These metal detections are likely from turbid samples and are not believed to be associated with historical dry-cleaning activities at the Site.

CONSTRUCTION COMPLETION REPORT – JULY 2020

PWGC oversaw an IRM at 124-22 Queens Boulevard in Kew Gardens, Queens, New York. The IRM was implemented in accordance with the IRM Work Plan, IRM Work Plan Addendum, and Excavation Work Plan (June 2016), and the requirements of NYSDEC for the subject property. IRM activities were performed under the NYSDEC BCP. The scope of work for the IRM consisted of the excavation and disposal of soils

from the entire property to a depth of 13 feet below street level. A total of 5,300 tons of soil has been disposed off-site.

Due to the proximity of adjacent buildings and in consideration of the footing depths of these buildings, the excavation could not exceed the depth of 13 feet below street level without risk of undermining the adjacent footings. Therefore, soils remain at the property at depths below 13 feet below street level which currently contain concentrations of VOCs that exceed RRSCOs.

As discussed in PWGC's Remedial Action Work Plan (RAWP), June 2019, additional remedial action for the subject site will include chemical oxidant injection to groundwater exhibiting elevated VOC concentrations and soil vapor extraction in the areas of shallow VOC impact.

The potential for vapor intrusion resulting from VOCs in the subsurface soil and groundwater will be mitigated by a sub-slab depressurization system (SSDS) and a vapor barrier.

2.4 Remedial Action Objectives

Based on the results of previous environmental investigations, namely the April 2015 Soil Vapor Intrusion (SVI) Study, the July 2015 Subsurface Investigation Report, and the December 2018 Remedial Investigation Report , the following Remedial Action Objectives (RAOs) were identified for this site.

2.4.1 Groundwater RAOs

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer, to the extent practicable, to pre-disposal/pre-

release conditions.

- Remove the source of ground or surface water contamination.

2.4.2 Soil RAOs

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.4.3 Soil Vapor RAOs

RAOs for Public Health Protection

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

2.5 Remaining Contamination

2.5.1 Soil/Fill

Following IRM activities, end-point samples and subsequent soil samples from the excavation depth of 13 feet below sidewalk level and below revealed the presence of lingering chlorinated solvent impact at concentrations greater than Unrestricted Use SCOs and Restricted-Residential Use SCOs. The remaining contamination was primarily entrained within 13 to 23 feet below grade on the western portion of the Site.

Figure 5 summarizes the results of all soil samples collected that exceed the Unrestricted Use SCOs and the Restricted Residential Use SCOs at the site after completion of remedial action.

2.5.2 Groundwater

Chlorinated solvent impact in groundwater was documented in the remedial investigation and during several subsequent monitoring events. The highest concentration of chlorinated solvent impact in groundwater was found to be 63 to 78 feet below grade on the eastern portion of the site. An additional round of groundwater sampling was completed in September 2020 to assess the groundwater quality for chemical injections. The results of the groundwater sampling are shown on Figure 6.

In October 2020 an enhanced bioremediation chemical injection event was performed at the site by applying PersulfOX, a chemical designed to degrade chlorinated solvents in groundwater, to eight injection points on the eastern portion of the site.

Currently, there are five permanent monitoring wells in place at the property. These wells are generally centralized in the eastern portion of the site where the highest degree of chlorinated solvent impact is remaining.

Figure 6 illustrates the locations of the monitoring wells summarize the results of all samples of groundwater that exceed AWQS after completion of soil removal activates and before the performance of chemical injections.

2.5.5 Soil Vapor

Soil vapor sampling events performed as part of the remedial investigation identified elevated levels of chlorinated solvents in soil vapor samples collected from beneath 13 feet below grade. The highest concentration of soil vapor impact is situated on the northeastern portion of the site, as well as a less widespread area of impact on the western edge of the site. Soil vapor mitigation and remediation will be addressed with the composite cap system which includes a vapor barrier, a sub-slab depressurization system (SSDS), and a soil vapor extraction (SVE) system.

Figure 7 summarizes the results of all samples of soil vapor that exceed the SCGs before the completion of the remedial action.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to restricted-residential uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 8**. These ICs are:

- The property may be used for restricted residential use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.

- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDEC and/or NYSDOH to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on **Figure 8** and any potential impacts that are identified must be monitored or mitigated; and
- Vegetable gardens and farming on the site are prohibited;

3.3 Engineering Controls

3.3.1 Cover and Vapor Barrier

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of a concrete slab ranging 18 to 32 inches throughout the foundation of the building.

The cover system is enhanced with a vapor barrier system which is made up a membrane which was placed beneath the entire building slab and the eastern, southern, and northern foundation walls. The western foundation wall was sealed with an epoxy product which was joined to the membrane. The materials used to form the vapor barrier are as follows:

- Grace Preprufe® 300R for horizonal applications.
- Grace Preprufe® 160R for vertical applications.
- Epoxy Sealant on western foundation wall.

The composite cover system is designed to protect occupants of the building from coming into contact with residual chlorinated solvent impact in the soils, and to assist in mitigating vapors from encroaching into the building.

Figure 9 presents the location of the cover system. The Excavation Work Plan (EWP) provided in **Appendix G** outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) provided in **Appendix G**.

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.2 Sub-Slab Depressurization System (SSDS)

An SSDS is installed below the concrete foundation slab and vapor barrier to further protect against the potential for the migration of soil vapors into the building.

SSDSs are designed to vent volatile compounds in a vapor phase from under the vapor barrier and prevent the volatile compounds from entering the building. SSDS utilize an in-situ process employing a network of sub-slab perforated collection piping where a blower is utilized to create a negative pressure gradient that causes movement of vapors toward the collection piping. The volatile constituents are readily removed from the subsurface through the riser pipe connected to the network of collection pipes. The extracted volatile compounds are then discharged to the atmosphere.

SSDS piping is constructed of 4-inch-diameter high density polyethylene (HDPE) and is piped to the blower located on the building's roof and then piped through granular activated carbon (GAC) units, and out an effluent stack. If SSDS influent concentrations are within allowable discharge limits as set forth in 6 NYCRR Part 212, the NYSDEC will be petitioned to allow the effluent to bypass carbon treatment.

Prior to SSDS system start-up, the system was inspected to ensure proper installation of the components. The system was tested during the start-up phase to ensure proper operation and the influent and effluent vapor sampling ports were sampled weekly for the first four weeks of operation, then monthly for the next two months. The sampling frequency will then be reduced to quarterly, in accordance with this SMP, while the SSDS system is operating.

System O&M requirements include a visual inspection of the system and its components, identification and repair of leaks, periodic changing out the GAC units as appropriate, regularly servicing the blower, adjusting pressures and flow rates for optimal performance, collecting gauge readings, and collecting influent and effluent vapor samples.

Procedures for operating and maintaining the SSDS are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As built drawings, signed and sealed by a professional engineer, are included in **Appendix I** – Operations and Maintenance Manual. **Figure 8** shows the location of the ECs for the site.

The active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that monitoring data indicates that the SSDS may no longer be required, a proposal to discontinue the SSDS will be submitted by the remedial party to the NYSDEC and NYSDOH.

3.3.3 Soil Vapor Extraction (SVE) System

An SVE system has been installed in an effort to reduce soil contamination at the two highest recorded concentration areas in the vicinity of MW-1 (approximately 300SF) and MW-5 (approximately 100SF).

SVE systems are designed to remediate soils of compounds in a vapor phase from the unsaturated zone. SVEs utilize an in-situ process employing a network of sub-slab

perforated well points connected to a blower that creates a negative pressure gradient that volatilizes VOCs from unsaturated soils and causes movement of vapors toward the collection piping. The volatile constituents are readily removed from the subsurface through the riser pipe connected to the network of collection pipes. The extracted volatile compounds are treated with granular activated carbon (GAC) and then discharged to the atmosphere.

The SVE design consists of nine (9) SVE wells points manifolded together into one (1) galvanized steel header pipe connected to a 2 HP SVE blower. Each well point is 2" dia. x 15' long with 5' feet of sch 40 slotted PVC screen on the bottom and a 10' solid riser pipe made of sch 40 PVC. Each SVE well point utilizes the 4" dia. PVC sleeves installed during the concrete slab pour for future ISCO injections. Six (6) SVE well points are installed in the sleeves around MW-1 and three (3) SVE well points are installed around MW-5. The exhaust from the SVE blower passes through granular activated carbon before exhausting outside the building at the roof. If SVE influent concentrations are within allowable discharge limits as set forth in 6 NYCRR Part 212, the NYSDEC will be petitioned to allow the effluent to bypass carbon treatment. An engineering drawing illustrating the locations and components of the SVE System is included in **Appendix I**.

System O&M requirements will include a visual inspection of the system and its components, identification and repair of leaks, periodic changing out the GAC units as appropriate, regularly servicing the blower(s), adjusting pressures and flow rates for optimal performance, collecting gauge readings, and collecting influent and effluent vapor samples. These tasks are included in the site's Site Management Plan (SMP) which outlines the ECs and ICs for the post-remedial phase of the project.

The SVE system will not be discontinued unless prior written approval is granted by the NYSDEC. In the event that monitoring data indicates that the SVE system may no longer be required, a proposal to discontinue the system will be submitted by the remedial party. Conditions that may warrant discontinuing the SVE system include contaminant concentrations in groundwater and/or soil that: (1) reach levels that are consistently below ambient water quality standards or the site SCGs, as appropriate; (2) have become asymptotic to a low level over an extended period of time, as accepted by the NYSDEC;

or (3) the NYSDEC has determined that the SVE system has reached the limit of its effectiveness. This assessment will be based in part on post-remediation contaminant levels in groundwater collected from monitoring wells located throughout the site. Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC.

3.3.4 - Monitoring Wells associated with Monitored Enhanced Attenuation

The five existing monitoring wells and eight existing injection points will remain operational, which are illustrated on **Figure 6**. Groundwater monitoring activities to assess enhanced attenuation, will continue, as determined by the NYSDEC with consultation with NYSDOH, until residual groundwater concentrations are found to be below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the system will be submitted by the remedial party. If attenuation of impact shows signs of stagnation at concentrations exceeding AWQS, additional InSitu Chemical Oxidation (ISCO) measures may be implemented. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix F**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media, namely groundwater and soil vapor.
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards.
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed quarterly or at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix H** – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs

implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Treatment System Monitoring and Sampling

4.3.1 Composite Cover System Monitoring

The composite cover system, namely the building slab and foundation walls, will be monitored annually to document existing conditions of the cover system and to ensure that the cover system is not breached, without proper notification and oversight. The cover system is in place to prevent human exposure to remaining contaminated soil/fill and to help mitigate soil vapor remaining at the Site.

The cover system will be inspected at a minimum of once a year. The status, including the existing condition and signs of past excavation patching of the cover system, will be observed and recorded.

4.3.2 Groundwater Monitoring

A long term groundwater monitoring program will be implemented to evaluate groundwater flow characteristics, confirm hydraulic control and plume stabilization, and to verify that remaining chlorinated solvent concentrations and the extent of groundwater contaminants are meeting remedial action objectives (RAOs). The monitoring will also measure the effectiveness of the ISCO activity.

The network of five monitoring wells was installed over the course of RI and IRM activities at the site. The monitoring wells are located in the basement of the building and are generally centralized on the eastern portion of the site where the highest impact to groundwater has been identified. Due to the depth to groundwater at the site of approximately 60 feet bgs, the monitoring wells were installed utilizing a Fraste XL Max sonic drill rig and constructed of 2-inch diameter PVC riser pipe above 15 to 20 feet of 20 mil slotted PVC well screen. Monitoring well MW-1 was installed to a depth of 80 feet bgs and screened from 60 to 80 feet bgs. Monitoring wells MW-2 and MW-3R were installed to a depth of 75 feet bgs and screened from 55 to 75 feet bgs. Monitoring wells

MW-4 and MW-5 were installed to a depth of 65 feet bgs and screened from 50 to 65 feet bgs. MW-6 was destroyed during building construction and is no longer accessible.

Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and a groundwater-sampling log. Other observations (e.g., well integrity, etc.) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the groundwater monitoring well network.

Prior to sampling, each well will be gauged with an electronic interface probe to measure the depth to LNAPL, if present, and the depth to water. Wells will be purged using a decontaminated submersible pump fitted with disposal polyethylene tubing under low flow conditions. During purging, the groundwater parameters pH, temperature, conductivity, oxygen reduction potential (ORP), turbidity, and dissolved oxygen will be monitored every three minutes with a Horiba U52 water quality instrument or similar. When measurements stabilize in accordance with the United States Environmental Protection Agency (USEPA) standard operating procedure EQASOP-GW001, purging will be deemed completed and the Horiba will be disconnected. The groundwater samples will then be collected directly from the tubing and placed in pre-cleaned laboratory supplied glassware and packed in a cooler on ice and delivered to a NYSDOH ELAP certified laboratory under chain-of-custody seal. The groundwater samples will be analyzed for VOCs per USEPA Method 8260.

Monitoring Well Repairs, Replacement And Decommissioning

If biofouling or silt accumulation occurs in the on-Site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced (as per the Monitoring Plan), if an event renders the wells unusable or no longer required.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of monitoring wells for the purpose of replacement, and the repair or decommissioning and

replacement process will be documented in the subsequent periodic report. Well decommissioning without replacement will be done only with the prior approval of NYSDEC. Well abandonment will be performed in accordance with NYSDEC's "Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be reinstalled in the nearest available location, unless otherwise approved by the NYSDEC.

4.3.2 Soil Vapor Monitoring

Monitoring of the SVE system / SSDS will consist of recording gauge readings and collecting influent and effluent vapor samples. SVE system / SSDS monitoring and sampling will be conducted quarterly in compliance with section 4.4 of this SMP. An Operations and Maintenance (O&M) Manual for the SVE System / SSDS, detailing the specific gauges and meters to be recorded, is included in Section 4. O&M will continue until the RAOs have been achieved. Modifications or shutdowns to the SVE system / SSDS will be performed in consultation with the NYSDEC.

A network of three vacuum monitoring points have also been installed at the site to evaluate the effectiveness of the SVE system / SSDS to create negative pressure in the subsurface, creating a vacuum atmosphere, to remove contaminants in the soil and soil vapor, and mitigate soil vapor intrusion into the building. Locations of the vacuum monitoring points are shown on **Figure 8**.

Sampling Protocol

All monitoring and sampling activities will be recorded in a field book and a site-specific system performance log. Other observations (e.g., system component integrity, etc.) will be noted on the system performance log. The system performance log will serve as the inspection form for the SVE system and SSDS.

Vacuum readings will be collected from the permanent vapor monitoring points by temporarily replacing the point cover cap outfitted with a brass barb or equivalent. The barb will be outfitted with ¼ inch diameter tubing connected to a vacuum gauge and vacuum readings will be recorded in the system performance logs.

In addition to routine system monitoring, influent and effluent vapor samples will be collected to verify the system's effectiveness and compliance with discharge requirements. The inspection and log forms included in **Appendix I** will be filled out during system inspection events.

4.3.2 Remedial System Sampling

Samples shall be collected from the SVE system on a quarterly basis, at minimum. Sampling locations required analytical parameters and schedule are provided in Table 1 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 1 – Remedial System Sampling Requirements and Schedule

Sampling Location	Analytical Parameters				Schedule
	VOCs (EPA Method 624)	TAL Metals (EPA Method 6010B)	Vacuum Pressure	VOC (EPA Method TO-15)	
SVE System Influent and Effluent Sampling				X	Quarterly
Vacuum Monitoring Points			X		Quarterly

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the monitoring well network on a routine basis. Sampling locations required analytical parameters and schedule are provided in Table 2 Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 2 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters				Schedule
	VOCs (EPA Method 8260)	TAL Metals (EPA Method 6010B)	pH (EPA Method 9040)	VOC (EPA Method TO-15)	
All Monitoring Wells	X				Quarterly- until chemical injections are completed
All Monitoring Wells	X				Annually- after chemical injections are completed

4.4.3 Groundwater Sampling

Groundwater monitoring will be performed quarterly to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report (PRR). Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will

be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

4.4.7 Monitoring QA/QC and Sampling Protocol

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the Site (**Appendix F**). Main Components of the QAPP include:

- QA/QC Objectives for Data Measurement;
- Sampling Program:
  - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
  - Sample holding times will be in accordance with the NYSDEC ASP requirements.
  - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
  - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
  - The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures;
- Preparation of a Data Usability Summary Report (DUSR), which will present the results of data validation, including a summary assessment of laboratory data

packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.

- Internal QC and Checks;
- QA Performance and System Audits;
- Preventative Maintenance Procedures and Schedules;
- Corrective Action Measures.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the SSDS and SVE systems;
- Will be updated periodically to reflect changes in site conditions or the manner in which the SSDS and SVE systems are operated and maintained.

Further detail regarding the Operation and Maintenance of the SSDS and SVE Systems is provided in **Appendix I** - Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System (or other Engineering Control) Performance Criteria

Soil Vapor Extraction System

The remedial action includes a SVE system to remove residual VOCs from the vadose zone and to stabilize plume migration and mitigate potential vapor intrusion into the proposed on-Site building. SVE systems are designed to physically remove volatile compounds in a vapor phase from the unsaturated zone. It is an in-situ process employing vapor extraction laterals where a blower is utilized to create a negative pressure gradient that causes movement of vapors toward the extraction wells. The volatile constituents are readily removed from the subsurface through the extraction wells. The extracted volatile compounds are then discharged to the atmosphere or treated if concentrations exceed air emission requirements.

The SVE system was designed and installed in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006. As-built drawings are included as **Appendix I** which illustrate the components of the system.

The SVE system was started for normal operation September 8, 2020 with temporary exterior piping in place. Routine monitoring which occurred over the course of six weeks showed that negative pressure was observed in the subsurface in conjunction with the SVE System. In November 2020, the components of the SVE System were replaced with permeant equipment.

The SVE system has been designed to operate on a continuous basis for the duration of the remedial phase, with minimal shut-down time for system maintenance activities.

Because of the numerous mechanical components (i.e. blower, valves, etc), regular maintenance activities are recommended to ensure the system operates efficiently. Specific equipment maintenance activities include:

- System monitoring, including recording system operational parameters such as vacuum, flow rate, pressure, and temperature readings and hours of system operation,
- Maintenance of blower, including greasing bearings, replacement of motor,
- Modification to PLC and interlock controls (i.e. adjusting time delays, differential pressure settings).

System Start-Up and Testing

Product manufacturer's catalog cut sheets for the specific SVE installed components are included in **Appendix I**.

- Prior to the system start-up, valves will be checked to ensure they are in their correct opened or closed position.
- After the system has been started, the flow rate of the blower will be adjusted to operate the system as designed.
- The blower will be inspected to ensure the fan is rotating in the proper direction.
- A visual inspection of pipes and connections will be conducted to determine if there are any leaks. Any necessary repairs will be made.

- The SVE system alarms will be tested to determine if they are operating correctly. These system alarms include monitories on vacuum pressure, flow, and temperature.
- Combined influent and effluent vapor samples will be collected as set forth in **Table 1**.

The system testing described above will be conducted if, in the course of the SVE system / SSDS lifetime, significant changes are made to the system, and the system must be restarted.

System Operation: Routine Operation Procedures

Routine operation procedures associated with the SVE system include the following:

- A system inspection log will be kept for each site visit that will include gauge readings, vacuum readings, alarm codes, and photoionization detector (PID) readings of the effluent vapor stream. Adjustments and repairs will be made on an as needed basis to keep the system operating as designed.
- Combined influent and effluent vapor samples will be collected at a minimum as set forth in **Table 1**. Analytical results will indicate if vapor phase granular activated carbon units are required to treat the effluent vapor stream.
- The system is designed to operate 24 hours a day, 7 days a week until the remedial action objectives (RAOs) are reached. Limited system shutdowns may occur during maintenance activities. The NYSDEC will be consulted regarding any modifications to the SVE system's operating schedule.

System Operation: Routine Equipment Maintenance

Because of the numerous mechanical components of the SVE system (i.e. blower, valves, etc), regular maintenance activities are recommended to ensure the system operates efficiently. Specific equipment maintenance activities will include:

- System monitoring, including recording system operational parameters,
- Maintenance of blower, including replacing bearings every 15,000 to 20,000 hours, replacement of belts,
- Modification to PLC and interlock controls (i.e. adjusting time delays, differential pressure settings).
- Visual inspections of the SVE components for leaks, damage, or scale / sediment build-up.
- Housekeeping inspections of the treatment room and the control room.
- Critical device / alarm testing and inspection.

System Operation: Non-Routine Equipment Maintenance

Non-routine equipment maintenance associated with the SVE system includes the following:

- Replace the blower or other parts on an as needed basis due to damage or exceeding the life expectancy of the equipment.
- If monitoring indicates that the system is not functioning as the design intended, the system may have to be redesigned, modified, and restarted. The NYSDEC will be consulted prior to any modifications to the SVE system.

Engineering Control System Performance Monitoring

ISCO Monitoring and Potential Re-Treatment, and Groundwater Monitoring

Based upon consultation with the NYSDEC, additional chemical injections using RegenOx may be utilized to expedite contaminant concentrations reductions in the groundwater or soil. The decision to install temporary or permanent ISCO injection wells and chemical oxidant will be implemented only after discussion with and approval by NYSDEC.

The remedial action may include additional ISCO at the eight existing injection points in an effort to expedite the groundwater remediation in conjunction with the long-

term use of the SVE system. Potential locations of ISCO injections will be determined based upon an evaluation of groundwater quality across the Site.

In addition to possible ISCO injections preformed within the existing injection points, an ISCO program may also be implemented within the shallow soils where chlorinated solvent impact remains. This shallow ISCO program will be implemented if it becomes apparent that the SVE system will not achieve the necessary remediation goals.

An appropriate mixture of chemical oxidant, based upon groundwater/soil quality and manufacturer recommendations, will be injected into the subsurface for future ISCO events. The decision preform additional ISCO events will be at the discretion of the property owner and will be implemented only after discussion with and approval by NYSDEC, including the preparation of a formal scope of work.

Monitoring Schedule

The effectiveness of the ISCO injections will be monitored utilizing the existing groundwater monitoring well network as documented in Section 3.3.1 and at a frequency detailed in **Table 2**.Groundwater sampling will be performed quarterly.

General Equipment Monitoring

Permanent ISCO wells will be inspected along with the routine site inspections required by NYSDEC. The following components will be inspected:

- ISCO well heads, well head covers, and gauge for depth.

System Monitoring Devices and Alarms

The ISCO wells have no monitoring devices or alarms.

Sampling Event Protocol

The groundwater will be sampled to determine the effectiveness of the ISCO injections utilizing the existing monitoring well network. Monitoring wells will not be sampled until a minimum of 1 month following a chemical injection, as recommended by the chemical manufacturer. Continuous monitoring will be performed quarterly, at minimum, in accordance with the routine sampling schedule included in SMP requirements.

6.0 REPORTING REQUIREMENTS

6.1 Site Management Reports

Site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in **Appendix H.** These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 3 and summarized in the Periodic Review Report.

Table 3: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Quarterly
Periodic Review Report	Annually

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);

- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets, and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

6.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in **Appendix D** -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC

EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document;
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and
  - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.
  - The overall performance and effectiveness of the remedy.

- A performance summary for all treatment systems at the site during the calendar year, including information such as:
  - The number of days the system operated for the reporting period;
  - The contaminant mass removed;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A description of the resolution of performance problems;
  - Alarm conditions;
  - Trends in equipment failure;
  - A summary of the performance, effluent and/or effectiveness monitoring; and
  - Comments, conclusions, and recommendations based on data evaluation.

6.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am

certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative]

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

6.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

6.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3) upon completion of an RSO, an RSO report must be submitted to the Department for approval. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

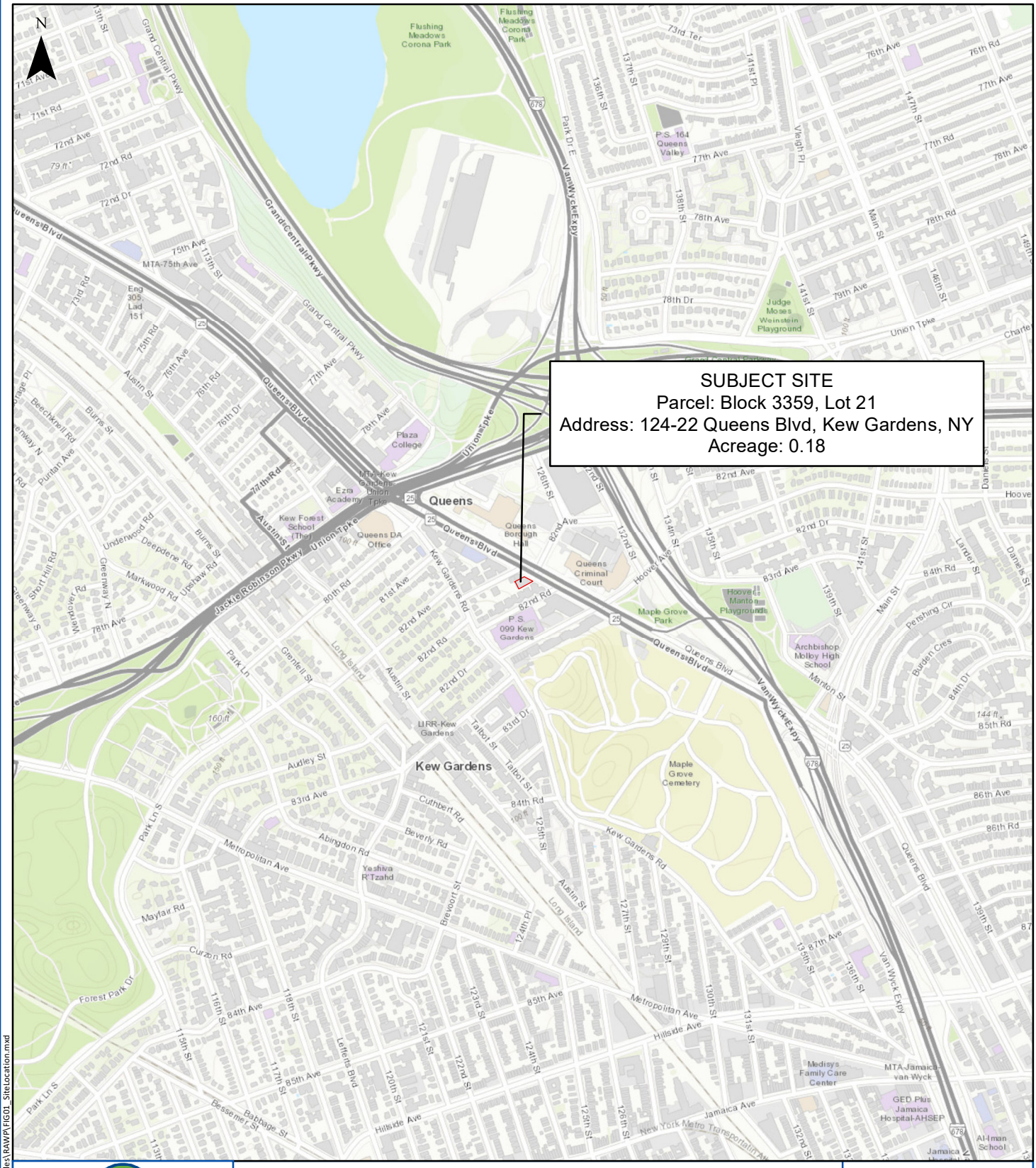
7.0 REFERENCES

6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

FIGURES



SITE LOCATION

124-22 QUEENS BLVD
KEW GARDENS, NY

Project:	ACT1701
Date:	7/29/2019
Designed by:	JP
Drawn by:	TS
Approved by:	JP
Figure No:	1

PWGC
CLIENT DRIVEN SOLUTIONS
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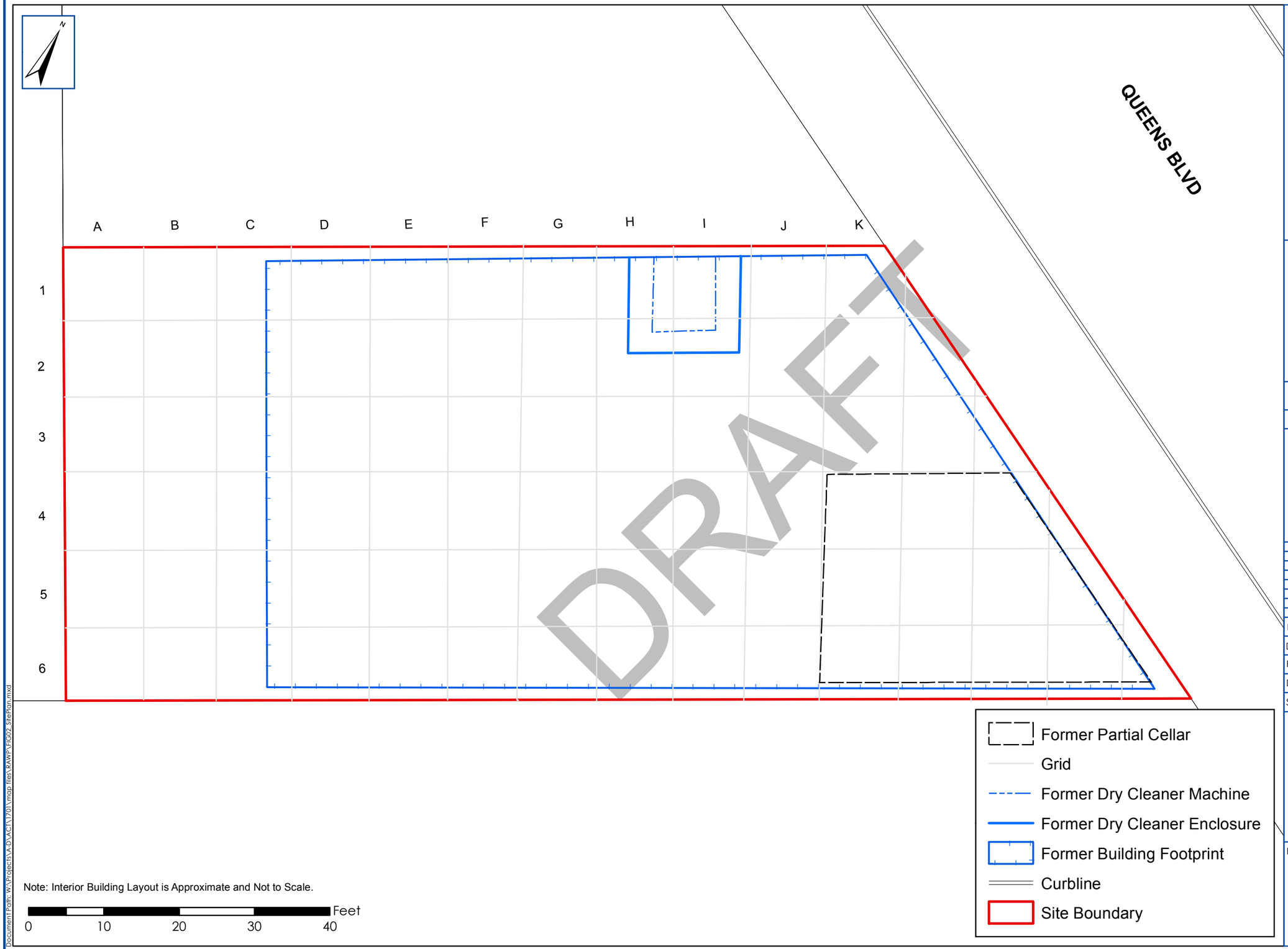

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NYS Department of Environmental Conservation
Division of Environmental Remediation
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Albany, New York 12233

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

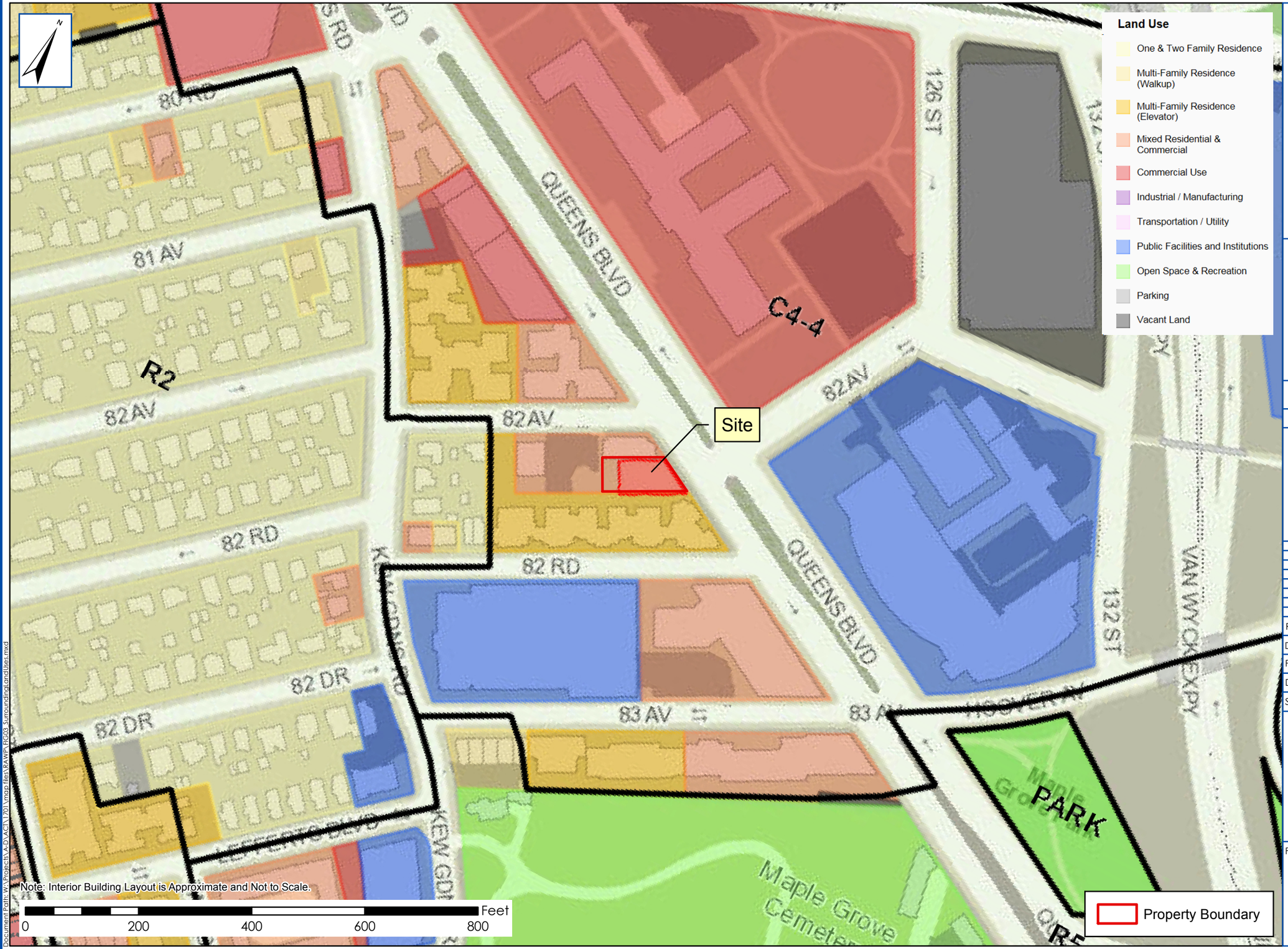
Project:	ACT1701	Designed by:	JP
Date:	3/5/2018	Drawn by:	TS
Scale:	AS SHOWN	Approved by:	JP

SITE PLAN

124-22 QUEENS BLVD
KEW GARDENS, NY

FIGURE NO:

2



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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

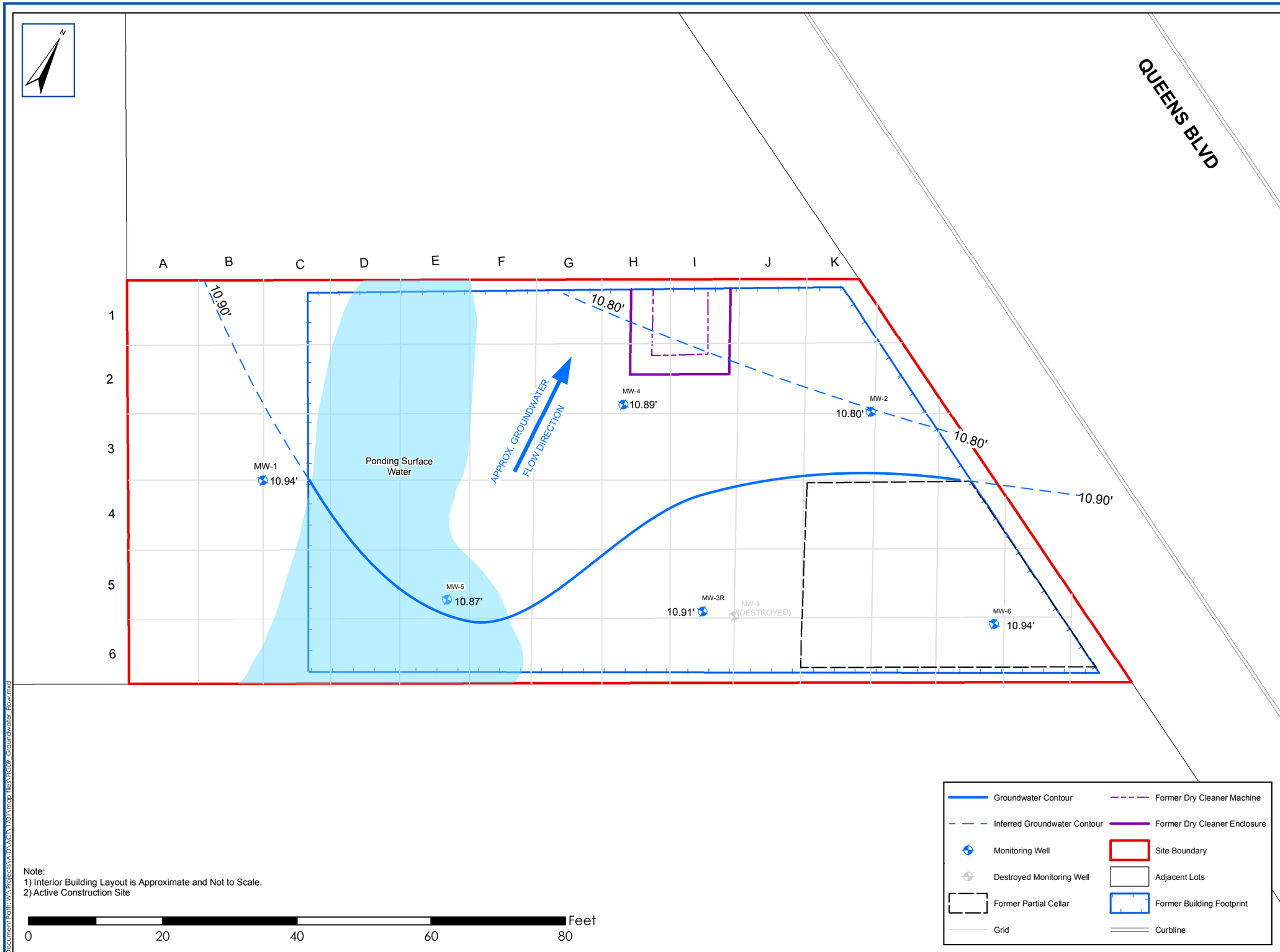
Project:	ACT1701	Designed by:	JP
Date:	2/28/2018	Drawn by:	TS
Scale:	AS SHOWN	Approved by:	JP

SURROUNDING LAND USES

124-22 QUEENS BLVD
KEW GARDENS, NY

FIGURE NO:

3



Document Path: W:\Projects\ACT\ACT1701\mxp files\FIG09 Groundwater Flow.mxd

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REVISION	DATE	INITIAL	COMMENTS

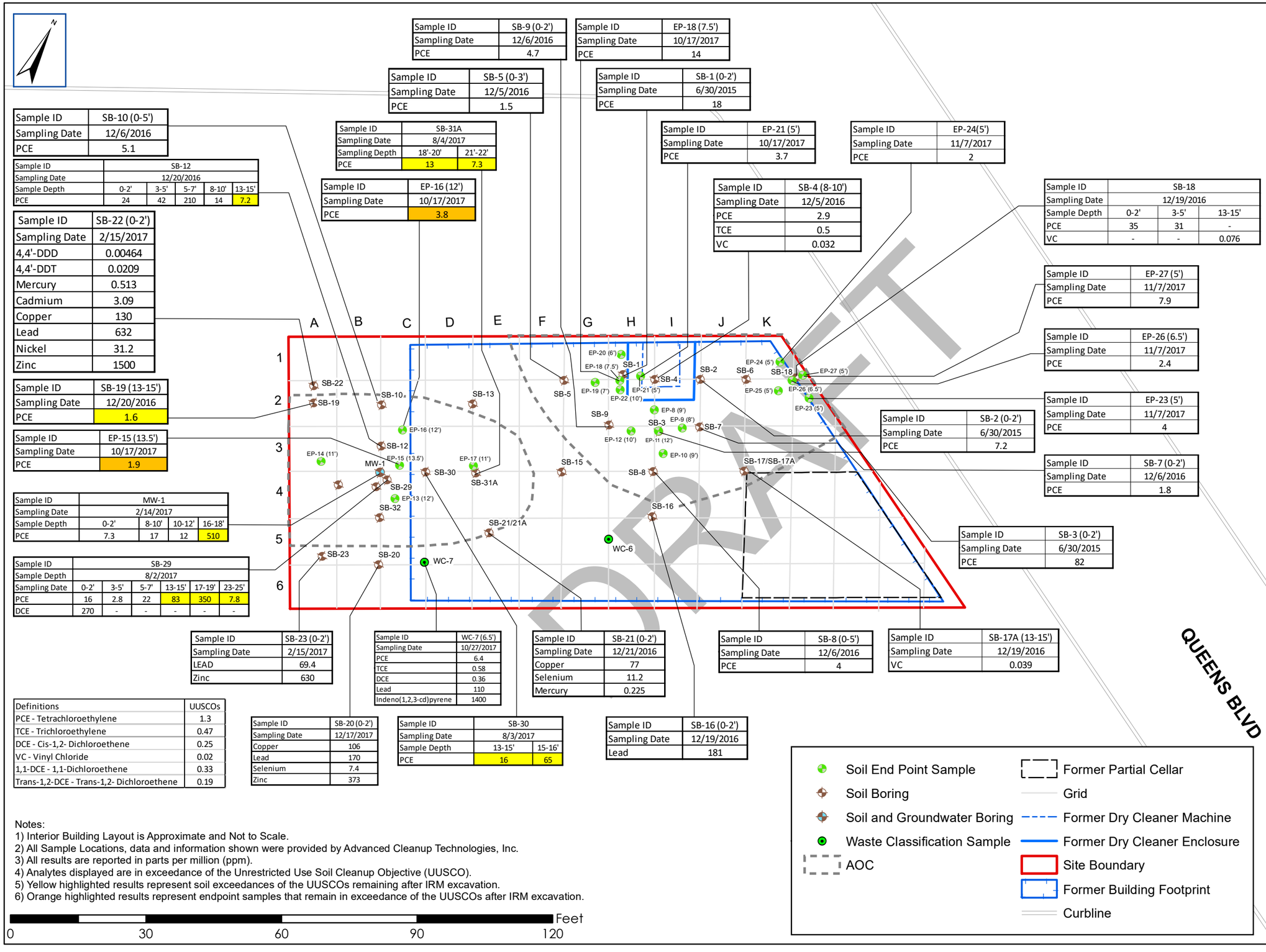
DRAWING INFORMATION:

Project:	ACT1701	Designed by:	JE
Date:	8/15/2018	Drawn by:	PH
Scale:	AS SHOWN	Approved by:	JE

Groundwater Flow

August 10, 2018

124-22 Queens BLVD
Kew Gardens, NY



Sample ID	SB-9 (0-2')
Sampling Date	12/6/2016
PCE	4.7

Sample ID	EP-18 (7.5')
Sampling Date	10/17/2017
PCE	14

Sample ID	SB-5 (0-3')
Sampling Date	12/5/2016
PCE	1.5

Sample ID	SB-1 (0-2')
Sampling Date	6/30/2015
PCE	18

Sample ID	SB-10 (0-5')
Sampling Date	12/6/2016
PCE	5.1

Sample ID	SB-31A	
Sampling Date	8/4/2017	
Sampling Depth	18'-20'	21'-22'
PCE	13	7.3

Sample ID	EP-21 (5')
Sampling Date	10/17/2017
PCE	3.7

Sample ID	EP-24(5')
Sampling Date	11/7/2017
PCE	2

Sample ID	SB-12				
Sampling Date	12/20/2016				
Sample Depth	0-2'	3-5'	5-7'	8-10'	13-15'
PCE	24	42	210	14	7.2

Sample ID	EP-16 (12')
Sampling Date	10/17/2017
PCE	3.8

Sample ID	SB-4 (8-10')
Sampling Date	12/5/2016
PCE	2.9
TCE	0.5
VC	0.032

Sample ID	SB-18		
Sampling Date	12/19/2016		
Sample Depth	0-2'	3-5'	13-15'
PCE	35	31	-
VC	-	-	0.076

Sample ID	SB-22 (0-2')
Sampling Date	2/15/2017
4,4'-DDD	0.00464
4,4'-DDT	0.0209
Mercury	0.513
Cadmium	3.09
Copper	130
Lead	632
Nickel	31.2
Zinc	1500

Sample ID	EP-27 (5')
Sampling Date	11/7/2017
PCE	7.9

Sample ID	EP-26 (6.5')
Sampling Date	11/7/2017
PCE	2.4

Sample ID	SB-19 (13-15')
Sampling Date	12/20/2016
PCE	1.6

Sample ID	SB-2 (0-2')
Sampling Date	6/30/2015
PCE	7.2

Sample ID	EP-23 (5')
Sampling Date	11/7/2017
PCE	4

Sample ID	EP-15 (13.5')
Sampling Date	10/17/2017
PCE	1.9

Sample ID	SB-7 (0-2')
Sampling Date	12/6/2016
PCE	1.8

Sample ID	MW-1			
Sampling Date	2/14/2017			
Sample Depth	0-2'	8-10'	10-12'	16-18'
PCE	7.3	17	12	510

Sample ID	SB-3 (0-2')
Sampling Date	6/30/2015
PCE	82

Sample ID	SB-29					
Sample Depth	8/2/2017					
Sampling Date	0-2'	3-5'	5-7'	13-15'	17-19'	23-25'
PCE	16	2.8	22	83	350	7.8
DCE	270	-	-	-	-	-

Sample ID	SB-23 (0-2')
Sampling Date	2/15/2017
LEAD	69.4
Zinc	630

Sample ID	WC-7 (6.5')
Sampling Date	10/27/2017
PCE	6.4
TCE	0.58
DCE	0.36
Lead	110
Indeno(1,2,3-cd)pyrene	1400

Sample ID	SB-21 (0-2')
Sampling Date	12/21/2016
Copper	77
Selenium	11.2
Mercury	0.225

Sample ID	SB-8 (0-5')
Sampling Date	12/6/2016
PCE	4

Sample ID	SB-17A (13-15')
Sampling Date	12/19/2016
VC	0.039

Definitions	UUSCOs
PCE - Tetrachloroethylene	1.3
TCE - Trichloroethylene	0.47
DCE - Cis-1,2- Dichloroethene	0.25
VC - Vinyl Chloride	0.02
1,1-DCE - 1,1-Dichloroethene	0.33
Trans-1,2-DCE - Trans-1,2- Dichloroethene	0.19

Sample ID	SB-20 (0-2')
Sampling Date	12/17/2017
Copper	106
Lead	170
Selenium	7.4
Zinc	373

Sample ID	SB-30	
Sampling Date	8/3/2017	
Sample Depth	13-15'	15-16'
PCE	16	65

Sample ID	SB-16 (0-2')
Sampling Date	12/19/2016
Lead	181

Notes:
1) Interior Building Layout is Approximate and Not to Scale.
2) All Sample Locations, data and information shown were provided by Advanced Cleanup Technologies, Inc.
3) All results are reported in parts per million (ppm).
4) Analytes displayed are in exceedance of the Unrestricted Use Soil Cleanup Objective (UUSCO).
5) Yellow highlighted results represent soil exceedances of the UUSCOs remaining after IRM excavation.
6) Orange highlighted results represent endpoint samples that remain in exceedance of the UUSCOs after IRM excavation.

0 30 60 90 120 Feet

- Soil End Point Sample
- Soil Boring
- Soil and Groundwater Boring
- Waste Classification Sample
- AOC
- Former Partial Cellar
- Grid
- Former Dry Cleaner Machine
- Former Dry Cleaner Enclosure
- Site Boundary
- Former Building Footprint
- Curbline

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CLIENT DRIVEN SOLUTIONS
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630 Johnson Ave., Suite 7
Bohemia, NY 11716
Ph: 631-589-6353 • Fax: 631-589-8705
pwgc.info@pwgrosser.com

DRAWING PREPARED FOR:

Luciano, LLC
25 Aldgate Drive East
Manhasset, New York 11030
&
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:			
Project:	ACT1701	Designed by:	JP
Date:	1/23/2019	Drawn by:	TS
Scale:	AS SHOWN	Approved by:	JP

SOIL ANALYTICAL RESULTS

124-122 QUEENS BLVD
KEW GARDENS , NY

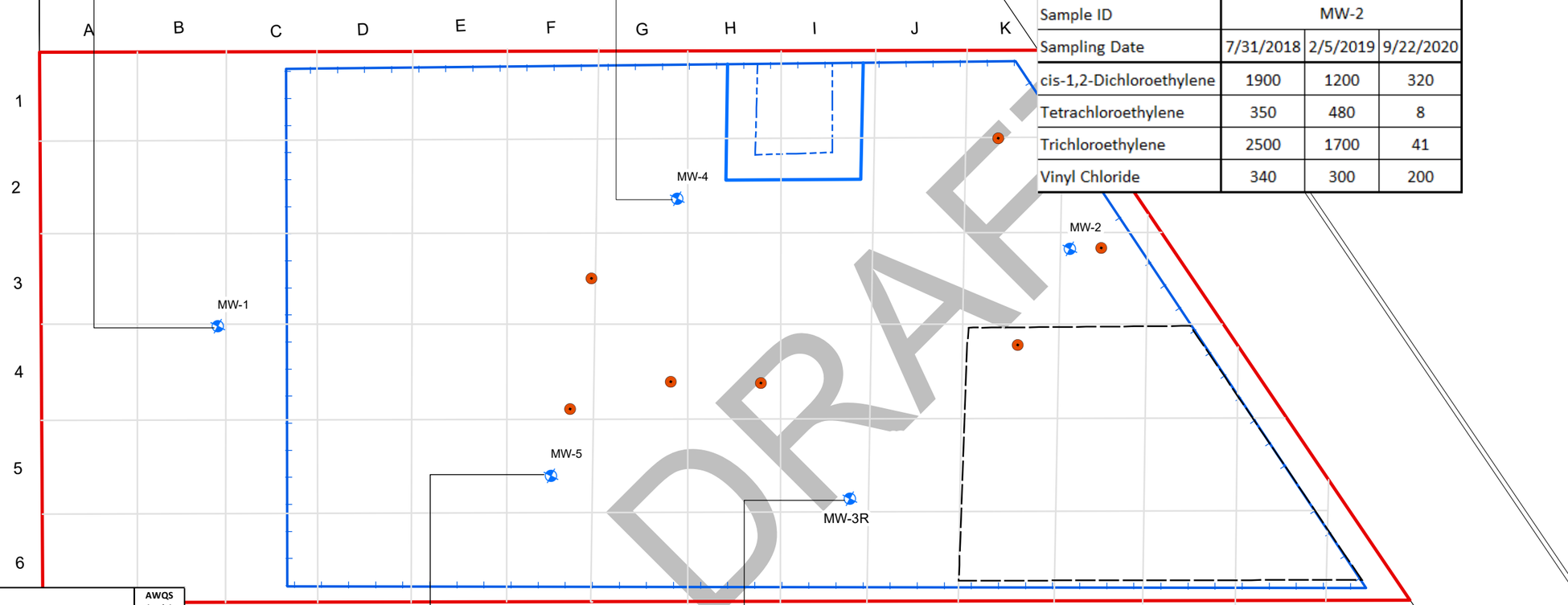
FIGURE NO:
5

Document Path: W:\Projects\A-D\ACT\1701\map files\RAWP\FIG07_SoilAnalyticalResults_VOCs-SVOCs.mxd

Sample ID	MW-1		
Sampling Date	7/30/2018	2/5/2019	9/22/2020
cis-1,2-Dichloroethylene	0.98	0.8	0.25
Tetrachloroethylene	110	49	48
Trichloroethylene	4.3	2.4	1.2
Vinyl Chloride	ND	0.38	ND

Sample ID	MW-4		
Sampling Date	7/31/2018	2/5/2019	9/22/2020
cis-1,2-Dichloroethylene	47	28	93
Tetrachloroethylene	28000	2000	3400
Trichloroethylene	160	170	230
Vinyl Chloride	ND	ND	3.5

Sample ID	MW-2		
Sampling Date	7/31/2018	2/5/2019	9/22/2020
cis-1,2-Dichloroethylene	1900	1200	320
Tetrachloroethylene	350	480	8
Trichloroethylene	2500	1700	41
Vinyl Chloride	340	300	200



Definitions	AWQS (µg/L)
1,1-DCE - 1,1-Dichloroethylene	5
1,2,4-Trimethylbenzene	5
Chloroform	7
Benzene	1
DCE - cis-1,2-Dichloroethylene	5
p- & m- Xylenes	5
PCE - Tetrachloroethylene	5
Toluene	5
trans-1,2-DCE - trans-1,2-Dichloroethylene	5
TCE - Trichloroethylene	5
VC - Vinyl Chloride	2
Xylenes, Total	5

Sample ID	MW-5		
Sampling Date	7/30/2018	2/5/2019	9/22/2020
cis-1,2-Dichloroethylene	1.7	3	0.5
Tetrachloroethylene	110	69	32
Trichloroethylene	13	11	3.7
Vinyl Chloride	ND	1.3	ND

Sample ID	MW-3R		
Sampling Date	7/31/2018	2/5/2019	9/22/2020
cis-1,2-Dichloroethylene	290	2800	900
Tetrachloroethylene	890	1200	45
Trichloroethylene	950	1200	48
Vinyl Chloride	95	150	390

Note:
1) Interior Building Layout is Approximate and Not to Scale.
2) All Sample Locations, data and information shown were provided by Advanced Cleanup Technologies, Inc.
3) All results are reported in ug/L.
4) Analytes displayed are in exceedence of their applicable NYSDEC Ambient Water Quality Class GA Standard (AWQS).
5) Current permanent monitoring wells (MW-1 - MW-3) must be inspected following IRM Construction to confirm they are not damaged as suspected, All damaged wells will be replaced in-kind.

0 10 20 30 40 Feet

- Injection Well
- Temporary Well
- Proposed Monitoring Well
- Injection Well 7.5' Buffer
- Monitoring Well
- Former Partial Cellar
- Grid
- Former Dry Cleaner Machine
- Former Dry Cleaner Enclosure
- Site Boundary
- Adjacent Lots
- Former Building Footprint
- Curbline

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REVISION	DATE	INITIAL	COMMENTS
	10/15/20	JS	ACT Modifies GW Data

DRAWING INFORMATION:

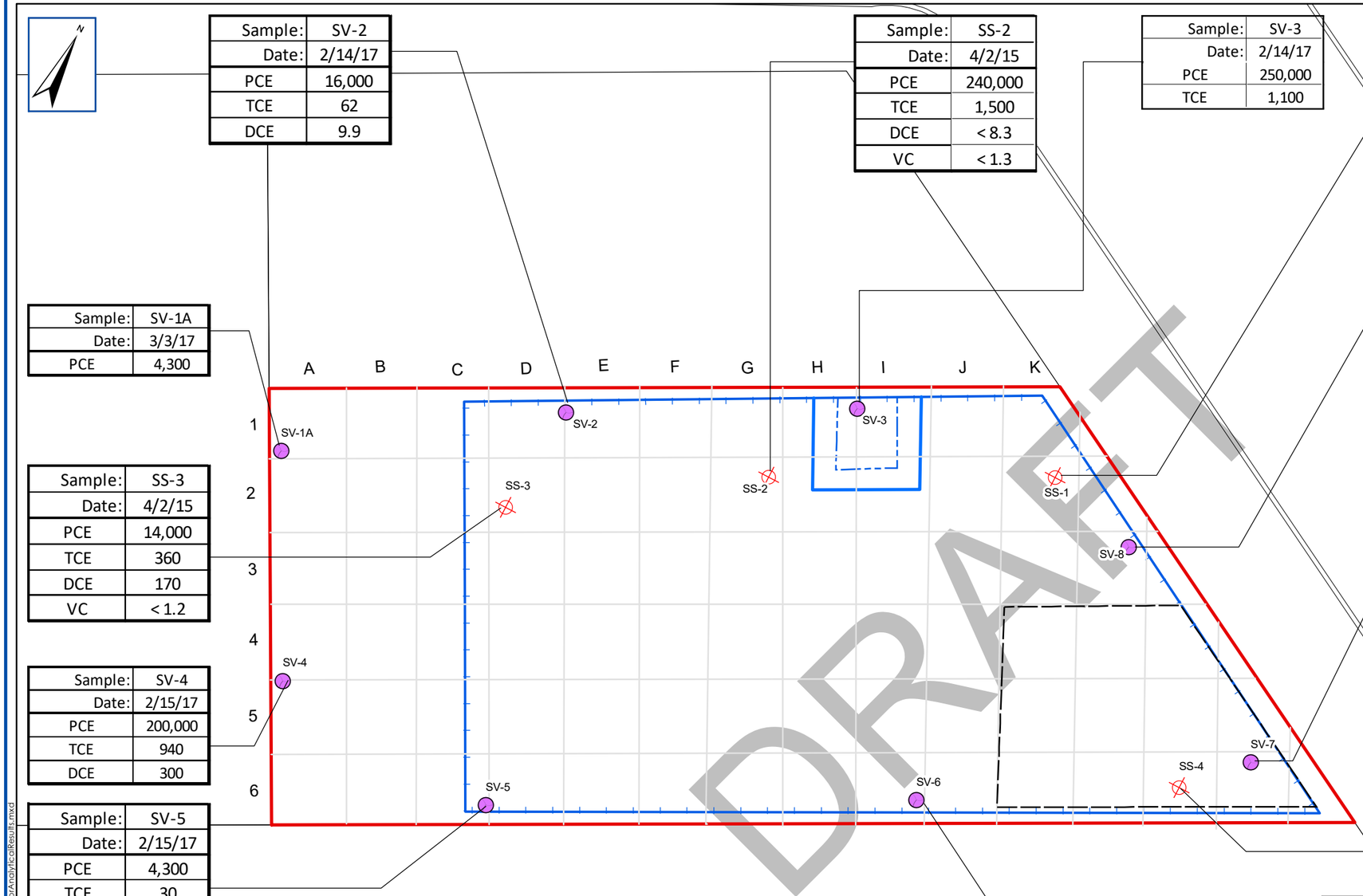
Project:	ACT1701	Designed by:	JE
Date:	10/15/2020	Drawn by:	UC
Scale:	AS SHOWN	Approved by:	JE

GROUNDWATER TREATMENT

124-22 QUEENS BLVD
KEW GARDENS, NY

FIGURE NO:
10

Document Path: W:\Projects\VAD\ACT\701\mxd\1F601_ProposedInjectionPoints.mxd



Sample:	SV-2
Date:	2/14/17
PCE	16,000
TCE	62
DCE	9.9

Sample:	SS-2
Date:	4/2/15
PCE	240,000
TCE	1,500
DCE	< 8.3
VC	< 1.3

Sample:	SV-3
Date:	2/14/17
PCE	250,000
TCE	1,100

Sample:	SS-1
Date:	4/2/15
PCE	45,000
TCE	1,100
DCE	26
VC	< 1.3

Sample:	SV-1A
Date:	3/3/17
PCE	4,300

Sample:	SV-8
Date:	2/14/17
PCE	9,000
TCE	4,300
DCE	530

Sample:	SS-3
Date:	4/2/15
PCE	14,000
TCE	360
DCE	170
VC	< 1.2

Sample:	SV-7
Date:	2/14/17
PCE	430
TCE	19
DCE	27

Sample:	SV-4
Date:	2/15/17
PCE	200,000
TCE	940
DCE	300

Sample:	SS-4
Date:	4/2/15
PCE	3,600
TCE	76
VC	57
DCE	150

Sample:	SV-5
Date:	2/15/17
PCE	4,300
TCE	30
DCE	48

Sample:	SV-6
Date:	2/15/17
PCE	3,400
TCE	73
DCE	39

Definitions:	*NYSDOH Indoor Air Guideline (5/2017)*	*NYSDOH Soil Vapor Sceening Level (5/2017)*
PCE - Tetrachloroethylene	10	100
TCE - Trichloroethylene	1	6
DCE - Cis-1,2- Dichloroethene	1	6
VC - Vinyl Chloride	0.2	6

Notes:
1) Interior Building Layout is Approximate and Not to Scale.
2) All Sample Locations, data and information shown were provided by Advanced Cleanup Technologies, Inc.
3) All results are reported in µg/m^3
4) Analytes displayed for Sub-slab Vapor Samples (SS-1 - SS-4) are in exceedance of their applicable May 2017 NYSDOH indoor air guideline values.
5) Analytes displayed for Soil Vapor Samples (SV-1A - SV-8) are in exceedance of their applicable May 2017 NYSDOH soil vapor screening levels.

0 20 40 60 80 Feet

- Sub-slab Vapor Sample
- Soil Vapor Sample
- Former Partial Cellar
- Grid
- Former Dry Cleaner Machine
- Former Dry Cleaner Enclosure
- Former Building Footprint
- Curbline
- Site Boundary

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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	ACT1701	Designed by:	JP
Date:	1/23/2019	Drawn by:	JCG
Scale:	AS SHOWN	Approved by:	JP

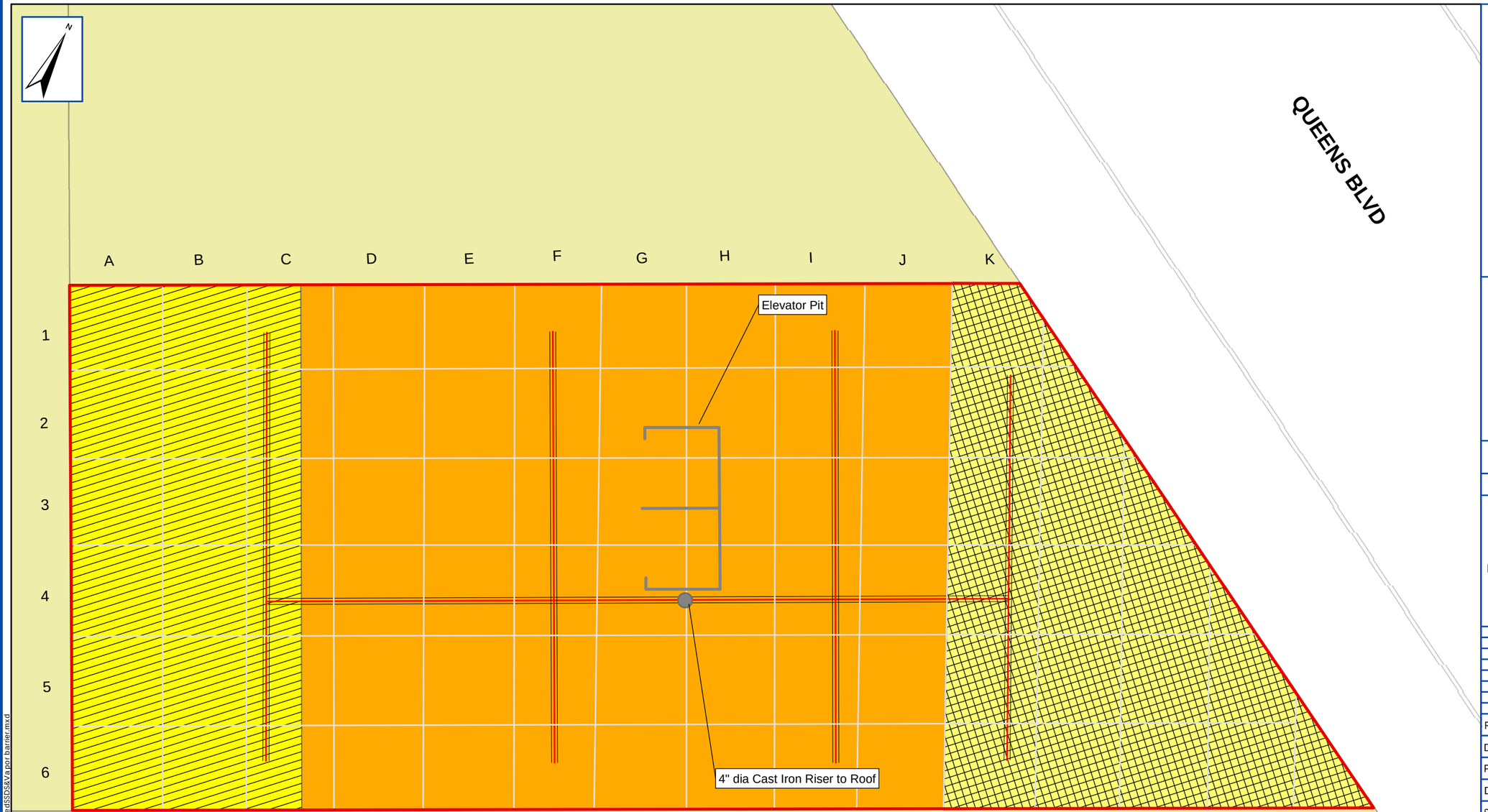
SOIL VAPOR ANALYTICAL RESULTS

124-22 QUEENS BLVD
KEW GARDENS, NY

FIGURE NO:

7

Document Path: W:\Projects\A-D\ACT\1701\mxp files\RAMPKFIG09_SoilVaporAnalyticalResults.mxd



Notes:
1) SVE - Soil Vapor Extraction
2) SSDS - Sub-Slab Depressurization System
3) SVE/SSDS blowers will be mounted on building rooftop.
4) Construction-level SVE/SSDS/vapor barrier design plans and details provided within RAWP Appendix.
5) Latest ammended development plans, top of concrete slab shown is at 9 ft bgs and located in building basement/parking area.

0 10 20 30 40 Feet

- Site Boundary/Extent of Proposed Vapor Barrier
- SVE/SSDS Trench Location
- 3.0' Thick Concrete Slab
- 2.0' Thick Concrete Slab
- 1.5' Thick Concrete Slab
- Adjacent Buildings
- Curbline

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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	ACT1701	Designed by:	JP
Date:	3/29/2018	Drawn by:	TS
Scale:	AS SHOWN	Approved by:	JP

Proposed SVE/SSDS, Vapor Barrier, and Cover Type Plan

124-22 QUEENS BLVD
KEW GARDENS, NY

FIGURE NO:

14

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APPENDIX A – LIST OF SITE CONTACTS

Name	Phone/Email Address
Luciano, LLC - Owner	917-862-1702 (mdong_66282@hotmail.com)
Paul Stewart, (ACT) - QEP	516-441-5800 (pauls@act.earth)
Paul Boyce, PE (PWGC) – Engineer of Record	631-589-6353 (paulb@pwgrosser.com)
Sadique Ahmed, PE (NYSDEC)	518-402-9656 (sadique.ahmed@dec.ny.gov)
John Grathwol, PE (NYSDEC)	518-402-9649 (john.grathwol@def.ny.gov)
Sara Heigel (NYSDEC)	518-402-9553 (Sara.heigel@dec.ny.gov)
Thomas Berinato, Esq. (Attoney)	718-575-3400 (TBerinato@verison.net)

Adjacent Properties:

North:
NY. Inc.
Forge Realty LLC
124-18 Queens Boulevard, Queens, NY 11415

Tenants: Subway, ATM Services

South:
G Madison LLC
Atlas ATM
124-30 Queens Boulevard, Queens, NY 11415

Tenants: Euro Grill & Salad Bar, Bank of America ATM,

East:
Department,
NYC Criminal Court, Queens County
125-01 Queens Boulevard, Queens, NY 11415

Tenants: Queens Police

Supreme Court Clerk, Building Department

West:
Forge Realty LLC
123 82 Avenue, Queens, NY 11415

Tenants: Unknown

APPENDIX B – EXCAVATION WORK PLAN (EWP)

B-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. The table below includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table Notifications*

John Grathwol	518-402-9656 john.grathwol@dec.ny.gov
Sadique Ahmed, PE	518-402-9656 Sadique.ahmed@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;

- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix E of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

B-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section 7 of this Appendix.

B-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

B-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

B-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes is included in the map within this Appendix. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

B-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for

development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

B-7 MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

B-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

B-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored. The existing cover system is comprised of a vapor barrier and a concrete slab ranging from 18 to 36 inches thick. Restoration will include patching the vapor barrier in accordance with the manufactures specifications and repairing the slab to match the pre-existing thickness. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

B-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d)which include the stricter of the following:

- Restricted-Residential SCOs
- Protection of Groundwater SCOs

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

B-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

B-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

B-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) provides measures for protection for on-Site workers and the downwind community (i.e., off-Site receptors including residences, businesses, and on-Site workers not directly involved in subsurface activities) from potential airborne contaminant releases resulting from subsurface activities at the Site.

The CAMP was established in accordance with the following requirements:

- 29 CFR 1910.120(h): This regulation specifies that air shall be monitored to identify and quantify levels of airborne hazardous substances and health hazards, and to determine the appropriate level of protection for workers.

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan: This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-Site through the air.

- New York State Department of Environmental Conservation (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor or equivalent. Air will be monitored for VOCs with a portable Photovac MicroTip photoionization detector (PID), or equivalent. **Table A-13** lists the Real-Time Air Monitoring Action Levels to be used in work areas. Air monitoring data shall be documented in a Site logbook by the designated Site safety officer. The QEP's Site safety officer or delegate shall calibrate and maintain air monitoring instruments in accordance with manufacturer's specifications. Instruments shall be zeroed daily and checked for accuracy and a daily log shall be kept.

Table B-1 - Air Monitoring Action Levels

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
PID	Breathing Zone	0-25 ppm, non-transient	None	Exposure below established exposure limits
PID	Breathing Zone	25-100 ppm, non-transient	Don APR	Based on potential exposure to VOCs
PID	Breathing Zone	>100 ppm, non-transient	Don ASR or SCBA, Institute vapor/odor suppression measures, Notify HSM.	Increased exposure to Site contaminants, potential for vapor release to public areas.
PID	Work Area Perimeter	< 5 ppm	None	Exposure below established exposure limits.
PID	Work Area Perimeter	> 5 ppm	Stop work and implement vapor release response plan until readings return	Increased exposure to Site contaminants, potential for vapor release to public areas

			to acceptable levels, Notify HSM.	
Aerosol Monitor	Work Area Perimeter	>100 but < 150 µg/m^3 for 15 minutes	Institute dust suppression measures, Notify HSM.	Work to continue if particulate concentrations remain below 150 µg/m^3
Aerosol Monitor	Work Area Perimeter	>150 µg/m^3	Don ASR or SCBA, Institute dust suppression measures, Notify HSM.	Stop work and implement dust suppression techniques until readings return to acceptable levels, Notify HSM.

B-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-Site. Specific odor control methods to be used on a routine basis may include limiting open excavations, use of tarping, hydromulch, or encapsulant to cover soils during excavations, direct loading of soils, use of chemical odorants, piping discharge SVE/SSDS air above the roof line, use of vapor phase carbon units to filter air, and monitoring air at and beyond property lines. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

B-15 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-Site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

B-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX C
RESPONSIBILITIES of
OWNER and REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan ("SMP") for the 124-22 Queens Boulevard site (the "site"), number C241177, are divided between the site owner, and a Remedial Party, as defined below. The owner(s) is/are currently listed as:
Luciano, LLC (the "owner").

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:
Advanced Cleanup Technologies.

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. In the event that damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated the Notifications section of this SMP.

6) In the event some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in the Notifications section of this SMP and (ii) coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 2.4 of the SMP. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.

9) Until such time as the NYSDEC deems the drinking water treatment system unnecessary, the owner shall operate the drinking water treatment system, pay for the utilities and report any maintenance issues to the RP and the NYSDEC.

11) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .

6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section the notifications of the SMP.

7) The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in this SMP.

8) The RP is responsible for the proper monitoring and maintenance of any installed drinking water treatment system associated with the site, as required in Section 5 or Appendix J (Operation , Monitoring and Maintenance Manual).

9) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

10) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX D – ENVIRONMENTAL EASEMENT

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Office of the General Counsel
625 Broadway, 14th Floor, Albany, New York 12233-1500
P: (518) 402-9185 I F: (518) 402-9018
www.dec.ny.gov

September 28, 2019

SENT VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED
AND ELECTRONIC MAIL kcanavan@cmmllp.com

Kelly M. Canavan, Esq.
Campolo, Middleton & McCormick, LLP
2495 Montauk Highway
P.O. Box 3046
Bridgehampton, NY 11932

RE: Environmental Easement Package
Site Name: 124-22 Queens Boulevard, Kew Gardens Site
Site No.: C241177

Dear Ms. Canavan:

Enclosed, please find a fully executed Environmental Easement, TP-584 and NYC–RPT tax forms referencing the site located at 124-22 Queens Boulevard, Kew Gardens, County of Queens, New York.

Once the Environmental Easement is recorded, the local municipality will need to be notified via Certified Mail, Return Receipt Requested.

Please return a copy of the recorded easement marked by the County Clerk's Office with the date and location of recording, and a certified copy of the municipal notice. The information from the recorded easement and notices are necessary to process the Certificate of Completion.

If you have any further questions or concerns relating to this matter, please contact our office at (518) 408-0409.

Sincerely,

Jennifer Andaloro, Esq.
Section Chief A
Remediation Bureau

ec: B. Burns, Esq., NYSDEC

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 23rd day of September, 2019 between Owner(s) Luciano LLC, having an office at 25 Aldgate Drive East, Manhasset, New York 11030, County of Nassau, State of New York (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 124-22 Queens Boulevard in the City of New York, County of Queens and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 3359 Lot 21, being the same as that property conveyed to Grantor by deed dated June 17, 2015 and recorded in the City Register of the City of New York as CRFN #2015000239073. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.1792 +/- acres, and is hereinafter more fully described in the Land Title Survey dated June 10, 2019 prepared by Stephen N. Gathura, L.L.S., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is

extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C241177-12-15, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C241177
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and

communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Luciano LLC:

By: _____

Print Name: Maohua Dong

Title: president Date: September 4. 2019

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Queens)

On the 04th day of September, in the year 2019, before me, the undersigned, personally appeared MAOHUA DONG, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

HONG WU JIANG
Notary Public, State of New York
No. 01HO6189625
Qualified in Kings County
Certificate Filed in Queens County
Commission Expires June 30, 2020

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Michael J. Ryan, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 23rd day of September, in the year 2019, before me, the undersigned, personally appeared Michael J. Ryan, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2022

SCHEDULE "A" PROPERTY DESCRIPTION

All that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Borough and County of Queens, City and State of New York, known and designated on a certain map entitled, "Map of Mullers Maple Hill Park at Richmond Hill, surveyed October, 1892 by Richard Evans, C.E. and C.S." and filed in the Office of the Clerk, now Register, Queens County, July 26th, 1893 as Map No. 956, as and by the lot numbers 26 and 27 and the southerly 10 feet of lot number 28 in Block 2, which southerly 10 feet is measured from a point on a line drawn at right angles in 82nd avenue (formerly "Lefferts Avenue"), said line being the easterly boundary line of lot number 30 on said Map.

Excepting, however, therefrom the land taken or acquired by the City of New York in the proceeding to widen Queens Boulevard known as Hoffman Boulevard on said Map, which does not exceed 6 inches in width. And the lot number 26 and 27 and the southerly 10 feet of lot number 28, as aforesaid, taken together are bounded and described according to said Map, less the land taken in the widening of said Queens Boulevard, as follows:

Beginning at a point on the westerly side of Queens Boulevard, designated on said map as Hoffman Boulevard, as widened, distant 48.16 feet (48.18 feet per tax map) southerly from the corner formed by the intersection of the westerly of Queens Boulevard with the southerly side of 82nd Avenue;

Running thence westerly and parallel with the southerly side of 82nd Avenue, 107.79 feet (108.30 feet per tax map) to the easterly line of lot number 30 as laid down on said Map;

Thence southerly at right angles to 82nd Avenue and along the easterly line of said lot number 30, as laid down on said Map, 60 feet;

Thence easterly parallel with 82nd Avenue and along the southerly line of lot number 26, as laid down on Map, 148.04 feet (148.54 feet per tax map) to the westerly side of Queens Boulevard, as widened;

And thence northerly along said westerly side of Queens Boulevard, as widened, 72.25 feet (72.26 feet per tax map) to the point or place of beginning.

Described parcel contains 7674.90 square feet or 0.1792 acres more or less.

TP-584-NYC (7/19)

Department of Taxation and Finance

Combined Real Estate Transfer Tax Return, Credit Line Mortgage Certificate, and Certification of Exemption from the Payment of Estimated Personal Income Tax for the Conveyance of Real Property Located in New York City

Recording office time stamp

See Form TP-584-NYC-I, Instructions for Form TP-584-NYC, *before completing this form. Print or type.*

Schedule A – Information relating to conveyance

Grantor/Transferor

☐ Individual
☐ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☑ Other

Name *(if individual, last, first, middle initial)* (☐ *mark an X if more than one grantor*): LUCIANO LLC

Social Security number:

Mailing address: 124-22 QUEENS BOULEVARD

Social Security number:

City	State	ZIP code	EIN
KEW GARDENS	NY	11415	47 3155664

Single member's name if grantor is a single member LLC *(see instructions)*

Single member EIN or SSN:

Grantee/Transferee

☐ Individual
☑ Corporation
☐ Partnership
☐ Estate/Trust
☐ Single member LLC
☐ Other

Name *(if individual, last, first, middle initial)* (☐ *mark an X if more than one grantee*): NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Social Security number:

Mailing address: 625 BROADWAY, 14TH FLOOR

Social Security number:

City	State	ZIP code	EIN
ALBANY	NY	12233	14 6013200

Single member's name if grantee is a single member LLC *(see instructions)*

Single member EIN or SSN:

Location and description of property conveyed

Tax map designation – Section, block & lot *(include dots and dashes)*	SWIS code (six digits)	Street address	City, town, or village	County
4 - 3359 - 21	650000	124-22 QUEENS BOULEVARD	NEW YORK	QUEENS

Type of property conveyed *(mark an X in applicable box)*

1 ☐ One- to three-family house
2 ☐ Residential cooperative
3 ☐ Residential condominium
4 ☐ Vacant land
5 ☑ Commercial/Industrial
6 ☐ Apartment building
7 ☐ Office building
8 ☐ Other _____

Date of conveyance: 09 (month) 23 (day) 2019 (year)

☐ Contract executed on or before April 1, 2019 *(see instructions)*

Percentage of real property conveyed which is residential real property 0 % *(see instructions)*

Condition of conveyance *(mark all that apply)*

a. ☐ Conveyance of fee interest
b. ☐ Acquisition of a controlling interest (state percentage acquired _____ %)
c. ☐ Transfer of a controlling interest (state percentage transferred _____ %)
d. ☐ Conveyance to cooperative housing corporation
e. ☐ Conveyance pursuant to or in lieu of foreclosure or enforcement of security interest *(attach Form TP-584.1, Schedule E)*
f. ☐ Conveyance which consists of a mere change of identity or form of ownership or organization *(attach Form TP-584.1, Schedule F)*
g. ☐ Conveyance for which credit for tax previously paid will be claimed *(attach Form TP-584.1, Schedule G)*
h. ☐ Conveyance of cooperative apartment(s)
i. ☐ Syndication
j. ☐ Conveyance of air rights or development rights
k. ☐ Contract assignment
l. ☐ Option assignment or surrender
m. ☐ Leasehold assignment or surrender
n. ☐ Leasehold grant
o. ☑ Conveyance of an easement
p. ☐ Conveyance for which exemption from transfer tax claimed *(complete Schedule B, Part 4)*
q. ☐ Conveyance of property partly within and partly outside the state
r. ☐ Conveyance pursuant to divorce or separation
s. ☐ Other *(describe)* _____

For recording officer's use	Amount received	Date received	Transaction number
	Schedule B, Part 1 $		
	Schedule B, Part 2 $		
	Schedule B, Part 3 $		

2019080200116301O1

Schedule B – Real estate transfer tax return (Tax Law, Article 31)

Part 1 – Computation of tax due *(in addition to the tax on line 4, you must compute the tax on lines 5a and 5b, if applicable)*

1	Enter amount of consideration for the conveyance *(if you are claiming a total exemption from tax, mark the exemption claimed box, enter consideration and proceed to Part 4)* ☐ **Exemption claimed**	1.	0 00
2	Continuing lien deduction *(see instructions if property is taken subject to mortgage or lien)*	2.	0 00
3	Taxable consideration *(subtract line 2 from line 1)*	3.	0 00
4	Tax: $2 for each $500, or fractional part thereof, of consideration on line 3	4.	0 00
5a	Tax: $1.25 for each $500, or fractional part thereof, of consideration for the conveyance of residential real property located in New York City if the amount on line 3 is $3 million or more *(see instructions)*	5a.	0 00
5b	Tax: $1.25 for each $500, or fractional part thereof, of consideration for the conveyance of property located in New York City other than residential real property, if the amount on line 1 is $2 million or more *(see instructions)*	5b.	0 00
6	Total before credit(s) claimed *(add lines 4, 5a, and 5b)*	6.	0 00
7	Amount of credit claimed for tax previously paid *(see instructions and attach Form TP-584.1, Schedule G)*	7.	0 00
8	Total tax due* *(subtract line 7 from line 6)*	8.	0 00

Part 2 – Computation of additional tax due on the conveyance of residential real property for $1 million or more *(see instructions)*

1	Enter amount of consideration for conveyance *(from Part 1, line 1)*	1.	0 00
2	Taxable consideration *(multiply line 1 by the percentage of the premises which is residential real property, as shown in Schedule A)*	2.	0 00
3	Total additional transfer tax due* *(multiply line 2 by 1% (.01))*	3.	0 00

Part 3 – Computation of supplemental tax due on the conveyance of residential real property, or interest therein, located in New York City, for $2 million or more *(see instructions)*

1	Enter amount of consideration for conveyance *(from Part 1, line 1)*	1.	0 00
2	Taxable consideration *(multiply line 1 by the percentage of the premises which is residential real property, as shown in Schedule A)*	2.	0 00
3	Total supplemental transfer tax due* *(multiply line 2 by tax rate, see instruction for rates)*	3.	0 00

*** The total tax (from Part 1, line 8; Part 2, line 3; and Part 3, line 3 above) is due within 15 days from the date of conveyance.**

Part 4 – Explanation of exemption claimed on Part 1, line 1 *(mark any boxes that apply)*

The conveyance of real property is exempt from the real estate transfer tax for the following reason:

a. Conveyance is to the United States of America, New York State, or any of their instrumentalities, agencies, or political subdivisions (or any public corporation, including a public corporation created pursuant to agreement or compact with another state or Canada) ..... a ☐

b. Conveyance is to secure a debt or other obligation ..... b ☐

c. Conveyance is without additional consideration to confirm, correct, modify, or supplement a prior conveyance ..... c ☐

d. Conveyance of real property is without consideration and not in connection with a sale, including conveyances conveying realty as bona fide gifts ..... d ☐

e. Conveyance is given in connection with a tax sale ..... e ☐

f. Conveyance is a mere change of identity or form of ownership or organization where there is no change in beneficial ownership. (This exemption cannot be claimed for a conveyance to a cooperative housing corporation of real property comprising the cooperative dwelling or dwellings.) Attach Form TP-584.1, Schedule F ..... f ☐

g. Conveyance consists of deed of partition ..... g ☐

h. Conveyance is given pursuant to the federal Bankruptcy Act ..... h ☐

i. Conveyance consists of the execution of a contract to sell real property, without the use or occupancy of such property, or the granting of an option to purchase real property, without the use or occupancy of such property ..... i ☐

j. Conveyance of an option or contract to purchase real property with the use or occupancy of such property where the consideration is less than $200,000 and such property was used solely by the grantor as the grantor's personal residence and consists of a one-, two-, or three-family house, an individual residential condominium unit, or the sale of stock in a cooperative housing corporation in connection with the grant or transfer of a proprietary leasehold covering an individual residential cooperative apartment ..... j ☐

k. Conveyance is not a conveyance within the meaning of Tax Law, Article 31, § 1401(e) *(attach documents supporting such claim)* ..... k ☐

Schedule C – Credit Line Mortgage Certificate (Tax Law, Article 11)

Complete the following only if the interest being transferred is a fee simple interest.
I (we) certify that: *(mark an X in the appropriate box)*

1. ☐ The real property being sold or transferred is not subject to an outstanding credit line mortgage.

2. ☐ The real property being sold or transferred is subject to an outstanding credit line mortgage. However, an exemption from the tax is claimed for the following reason:
   a ☐ The transfer of real property is a transfer of a fee simple interest to a person or persons who held a fee simple interest in the real property (whether as a joint tenant, a tenant in common or otherwise) immediately before the transfer.

   b ☐ The transfer of real property is (A) to a person or persons related by blood, marriage or adoption to the original obligor or to one or more of the original obligors or (B) to a person or entity where 50% or more of the beneficial interest in such real property after the transfer is held by the transferor or such related person or persons (as in the case of a transfer to a trustee for the benefit of a minor or the transfer to a trust for the benefit of the transferor).

   c ☐ The transfer of real property is a transfer to a trustee in bankruptcy, a receiver, assignee, or other officer of a court.

   d ☐ The maximum principal amount secured by the credit line mortgage is $3,000,000 or more, and the real property being sold or transferred is **not** principally improved nor will it be improved by a one- to six-family owner-occupied residence or dwelling.

   Note: for purposes of determining whether the maximum principal amount secured is $3,000,000 or more as described above, the amounts secured by two or more credit line mortgages may be aggregated under certain circumstances. See TSB-M-96(6)-R for more information regarding these aggregation requirements.

   e ☐ Other *(attach detailed explanation)*.

3. ☐ The real property being transferred is presently subject to an outstanding credit line mortgage. However, no tax is due for the following reason:
   a ☐ A certificate of discharge of the credit line mortgage is being offered at the time of recording the deed.

   b ☐ A check has been drawn payable for transmission to the credit line mortgagee or his agent for the balance due, and a satisfaction of such mortgage will be recorded as soon as it is available.

4. ☐ The real property being transferred is subject to an outstanding credit line mortgage recorded in _____ (insert liber and page or reel or other identification of the mortgage). The maximum principal amount of debt or obligation secured by the mortgage is _____. No exemption from tax is claimed and the tax of _____ is being paid herewith. *(Make check payable to county clerk where deed will be recorded or, if the recording is to take place in New York City but not in Richmond County, make check payable to the **NYC Department of Finance.**)*

Signature (both the grantor(s) and grantee(s) must sign)

The undersigned certify that the above information contained in schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of his/her knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

Grantor signature	Title	Grantee signature	Title
			NYSDEC Attorney
Grantor signature	Title	Grantee signature	Title

Reminder: Did you complete all of the required information in Schedules A, B, and C? Are you required to complete Schedule D? If you marked *e*, *f*, or *g* in Schedule A, did you complete Form TP-584.1? If the contract was executed prior to April 1, 2019, did you attach the necessary verification? Have you attached your check(s) made payable to the county clerk where recording will take place or, if the recording is in the New York City boroughs of Manhattan, Bronx, Brooklyn, or Queens, to the ***NYC Department of Finance***? If no recording is required, send this return and your check(s), made payable to the ***NYS Department of Taxation and Finance***, directly to the NYS Tax Department, RETT Return Processing, PO Box 5045, Albany NY 12205-0045. If not using U.S. Mail, see Publication 55, *Designated Private Delivery Services*.

Signature (both the grantor(s) and grantee(s) must sign)

The undersigned certify that the above information contained in schedules A, B, and C, including any return, certification, schedule, or attachment, is to the best of his/her knowledge, true and complete, and authorize the person(s) submitting such form on their behalf to receive a copy for purposes of recording the deed or other instrument effecting the conveyance.

Grantor signature	Title	Grantee signature	Title
			NYSDEC Attorney
Grantor signature	Title	Grantee signature	Title

2019080200116301

Schedule D – Certification of exemption from the payment of estimated personal income tax (Tax Law, Article 22, § 663)

Complete the following only if a fee simple interest or a cooperative unit is being transferred by an individual or estate or trust.

If the property is being conveyed by a referee pursuant to a foreclosure proceeding, proceed to Part 2, mark the second box under *Exemptions for nonresident transferor(s)/seller(s)*, and sign at bottom.

Part 1 – New York State residents

If you are a New York State resident transferor(s)/seller(s) listed in Form TP-584-NYC, Schedule A (or an attachment to Form TP-584-NYC), you must sign the certification below. If one or more transferors/sellers of the real property or cooperative unit is a resident of New York State, **each** resident transferor/seller must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all resident transferors/sellers.

Certification of resident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law, § 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Note: A resident of New York State may still be required to pay estimated tax under Tax Law, § 685(c), but not as a condition of recording a deed.

Part 2 – Nonresidents of New York State

If you are a nonresident of New York State listed as a transferor/seller in Form TP-584-NYC, Schedule A (or an attachment to Form TP-584-NYC) but are not required to pay estimated personal income tax because one of the exemptions below applies under Tax Law, § 663(c), mark the box of the appropriate exemption below. If any one of the exemptions below applies to the transferor(s)/seller(s), that transferor(s)/seller(s) is not required to pay estimated personal income tax to New York State under Tax Law, § 663. **Each** nonresident transferor/seller who qualifies under one of the exemptions below must sign in the space provided. If more space is needed, photocopy this Schedule D and submit as many schedules as necessary to accommodate all nonresident transferors/sellers.

If none of these exemption statements apply, you must complete Form IT-2663, *Nonresident Real Property Estimated Income Tax Payment Form*, or Form IT-2664, *Nonresident Cooperative Unit Estimated Income Tax Payment Form*. For more information, see *Payment of estimated personal income tax*, on Form TP-584-NYC-I, page 1.

Exemption for nonresident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law, § 663 due to one of the following exemptions:

☐ The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ (Date) to _____ (Date) *(see instructions)*.

☐ The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.

☐ The transferor or transferee is an agency or authority of the United States of America, an agency or authority of the state of New York, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Certification of resident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) as signed below was a resident of New York State, and therefore is not required to pay estimated personal income tax under Tax Law, section 663(a) upon the sale or transfer of this real property or cooperative unit.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

Exemption for nonresident transferor(s)/seller(s)

This is to certify that at the time of the sale or transfer of the real property or cooperative unit, the transferor(s)/seller(s) (grantor) of this real property or cooperative unit was a nonresident of New York State, but is not required to pay estimated personal income tax under Tax Law, section 663 due to one of the following exemptions:

☐ The real property or cooperative unit being sold or transferred qualifies in total as the transferor's/seller's principal residence (within the meaning of Internal Revenue Code, section 121) from _____ (Date) to _____ (Date) *(see instructions)*.

☐ The transferor/seller is a mortgagor conveying the mortgaged property to a mortgagee in foreclosure, or in lieu of foreclosure with no additional consideration.

☐ The transferor or transferee is an agency or authority of the United States of America, an agency or authority of the state of New York, the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, the Government National Mortgage Association, or a private mortgage insurance company.

Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date
Signature	Print full name	Date

NEW YORK CITY DEPARTMENT OF FINANCE

NYC - RPT

Department of Finance

REAL PROPERTY TRANSFER TAX RETURN

(Pursuant to Title 11, Chapter 21, NYC Administrative Code)

▲ DO NOT WRITE IN THIS SPACE ▲
FOR OFFICE USE ONLY

GRANTOR

● Name: LUCIANO LLC

● Grantor is a(n): (check one) ☐ individual ☐ partnership ☐ corporation ☐ single member LLC ☑ multiple member LLC (see instructions) ☐ other _____

Telephone Number:

● Permanent mailing address after transfer (number and street): 124-22 QUEENS BOULEVARD

● City and State: KEW GARDENS, NY

Zip Code: 11415

● Single member's name if grantor is a single member LLC:

SOCIAL SECURITY NUMBER: ☐☐☐ ■ ☐☐ ■ ☐☐☐☐

OR

EMPLOYER IDENTIFICATION NUMBER: 47 ■ 3155664

SINGLE MEMBER EIN OR SSN:

GRANTEE

● Name: NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION

● Grantee is a(n): (check one) ☐ individual ☐ partnership ☑ corporation ☐ single member LLC ☐ multiple member LLC (see instructions) ☐ other _____

Telephone Number:

● Permanent mailing address after transfer (number and street): 625 BROADWAY, 14TH FLOOR

● City and State: ALBANY, NY

Zip Code: 12233

● Single member's name if grantee is a single member LLC:

SOCIAL SECURITY NUMBER: ☐☐☐ ■ ☐☐ ■ ☐☐☐☐

OR

EMPLOYER IDENTIFICATION NUMBER: 14 ■ 6013200

SINGLE MEMBER EIN OR SSN:

PROPERTY LOCATION

LIST EACH LOT SEPARATELY. ATTACH A RIDER IF ADDITIONAL SPACE IS REQUIRED

● Address (number and street)	Apt. No.	Borough	Block	Lot	# of Floors	Square Feet	● Assessed Value of Property
124-22 QUEENS BOULEVARD		QUEENS	3359	21	12	49,612	433,350.00

● DATE OF TRANSFER TO GRANTEE: 09/23/2019

● PERCENTAGE OF INTEREST TRANSFERRED: 100 %

CONDITION OF TRANSFER. See Instructions

● Check (✓) all of the conditions that apply and fill out the appropriate schedules of this return. Additionally, Schedules1 and 2 **must** be completed for all transfers.

a. ☐ ..... Arms length transfer
b. ☐ ..... Transfer in exercise of option to purchase
c. ☐ ..... Transfer from cooperative sponsor to cooperative corporation
d. ☐ ..... Transfer by referee or receiver (complete Schedule A)
e. ☐ ..... Transfer pursuant to marital settlement agreement or divorce decree (complete Schedule I)
f. ☐ ..... Deed in lieu of foreclosure (complete Schedule C)
g. ☐ ..... Transfer pursuant to liquidation of an entity (complete Schedule D)
h. ☐ ..... Transfer from principal to agent, dummy, strawman or conduit or vice-versa (complete Schedule E)
i. ☐ ..... Transfer pursuant to trust agreement or will (attach a copy of trust agreement or will)
j. ☐ ..... Gift transfer not subject to indebtedness
k. ☐ ..... Gift transfer subject to indebtedness
l. ☐ ..... Transfer to a business entity in exchange for an interest in the business entity (complete Schedule F)
m. ☐ ..... Transfer to a governmental body
n. ☐ ..... Correction deed
o. ☐ ..... Transfer by or to a tax exempt organization (complete Schedule G)
p. ☐ ..... Transfer of property partly within and partly without NYC
q. ☐ ..... Transfer of successful bid pursuant to foreclosure
r. ☐ ..... Transfer by borrower solely as security for a debt or a transfer by lender solely to return such security
s. ☐ ..... Transfer wholly or partly exempt as a mere change of identity or form of ownership. Complete Schedule M)
t. ☐ ..... Transfer to a REIT or to a corporation or partnership controlled by a REIT. (Complete Schedule R)
u. ☐ ..... Other transfer in connection with financing (describe): _____
v. ☐ ..... A grant or assignment of a leasehold interest in a tax-free NY area
w. ☐ ..... Transfer to an HDFC or an entity controlled by an HDFC. (Complete Schedule L)
x. ..... Reserved
y. ..... Reserved
z. ☑ ..... Other (describe) EASEMENT

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TYPE OF PROPERTY (✓)

a. ☐ ..... 1-3 family house
b. ☐ ..... Individual residential condominium unit
c. ☐ ..... Individual cooperative apartment
d. ☐ ..... Commercial condominium unit
e. ☐ ..... Commercial cooperative
f. ☐ ..... Apartment building
g. ☐ ..... Office building
h. ☐ ..... Industrial building
i. ☐ ..... Utility
j. ☑ ..... OTHER. (describe): COMMERCIAL REAL ESTATE

TYPE OF INTEREST (✓)

Check box at LEFT if you intend to record a document related to this transfer. Check box at RIGHT if you do not intend to record a document related to this transfer.

	REC.		NON REC.
a.	☐	Fee	☐
b.	☐	Leasehold Grant	☐
c.	☐	Leasehold Assignment or Surrender	☐
d.	☐	Easement	☑
e.	☐	Subterranean Rights	☐
f.	☐	Development Rights	☐
g.	☐	Stock	☐
h.	☐	Partnership Interest	☐
i.	☐	OTHER. (describe):	☐

SCHEDULE 1 - DETAILS OF CONSIDERATION

COMPLETE THIS SCHEDULE FOR ALL TRANSFERS AFTER COMPLETING THE APPROPRIATE SCHEDULES ON PAGES 5 THROUGH 12. ENTER "ZERO" ON LINE 11 IF THE TRANSFER REPORTED WAS WITHOUT CONSIDERATION.

1. Cash	1.	0 00
2. Purchase money mortgage	2.	0 00
3. Unpaid principal of pre-existing mortgage(s)	3.	0 00
4. Accrued interest on pre-existing mortgage(s)	4.	0 00
5. Accrued real estate taxes	5.	0 00
6. Amounts of other liens on property	6.	0 00
7. Value of shares of stock or of partnership interest received	7.	0 00
8. Value of real or personal property received in exchange	8.	0 00
9. Amount of Real Property Transfer Tax and/or other taxes or expenses of the grantor which are paid by the grantee	9.	0 00
10. Other (describe):	10.	0 00
11. **TOTAL CONSIDERATION** (add lines 1 through 10 - must equal amount entered on line 1 of Schedule 2) (see instructions)	11.	$ 0 00

See instructions for special rules relating to transfers of cooperative units, liquidations, marital settlements and transfers of property to a business entity in return for an interest in the entity.

SCHEDULE 2 - COMPUTATION OF TAX

A. Payment Pay amount shown on line 15 - *See Instructions*

		Payment Enclosed
1. Total Consideration (from line 11, above)	1.	0 00
2. Excludable liens (see instructions)	2.	0 00
3. Consideration (line 1 less line 2)	3.	0 00
4. Tax Rate (see instructions)	4.	0 %
5. HDFC Exemption (see Schedule L, line 15)	5.	0 00
6. Consideration less HDFC Exemption (line 3 less line 5)	6.	0 00
7. Percentage change in beneficial ownership (see instructions)	7.	100 %
8 Taxable consideration (multiply line 6 by line 7)	8.	0 00
9. Tax (multiply line 8 by line 4)	9.	0 00
10. Credit (see instructions)	10.	0 00
11. Transfer tax previously paid (see Schedule L, line 18)	11.	0 00
12. Tax due (line 9 less line 10 and 11) (if the result is negative, enter zero)	12.	0 00
13. Interest (see instructions)	13.	0 00
14. Penalty (see instructions)	14.	0 00
15. **Total Tax Due** (add lines 12, 13 and 14)	15.	$ 0 00

2019080200116101O2

GRANTOR'S ATTORNEY ▼

Name of Attorney		Telephone Number
KELLY CANAVAN, ESQ.		(631) 738-9100
Address (number and street)	**City and State**	**Zip Code**
CAMPOLO, MIDDLETON & MCCORMICK, LLP 4175 VETERANS MEMORIAL HIGHWAY, SUITE 400	RONKONKOMA, NY	11779
EMPLOYER IDENTIFICATION NUMBER: 26-2424728	OR	SOCIAL SECURITY NUMBER:

GRANTEE'S ATTORNEY ▼

Name of Attorney		Telephone Number
		( )
Address (number and street)	**City and State**	**Zip Code**
EMPLOYER IDENTIFICATION NUMBER:	OR	SOCIAL SECURITY NUMBER:

CERTIFICATION ▼

I swear or affirm that this return, including any accompanying schedules, affidavits and attachments, has been examined by me and is, to the best of my knowledge, a true and complete return made in good faith, pursuant to Title 11, Chapter 21 of the Administrative Code and the regulations issued thereunder.

GRANTOR

Sworn to and subscribed to before me on this 19th day of August, 2019.

47-3155664
EMPLOYER IDENTIFICATION NUMBER OR SOCIAL SECURITY NUMBER

LUCIANO LLC
Name of Grantor

Signature of Notary

Signature of Grantor

Notary's stamp or seal

HONG WU JIANG
Notary Public, State of New York
No. 01HO6189625
Qualified in Kings County
Certificate Filed in Queens County
Commission Expires June 30, 2020

GRANTEE

Sworn to and subscribed to before me on this 18th day of September, 2019.

14-6013200
EMPLOYER IDENTIFICATION NUMBER OR SOCIAL SECURITY NUMBER

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Name of Grantee

Signature of Notary

Signature of Grantee

Notary's stamp or seal

COLLEEN A. McCARTHY
Notary Public, State of New York
Qualified in Albany County
No. 02MC5046480
Commission Expires July 27, 2021

2019080200116101

APPENDIX E – SOIL BORING LOGS AND MONITORING WELL CONSTRUCTION LOGS

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	Client: ACT Project: 8172-kgny Address: 124-22 Queens Blvd, Kew Gardens, NY	BORING LOG Boring No. SB-1 Page: 1 of 1

Drilling Start Date: **06/30/2015**	Boring Depth (ft): **16.0**
Drilling End Date: **6/30/2015**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Concrete (0.5') Concrete: Fill material-brown silty soil w/ ash, coal, pebbles, loose, dry	0.4	SB-1 (0-2')	0
								(1.5') Silty SAND (SM); mostly fine grained sand, little silt, brown	0.0		
5								(4.0') Silty SAND with gravel (SM); mostly fine grained sand, little fine-coarse gravel, little silt, medium dense, wet, brown-orange	0.0	SB-1 (7')	5
10								(9.0') Fat CLAY (CH); little fine-coarse gravel, little silt, mostly clay, high plasticity, medium stiff, wet, gray-black	0.0		10
15								(15.0') Poorly graded SAND with gravel (SP); mostly fine grained sand, little fine-coarse gravel, medium dense, wet, gray (16.0') Boring terminated	0.0		15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-2 **Page:** 1 of 1

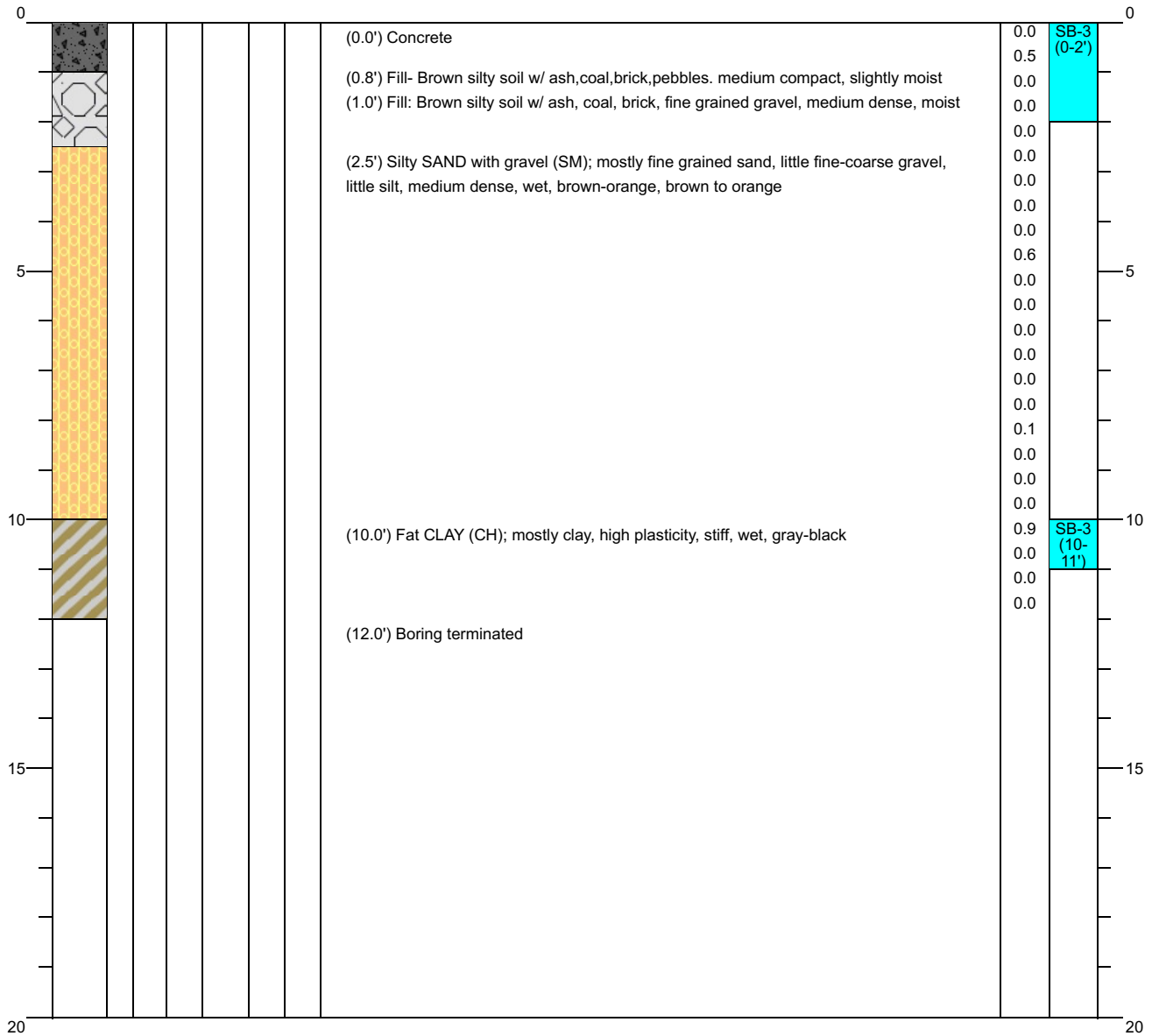
Drilling Start Date: **6/30/2015**	Boring Depth (ft): **12.0**
Drilling End Date: **6/30/2015**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Concrete	0.0	SB-2 (0-2')	0
								(0.5') Silty SAND (SM); mostly fine grained sand, little silt, loose, dry, orange-brown	0.0		
								(1.0') Silty SAND with gravel (SM); mostly fine grained sand, little coarse gravel, little silt, trace clay, loose, moist, orange-brown	0.0		
									0.0		
									0.0		
									0.0		
									0.0		
5								(4.0') SILT with sand (ML); few fine-coarse gravel, trace fine sand, some silt, moist, light brown, orange to brown	0.0		5
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(8.0') Lean CLAY (CL); trace fine-coarse gravel, little silt, medium plasticity, medium stiff, wet, orange-brown	5.2		
									18.5		
									17.2		
10								(9.5') Fat CLAY (CH); high plasticity, stiff, wet, gray	13.0		10
									27.0	SB-2 (10-11')	
									3.1		
								(11.0') ORGANIC SOIL (OL); mostly silt, wet, black	0.0		
									0.0		
								(12.0') Boring terminated			
15											15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-3 **Page:** 1 of 1

Drilling Start Date: **6/30/2015**	Boring Depth (ft): **12.0**
Drilling End Date: **6/30/2015**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-4 **Page:** 1 of 1

Drilling Start Date: **12/5/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/5/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine gravel, little silt, poorly graded, medium dense, moist, brown	4.5 8.7 8.5 19.2 10.5 3.1 4.4 2.6 2.7	SB-4 (0-3') SB-4 (3-5')	0
5								(5.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine-coarse gravel, little silt, poorly graded, medium dense, moist, brown	2.3 1.8 3.3 0.7 0.0 0.7 2.8 4.9	SB-4 (8-10')	5
10								(9.0') Fat CLAY (CH); little silt, mostly clay, high plasticity, soft, wet, gray (9.5') ORGANIC SOIL (OL); mostly silt, trace clay, low plasticity, soft, moist, black	3.1 70.0 40.0 110.0 1.9 2.1	SB-4 (10-12')	10
15								(12.0') Silty SAND (SM); mostly fine-medium grained sand, some silt, medium dense, wet, gray (13.0') Silty SAND (SM); mostly fine grained sand, little silt, medium dense, wet, gray (15.0') Boring terminated	0.3 0.0 0.4 0.0 0.0 0.0	SB-4 (13-15')	15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-5 **Page:** 1 of 1

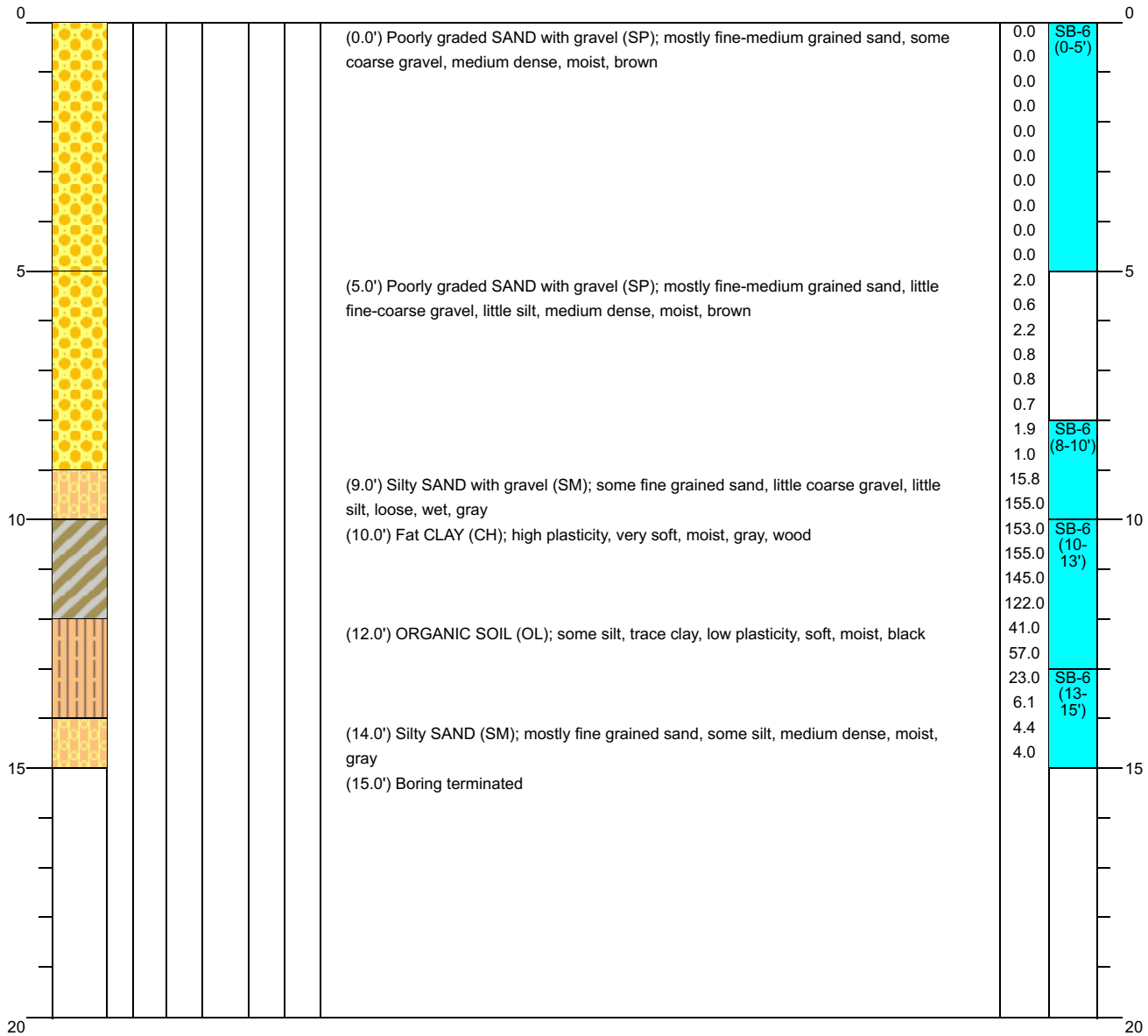
Drilling Start Date: **12/5/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/5/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method: **Direct Push**	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine-coarse gravel, little silt, medium dense, moist, brown	0.0 0.0 0.5 0.3 0.0 0.2	SB-5 (0-3')	0
									0.0 0.0 0.0 0.0	SB-5 (3-5')	
5								(5.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine-coarse gravel, some silt, medium dense, moist, brown	0.0 0.5 0.0 0.2 0.2 0.2		5
								(8.5') Fat CLAY (CH); little silt, high plasticity, stiff, wet, dark gray (9.0') ORGANIC SOIL (OL); trace clay, low plasticity, soft, wet, black	0.0 0.1 0.3 0.0	SB-5 (8-10')	
10								(10.0') Fat CLAY (CH); trace silt, high plasticity, soft, wet, black	0.3 0.8 0.2 0.2		10
								(12.0') Poorly graded SAND with gravel (SP); mostly fine-medium grained sand, little fine-coarse gravel, medium dense, moist, gray	0.0 0.0 0.4 0.0	SB-5 (13-15')	
15								(15.0') Boring terminated	0.0 0.0		15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-6 **Page:** 1 of 1

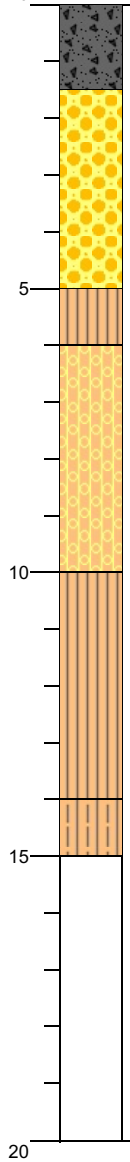
Drilling Start Date: **12/5/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/5/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-7 **Page:** 1 of 1

Drilling Start Date: **12/6/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/6/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



DEPTH (ft)	SOIL/ROCK VISUAL DESCRIPTION	PID (ppm)	Lab Sample	DEPTH (ft)
0	(0.0') Concrete	1.6	SB-7 (0-2')	0
	(1.0') Fill- Black coarse sand, shell fragments, moist, loose	7.7		
	(1.5') Poorly graded SAND (SP); mostly fine-medium grained sand, trace silt, medium dense, moist, dark brown	1.0		
		2.2		
		0.7		
		0.6		
		1.5	SB-7 (3-5')	
		0.1		
		1.9		
5		0.4		5
	(5.0') SILT (ML); trace fine gravel, some fine sand, mostly silt, low plasticity, soft, moist, brown	0.0		
		0.8		
	(6.0') Silty SAND (SM); mostly fine-medium grained sand, some silt, loose, moist, brown	1.5		
		0.5		
		0.1		
		1.2		
		2.2	SB-7 (8-10')	
		4.1		
		2.4		
10		0.0		10
	(10.0') SILT (ML); mostly silt, low plasticity, medium stiff, moist, black	0.0		
		0.0		
		0.0		
		0.0		
		0.9		
		0.2		
		0.0	SB-7 (13-15')	
		0.0		
	(14.0') ORGANIC SOIL (OL); mostly silt, little clay, low plasticity, medium stiff, moist, black	0.3		
15	(15.0') Boring terminated	0.0		15
20				20

NOTES:

Client:	ACT	BORING LOG
Project:	8172-kgny	Boring No. SB-8
Address:	124-22 Queens Blvd, Kew Gardens, NY	Page: 1 of 1

Drilling Start Date: **12/6/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/6/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Concrete (0.5') Fill- Black coarse poorly graded sand, some fine-coarse angular gravel, shells, moist, medium dense	0.0 0.0 0.0 0.3	SB-8 (0-5')	0
								(2.0') Poorly graded SAND (SP); trace silt, medium dense, dry, brown	0.0 0.1 0.0 0.0 0.0 0.0		
5								(5.0') Silty SAND (SM); mostly fine grained sand, some silt, medium dense, moist, brown	0.0 0.2 0.0 0.0		5
								(7.0') Fat CLAY (CH); some silt, mostly clay, high plasticity, soft, wet, gray	78.0 25.0 9.7 5.5 7.9 3.5	SB-8 (8-10')	
10								(10.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine gravel, little silt, medium dense, wet, brown	8.5 22.6 25.0 43.0	SB-8 (10-12')	10
								(12.0') Fat CLAY (CH); little fine sand, little silt, mostly clay, high plasticity, soft, wet, gray	71.0 18.0		
								(13.0') SILT (ML); little fine gravel, mostly silt, low plasticity, moist, black	94.0 8.5 11.0 5.7	SB-8 (13-15')	
15								(15.0') Boring terminated			15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	Client: ACT Project: 8172-kgny Address: 124-22 Queens Blvd, Kew Gardens, NY	BORING LOG Boring No. SB-9 Page: 1 of 1

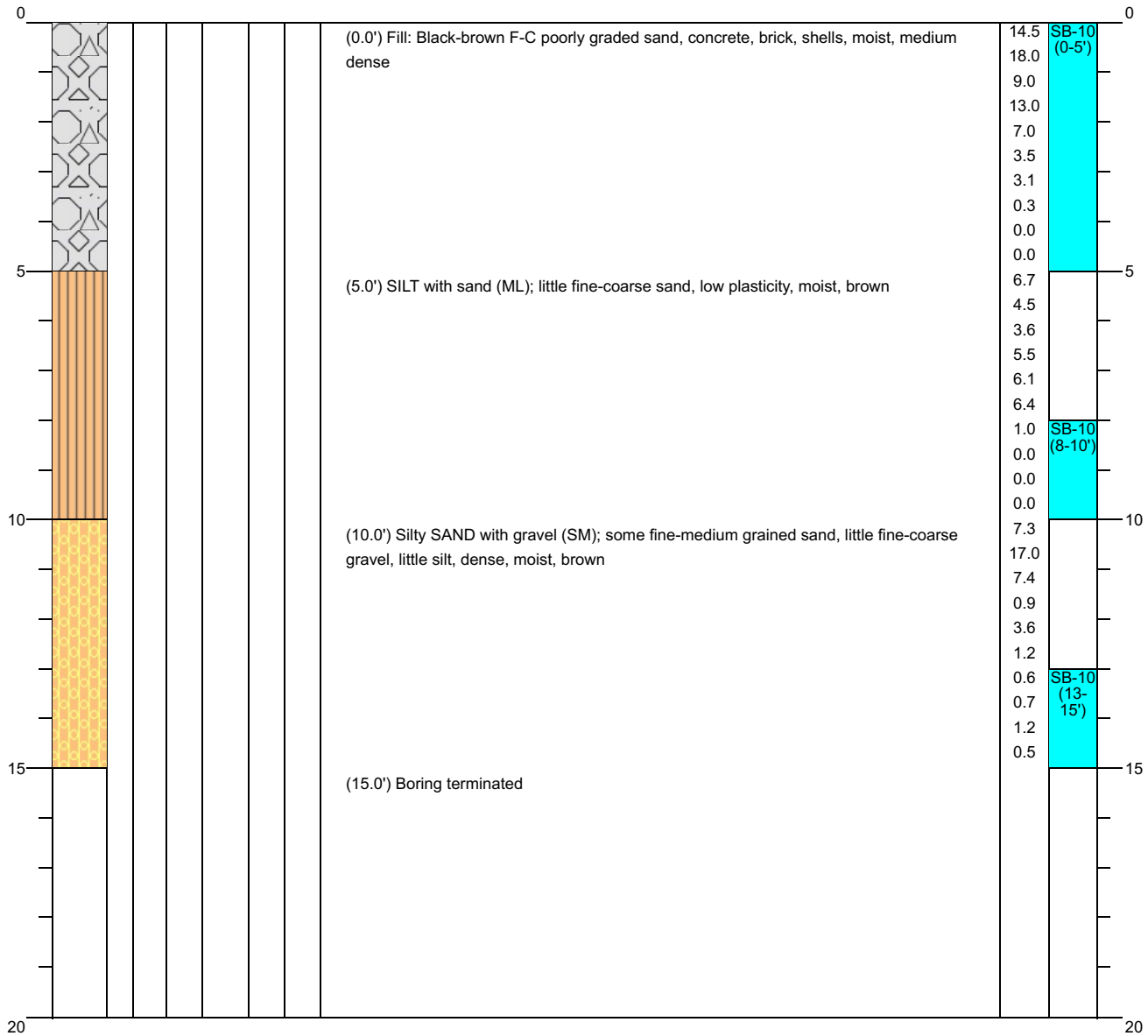
Drilling Start Date: **12/6/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/6/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Concrete: Fill- Black coal, shells, f-c angular gravel, moist, medium dense (0.5') Silty SAND with gravel (SM); mostly fine grained sand, little fine-coarse gravel, little silt, medium dense, moist, brown	0.1 0.0 0.0 0.0 0.1 0.0	SB-9 (0-2')	0
									0.0 0.1 0.4 0.2	SB-9 (3-5')	
5								(5.0') Poorly graded SAND with gravel (SP); mostly fine-medium grained sand, some fine-coarse gravel, medium dense, moist, brown	0.0 0.2 0.3 0.6 0.0 0.0		5
								(8.0') Fat CLAY (CH); trace silt, high plasticity, soft, moist, gray	0.0 0.0 0.0 0.0	SB-9 (8-10')	
10								(9.5') SILT (ML); mostly silt, low plasticity, moist, black (10.0') ORGANIC SOIL (OL); mostly silt, some clay, low plasticity, moist, grayish black	0.0 0.0 0.0 0.0 0.7 0.0		10
								(12.5') Silty SAND (SM); mostly fine grained sand, trace coarse gravel, some silt, loose, moist, gray	0.0 0.0 0.0 0.0	SB-9 (13-15')	
15								(15.0') Boring terminated			15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-10 **Page:** 1 of 1

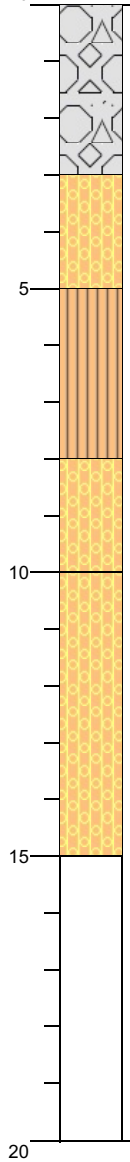
Drilling Start Date: **12/6/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/6/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-12 **Page:** 1 of 1

Drilling Start Date: **12/20/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/20/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



DEPTH (ft)	SOIL/ROCK VISUAL DESCRIPTION	PID (ppm)	Lab Sample	DEPTH (ft)
0	(0.0') Fill: 0-3 feet. Brown-Black, poorly graded sand, little f-c gravel, trace silt, black, shells, moist, medium dense	40.0	SB-12 (0-2)	0
		110.0		
		61.0		
		97.0		
		184.0		
		19.0		
	(3.0') Silty SAND with gravel (SM); little fine-coarse gravel, little silt, medium dense, moist, dark brown, root	421.0	SB-12 3-5	
		527.0		
		2,200		
		675.0		
5	(5.0') SILT (ML); some fine sand, mostly silt, low plasticity, wet, light brown	640.0	SB-12 5-7	5
		520.0		
		260.0		
		150.0		
	(7.0') As Above: mostly silt, trace fine gravel, mottled orange-gray	260.0		
		150.0		
	(8.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine-coarse gravel, little silt, dense, moist, reddish-brown	530.0	SB-12 8-10	
		400.0		
		480.0		
		60.0		
10	(10.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine-coarse gravel, dense, moist, red-brown	120.0		10
		125.0		
		170.0		
		320.0		
		140.0		
		400.0		
		140.0	SB-12 (13-15')	
		115.0		
		30.0		
		360.0		
15	(15.0') Boring terminated			15
20				20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-13 **Page:** 1 of 1

Drilling Start Date: **12/20/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/20/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Fill (0.5') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine-coarse gravel, little silt, medium dense, moist, red-brown	0.8 0.8 0.7 0.7	SB-13 (0-2')	0
5								(5.0') As Above: - Some silt, little coarse gravel (6.0') SILT (ML); trace coarse gravel, mostly silt, trace clay, low plasticity, stiff, moist, brown-gray	0.6 0.5 0.4 0.4 0.4 0.2 0.3 0.0 0.7 0.3 0.0 0.7	SB-13 (3-5')	5
10								(9.5') Silty SAND (SM); mostly fine-medium grained sand, trace fine gravel, little silt, medium dense, moist, gray (10.0') As Above: no gravel, some silt, wet, loose, brown (12.0') As Above: Little silt, medium dense, moist, gray	0.3 0.5 0.5 0.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	SB-13 (8-10')	10
15								(14.0') As Above (15.0') Boring terminated	0.0 0.0 0.0 0.0	SB-13 (13-15')	15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-15 **Page:** 1 of 1

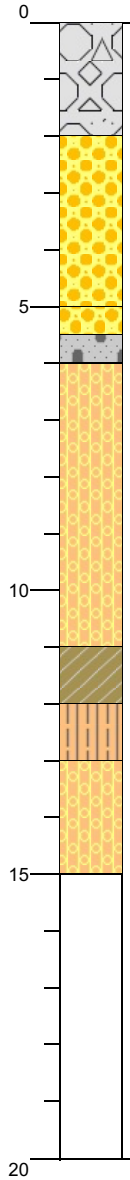
Drilling Start Date: **12/19/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/19/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Fill: concrete (0.5') Poorly graded SAND with gravel (SP); mostly fine-coarse grained sand, some fine-coarse gravel, trace silt, medium dense, moist, brown		SB-15 (0-2')	0
									0.2	SB-15 (3-5')	
5								(5.0') As Above: Poorly graded sand (SP) -Trace fine gravel			5
								(7.0') Silty SAND (SM); mostly fine-coarse grained sand, medium dense, wet, brown	0.1		
								(8.0') Silty SAND (SM); mostly fine grained sand, some silt, medium dense, wet, brown		SB-15 (8-10')	
10								(9.0') Elastic SILT (MH); mostly silt, some clay, medium plasticity, soft, moist, gray (9.5') ORGANIC SOIL (OL); trace fine sand, low plasticity, medium stiff, moist, black (10.0') Silty SAND (SM); mostly fine grained sand, little silt, medium dense, wet, brown			10
								(11.5') SILT (ML); little fine sand, mostly silt, low plasticity, soft, wet, black			
								(13.0') Silty SAND with gravel (SM); some fine-coarse gravel, medium dense, moist, gray		SB-15 (13-15')	
15								(15.0') Boring terminated			15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-16 **Page:** 1 of 1

Drilling Start Date: **12/19/16**	Boring Depth (ft): **15.0**
Drilling End Date: **12/19/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

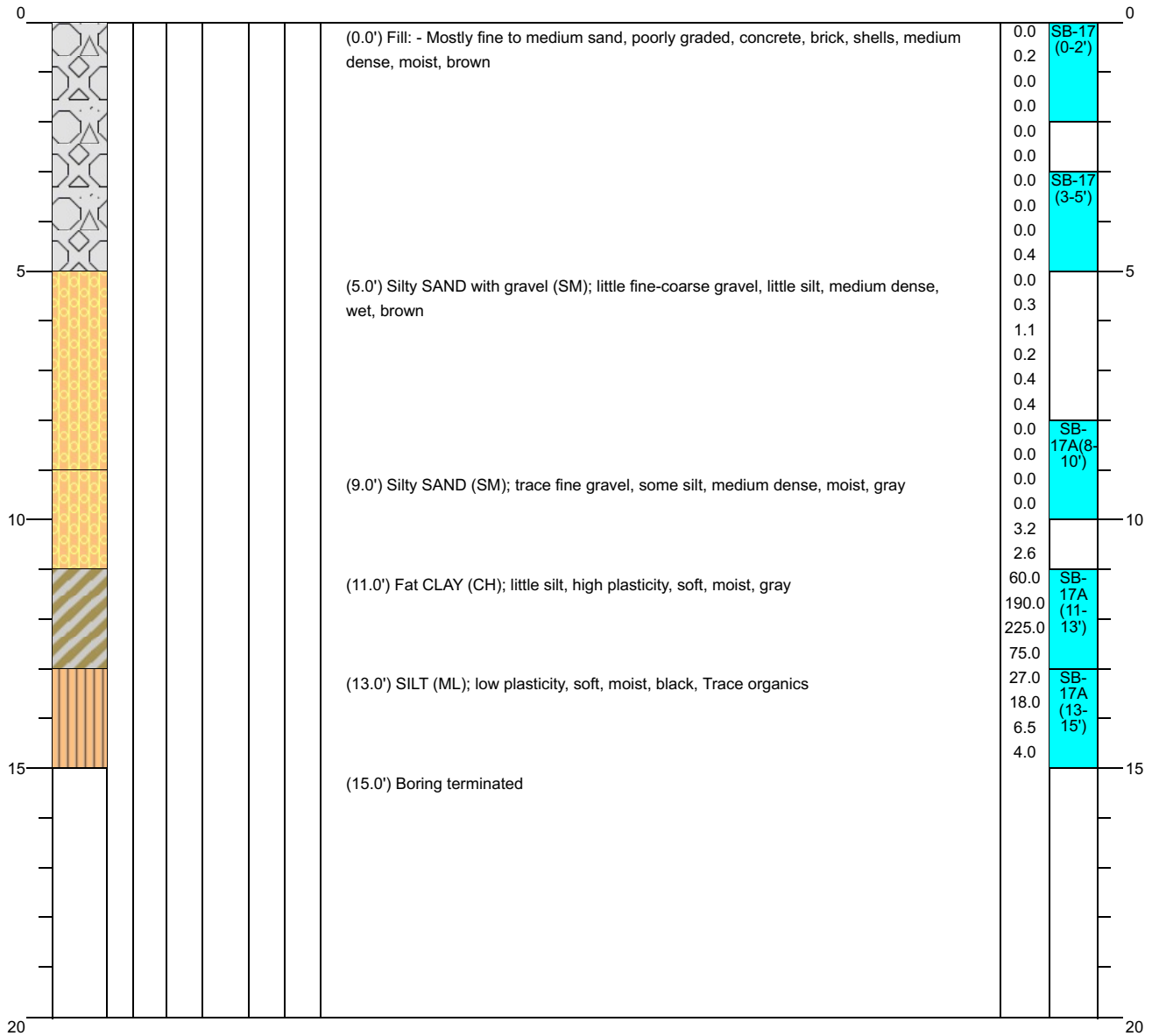


DEPTH (ft)	SOIL/ROCK VISUAL DESCRIPTION	PID (ppm)	Lab Sample	DEPTH (ft)
0	(0.0') Fill: Black poorly graded gravel, shell, brick, concrete, moist, dense	0.0	SB-16 (0-2')	0
		0.0		
		0.0		
		0.0		
	(2.0') Poorly graded SAND (SP); trace fine gravel, trace silt, medium dense, moist, brown	0.4		
		0.2		
		0.0	SB-16 (3-5')	
		0.0		
		0.0		
		0.0		
5	(5.0') Poorly graded SAND (SP); trace fine-coarse gravel, trace silt, medium dense, moist, brown	0.1		5
	(5.5') Poorly graded GRAVEL with sand (GP); little fine-coarse sand, medium dense, moist, brown	0.0		
	(6.0') Silty SAND with gravel (SM); little fine gravel, little silt, medium dense, moist, brown	0.0		
		0.0		
		0.0		
		0.0	SB-16 (8-10')	
		0.0		
		0.0		
		0.0		
10	(10.0') As Above: Mostly fine sand, some silt, trace fine gravel	0.0		10
	(11.0') Lean CLAY (CL); some silt, medium plasticity, moist, gray, medium stiff	0.0		
		0.0		
	(12.0') ORGANIC SOIL (OL); trace fine gravel, low plasticity, medium stiff, moist, black	0.0		
		0.0		
	(13.0') Silty SAND with gravel (SM); little fine gravel, little silt, medium dense, moist, brown, roots	0.0	SB-16 (13-15')	
		0.0		
		0.0		
		0.0		
15	(15.0') Boring terminated			15
20				20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-17/17A **Page:** 1 of 1

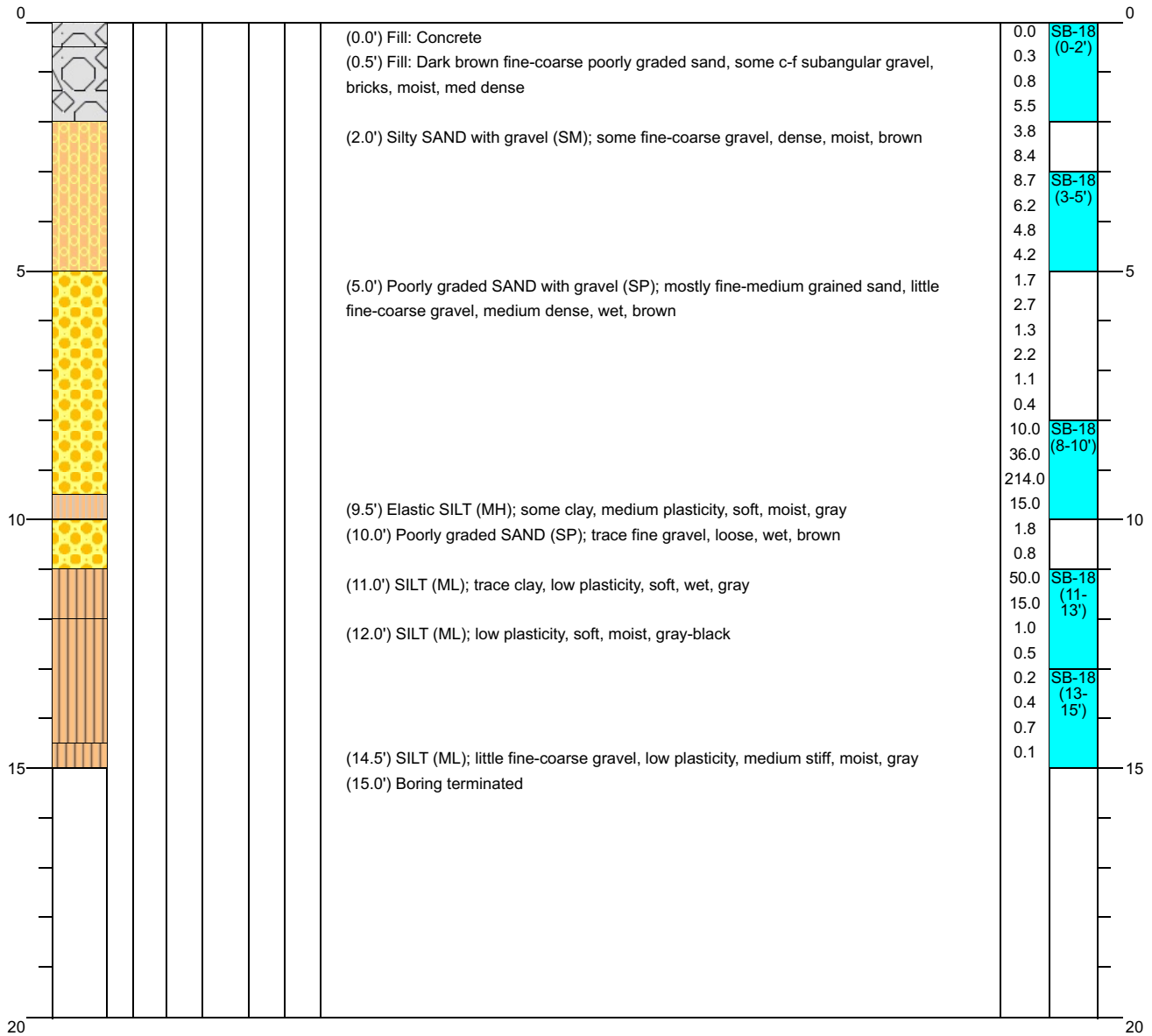
Drilling Start Date: **12/19/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/19/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-18 **Page:** 1 of 1

Drilling Start Date: **12/19/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/19/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-19 **Page:** 1 of 1

Drilling Start Date: **12/20/2016**	Boring Depth (ft): **15.0**
Drilling End Date: **12/20/2016**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Concrete	0.0	SB-19 (0-2')	0
								(0.5') Silty SAND with gravel (SM); little fine-coarse gravel, some silt, medium dense, moist, light brown	0.2		
									0.0		
									0.0		
									0.0		
									0.0		
									0.2	SB-19 (3-5')	
									0.0		
									0.0		
5									0.0		5
								(5.0') Silty SAND with gravel (SM); little fine-coarse gravel, little silt, medium dense, moist, brown	0.2		
									1.2		
									0.6		
									1.0		
									0.1		
									0.3		
									0.0	SB-19 (8-10')	
									0.0		
									0.2		
10									0.1		10
								(10.0') Silty SAND (SM); mostly fine-coarse grained sand, trace fine-coarse gravel, little silt, medium dense, moist, dark brown	0.2		
									0.0		
									1.7		
									2.0		
									1.9		
									2.0		
									1.5	SB-19 (13-15')	
									0.7		
									0.0		
15								(15.0') Boring terminated	0.0		15
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-20 **Page:** 1 of 1

Drilling Start Date: **2/17/2017**	Boring Depth (ft): **16.0**
Drilling End Date: **2/17/2017**	Boring Diameter (in):
Drilling Company:	Sampling Method(s): **Direct Push**
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				DP			0.0	(0.0') Fill: concrete, shells, coal, fine gravel, moist, some poorly graded sand	0.0	SB-20 0-2	0
									0.0		
									0.0		
									0.0		
								(2.0') Poorly graded SAND (SP); mostly fine-medium grained sand, trace fine-coarse gravel, trace silt, medium dense, moist, light brown	0.0		
									0.0		
									0.0		
									0.0		
				DP			4.0	(4.0') As Above	0.0	SB-20 4-5	
5									0.0		5
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
				DP			4.0	(8.0') Poorly graded SAND (SP); some fine-medium grained sand, trace coarse gravel, few silt, medium dense, moist, dark brown, sub angular to sub rounded, tr. oxidation	0.0	SB-20 8-10	
10									0.0		10
									0.0		
									0.0		
									0.0		
									0.0		
				DP			4.0	(12.0') As Above	0.0		
									0.0		
									0.0	SB-20 13-15	
									0.0		
									0.0		
15									0.0		15
									0.4		
								(16.0') Boring terminated			
								(16.0') As Above			
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-21/21A **Page:** 1 of 1

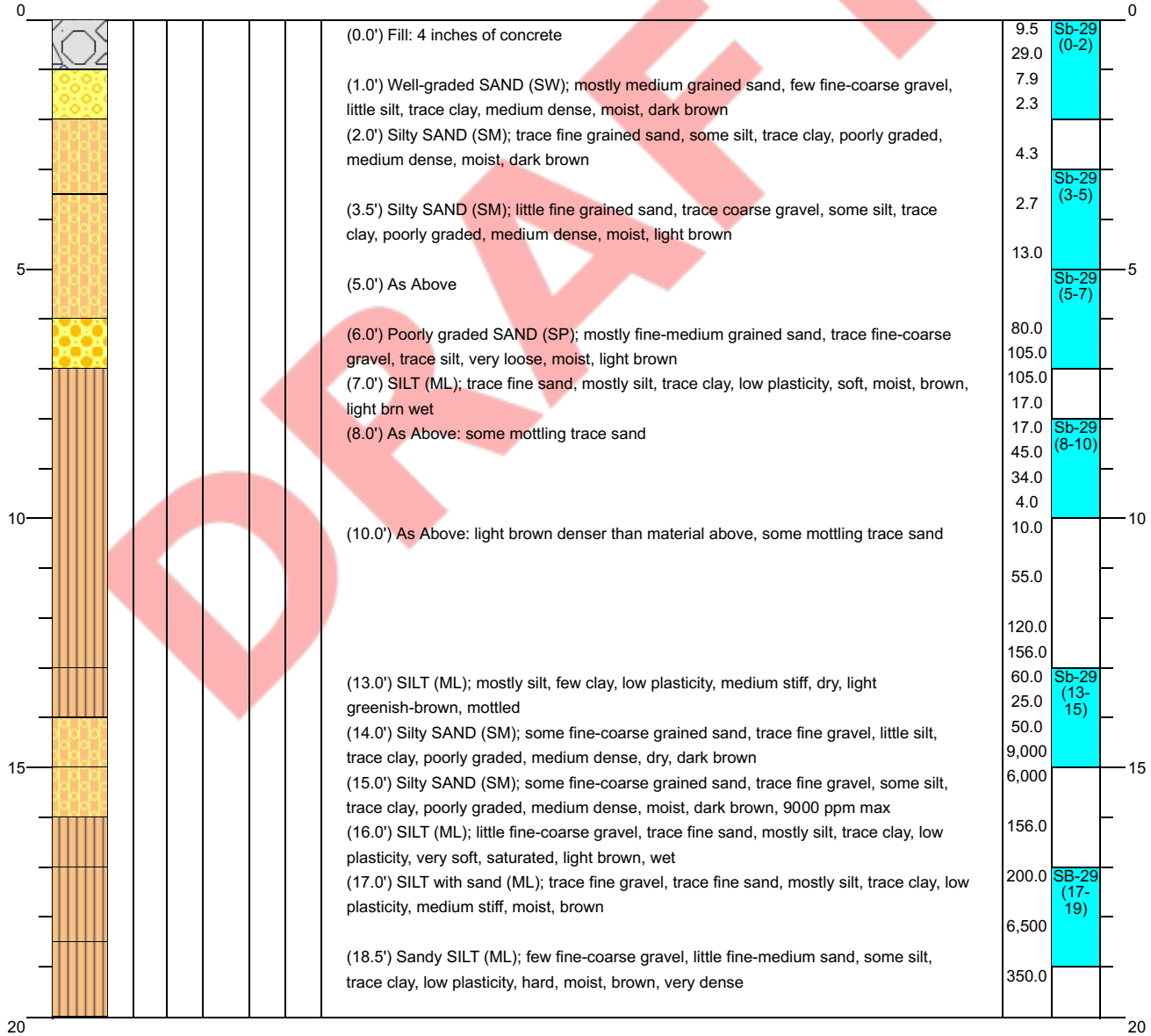
Drilling Start Date: **2/21/2017**	Boring Depth (ft): **16.0**
Drilling End Date: **2/21/2017**	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Silty SAND (SM); trace fine gravel, trace silt, medium dense, moist, light brown	0.0	SB-21/21A (0-2')	0
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(4.0') As Above: With weathered bedrock fragments Granite-Gneiss. Last 5" moist	0.0	SB-21/21A (4-5')	
5									0.0		5
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(8.0') SILT with sand (ML); little fine sand, mostly silt, low plasticity, medium stiff, moist, light brown-gray	0.0	SB-21/21A (8-10')	
								(9.0') ORGANIC SOIL (OL); mostly silt, very dark gray, black	0.0		
									0.0		
10									0.0		10
									0.0		
								(11.0') SILT (ML); little fine sand, low plasticity, soft, wet, Mottled-green to blue/grey	0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(14.0') Silty SAND (SM); little silt, poorly graded, loose, moist, brown	4.5	SB-21/21A (14-16')	
									7.0		
15									4.0		15
									1.7		
								(16.0') Boring terminated			
20											20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	Client: ACT Project: 8172-kgny Address: 124-22 Queens Blvd, Kew Gardens, NY	BORING LOG Boring No. SB-29 Page: 1 of 2

Drilling Start Date:	Boring Depth (ft): 0
Drilling End Date:	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES: Hole precleared on 08/02/2017 09:33.

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-29 **Page:** 2 of 2

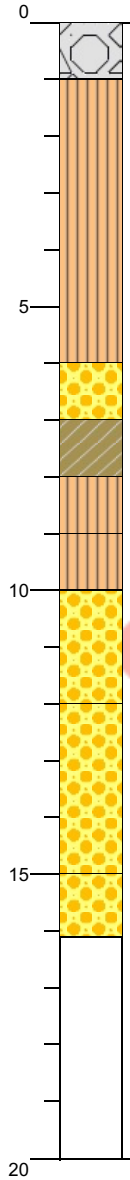
Drilling Start Date:	Boring Depth (ft): 0
Drilling End Date:	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(20.0') As Above	130.0		20
								(21.0') Silty SAND (SM); little fine-medium grained sand, some silt, trace clay, poorly graded, very loose, saturated, brown	36.0 289.0 210.0 82.0		
								(23.0') Silty SAND (SM); some fine-medium grained sand, little silt, poorly graded, very loose, wet, brown	26.0 22.0	Sb-29 (23-25)	
25								(24.5') Silty SAND (SM); some medium grained sand, few fine gravel, some silt, poorly graded, very dense, wet, brown (25.0') As Above	42.0 36.0		25
30											30
35											35
40											40

NOTES: Hole precleared on 08/02/2017 09:33.

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-30 **Page:** 1 of 1

Drilling Start Date:	Boring Depth (ft): 0
Drilling End Date:	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



DEPTH (ft)	SOIL/ROCK VISUAL DESCRIPTION	PID (ppm)	Lab Sample	DEPTH (ft)
0	(0.0') Fill: brick. plaster	1.7	Sb-30 (0-2)	0
	(1.0') SILT with sand (ML); few coarse gravel, little fine-coarse sand, mostly silt, low plasticity, soft, dry, brown	0.8 0.0 0.0 0.0 1.0		
	(3.5') As Above: glass fragments	0.0	Sb-30 (3-5)	
5	(5.0') As Above: trace brick and fill materials	0.0 0.0 0.0 0.2 0.6		5
	(6.0') Poorly graded SAND (SP); some fine-coarse grained sand, few fine-coarse gravel, few silt, loose, moist, brown, some brick material (7.0') Lean CLAY (CL); trace fine sand, some silt, little clay, medium plasticity, medium stiff, wet, light brown (8.0') SILT with sand (ML); trace fine sand, mostly silt, trace clay, nonplastic, stiff, moist, greenish-brown, mottled (9.0') SILT with sand (ML); little fine-medium sand, some silt, nonplastic, medium stiff, moist, reddish-brown, oxidized (9.5') As Above	3.8 4.8 0.7 2.4 1.2 5.7 8.2 7.9	Sb-30 (8-10)	
10	(10.0') Poorly graded SAND (SP); some fine-coarse grained sand, few coarse gravel, little silt, very dense, moist, brown, dense, glacial till	7.6 7.7 8.6 11.0		10
	(12.0') Poorly graded SAND (SP); some fine-coarse grained sand, few coarse gravel, little silt, very dense, moist, brown	16.0 5.7 12.0	Sb-30 (13-15)	
15	(14.5') As Above (15.0') Poorly graded SAND (SP); some fine-coarse grained sand, trace fine-coarse gravel, little silt, medium dense, wet, brown (16.0') As Above: redrilled last sampler. refusal at 16 feet	390.0 550.0 150.0 4.8 450.0 211.0		15
20				20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	Client: ACT Project: 8172-kgny Address: 124-22 Queens Blvd, Kew Gardens, NY	BORING LOG Boring No. SB-31A Page: 1 of 2

Drilling Start Date:	Boring Depth (ft): 0
Drilling End Date:	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.0') Fill: gray poorly graded gravel, some medium sand, moist, no sheen, concrete, metal shards, brick fragments	0.0	SB-31A (0-2)	0
								(1.0') Poorly graded SAND with gravel (SP); mostly fine-medium grained sand, some fine-coarse gravel, dense, moist, brown	0.0		
									0.0		
									0.0		
									0.0		
									0.0	SB-31A (3-5)	
									0.0		
									0.0		
5								(4.5') As Above	0.0		5
								(5.0') Poorly graded SAND with gravel (SP); mostly fine-medium grained sand, some fine-coarse gravel, little silt, dense, moist, brown	0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0	SB-31A (8-10)	
								(8.5') As Above	0.0		
								(9.0') Poorly graded SAND with gravel (SP); mostly fine-medium grained sand, little fine-coarse gravel, trace silt, medium dense, moist, gray	0.0		
10								(9.5') As Above	0.0		10
								(10.0') Silty SAND with gravel (SM); some fine-coarse grained sand, some fine-coarse gravel, little silt, poorly graded, dense, moist, gray-black, glacial till	0.0		
									0.0		
									0.0		
									0.0		
								(12.5') As Above	0.0	SB-31A (13-15)	
								(13.0') Silty SAND with gravel (SM); some fine grained sand, some fine-coarse gravel, little silt, poorly graded, dense, moist, gray-brown	0.2		
									0.0		
15								(14.5') As Above	4.7		15
								(15.0') Silty SAND with gravel (SM); mostly fine-medium grained sand, little fine-coarse gravel, little silt, poorly graded, dense, moist, brown, glacial till	0.2		
									1.8		
									0.0		
									0.0		
									12.0		
									17.0		
									26.0	SB-31A (18-20)	
									1.3		
									105.0		
									56.0		
20								(19.5') As Above			20

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-31A **Page:** 2 of 2

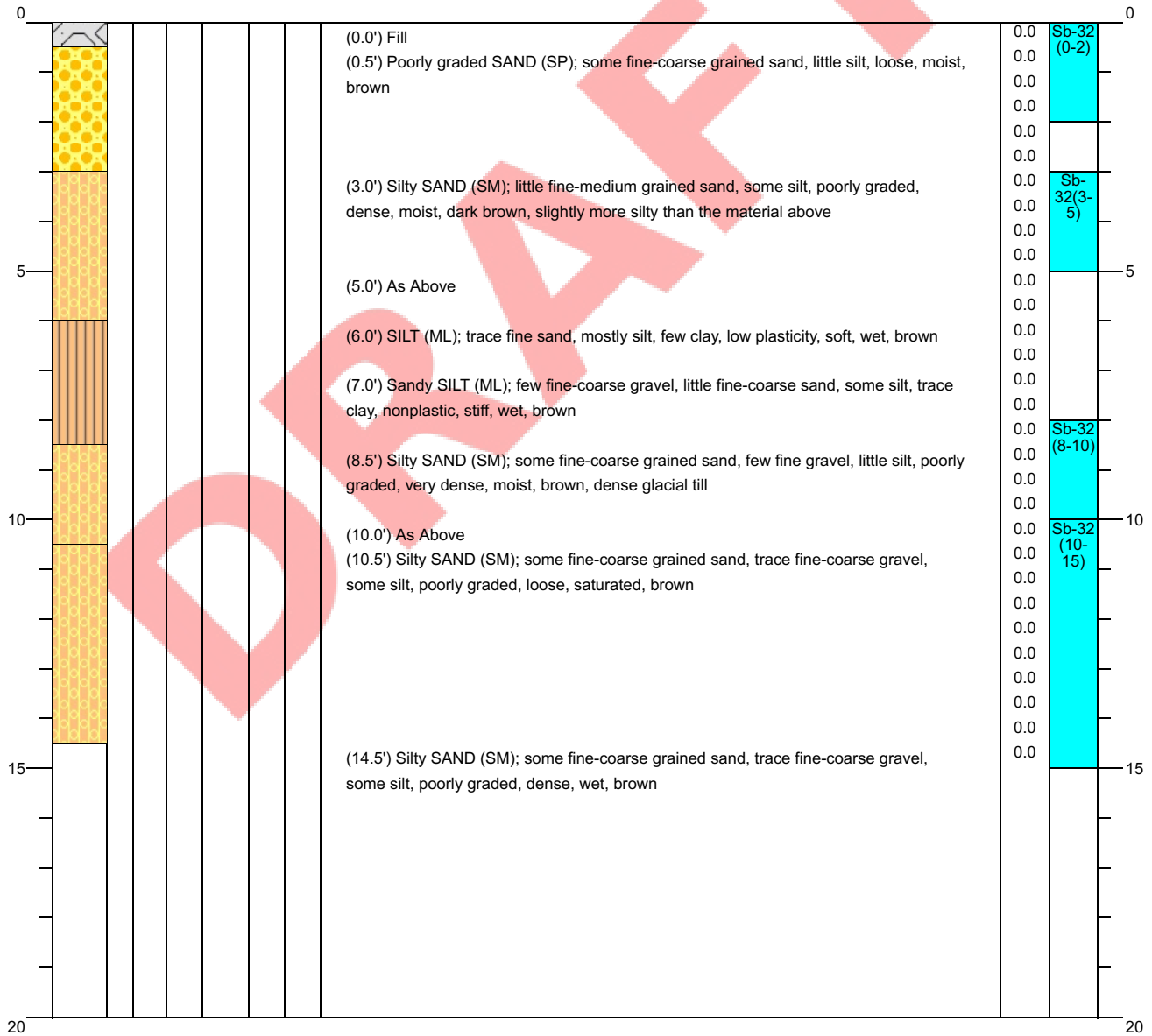
Drilling Start Date:	Boring Depth (ft): **0**
Drilling End Date:	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(20.0') No Recovery (20.5') No Recovery (21.0') Poorly graded SAND with gravel (SP); mostly fine-medium grained sand, little fine-coarse gravel, brown, liner stuck in sampler, able to recover lower Foot of liner 21-22'. (21.5') met refusal at 22'	21.0 21.0	SB-31A (21-22)	20
25											25
30											30
35											35
40											40

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**BORING LOG** **Boring No.** SB-32A **Page:** 1 of 1

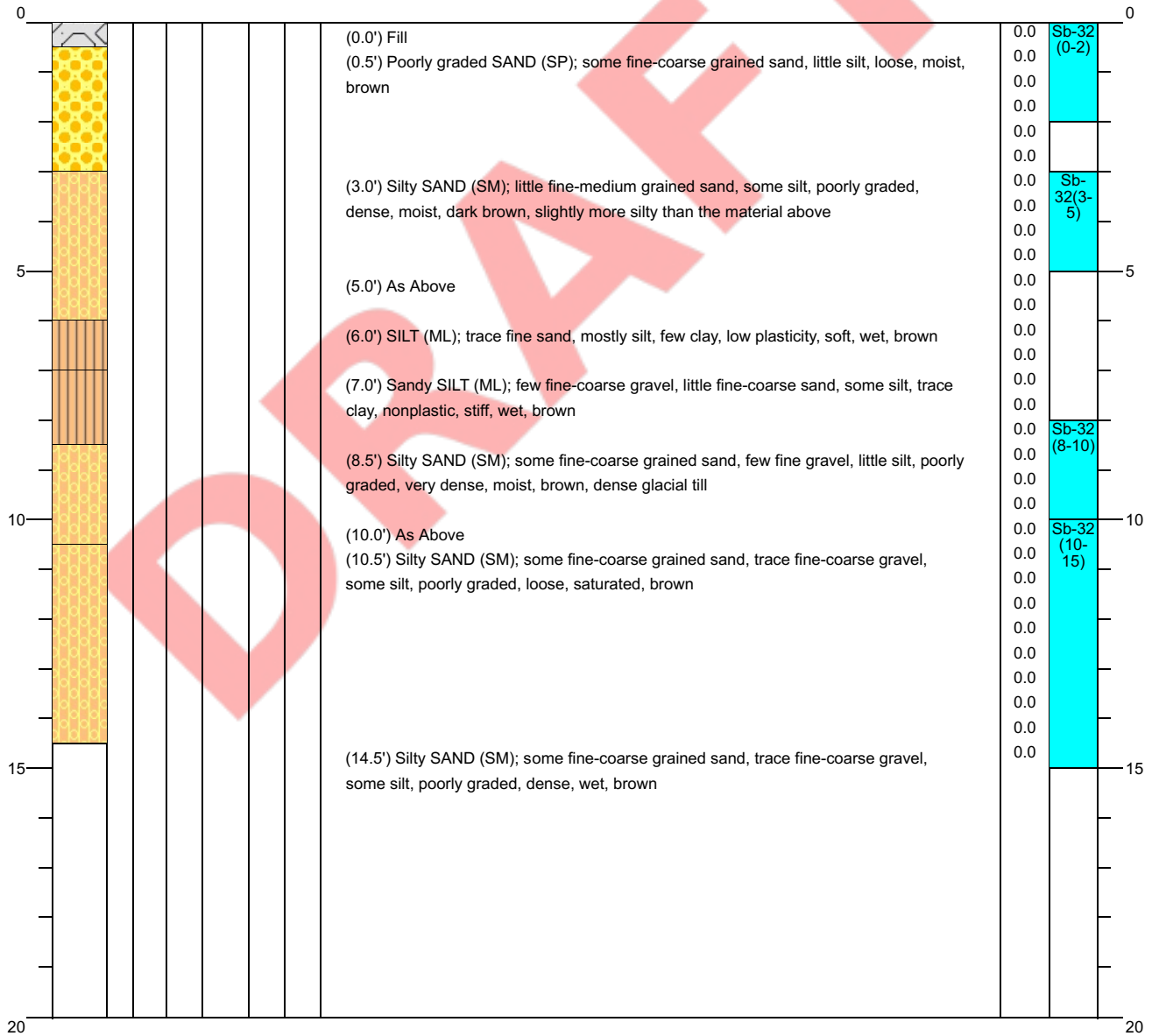
Drilling Start Date:	Boring Depth (ft): **0**
Drilling End Date:	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	Client: ACT Project: 8172-kgny Address: 124-22 Queens Blvd, Kew Gardens, NY	BORING LOG Boring No. SB-32B Page: 1 of 1

Drilling Start Date:	Boring Depth (ft): 0
Drilling End Date:	Boring Diameter (in):
Drilling Company:	Sampling Method(s):
Drilling Method:	DTW During Drilling (ft):
Drilling Equipment:	DTW After Drilling (ft):
Driller:	Ground Surface Elev. (ft):
Logged By: **Alexandra Keenan**	Location (X,Y):



NOTES:

4' PT

* Drilling in water (at surface) poor drainage (?) soon as gravel cleared the hole fills w/ water

* NO PPM's recorded on SB-33 boring *

FIELD
SOIL BORING LOG

* photovac fault 3 - not operating *

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS
960 S. Broadway
Hicksville, NY

West Mw-1

JOB No.: 872-K6NY
LOCATION: 124-22 Queens Blvd Flushing, NY
Drilling Method: Direct Push drilling technology- PORTABLE

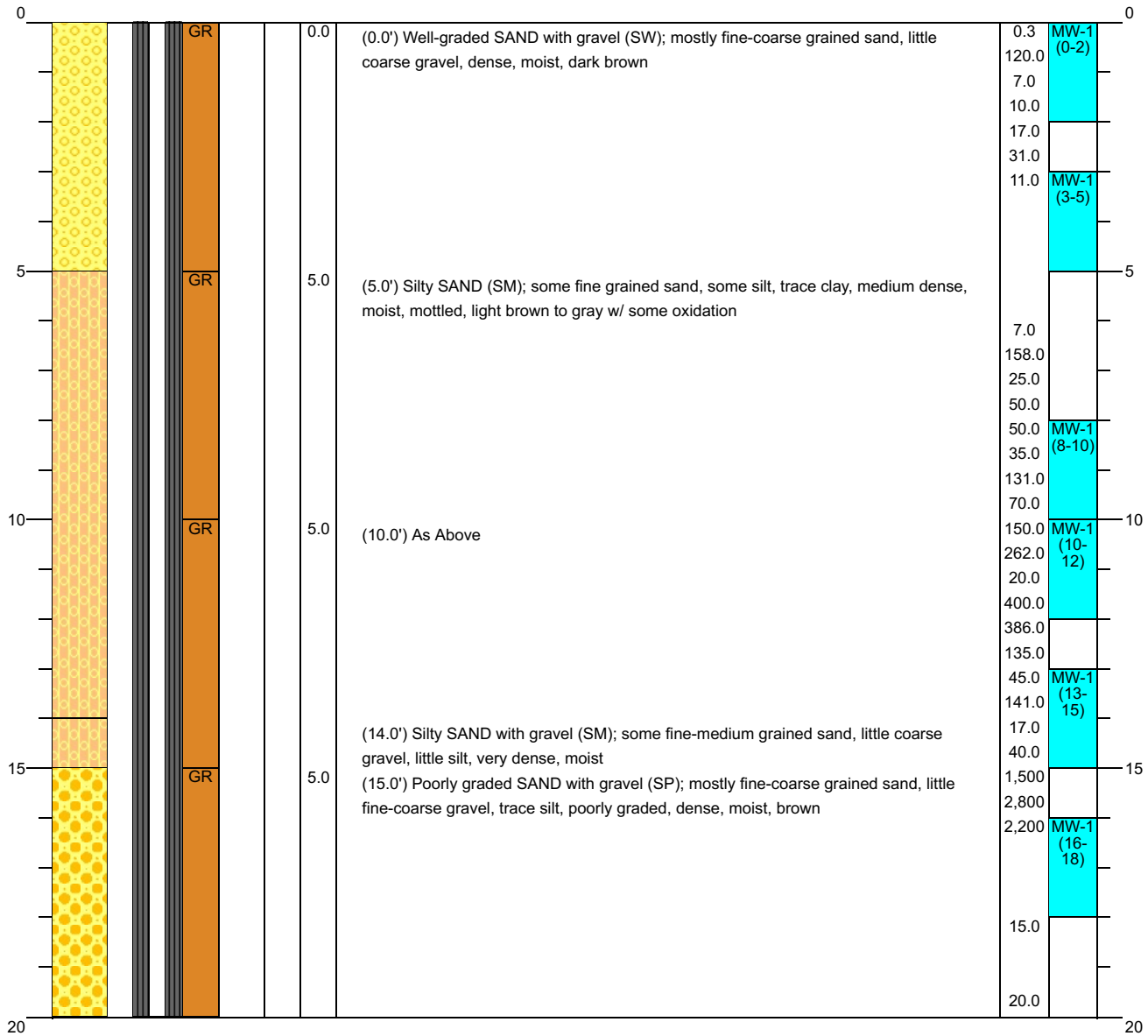
BORING NUMBER: SB "33"
DATE: 9/7/18
WEATHER: humid, cool cloudy

Depth (ft. bgs)	Depth (ft)	Recovery (ft)	PID (ppm)	USCS Symbol	Description	Environmental Description
			4350 ppb		0-1 - coarse sands - light brown to brown - silty - compact - wet from poor drainage @1 large concrete fragment poor sort	little to no odors
1			3830 ppb			
	0-4	3'ft	2650 ppb			
2			270 ppb		1-4 - light brown to brown - medium sands - silty - compact/dense abundant pea sized gravels well sorted - No observable odors	
			137 ppb			
3			0 ppb			
			0 ppb			
4			560 ppb			
			* 780 ppb →		~6" redrill - saturated mud + some gravels from surface	780 ppb most likely part of redrill
5			0 ppb			
		Full	0 ppb		Uniform liner of: light brown to brown - medium sands - silty - dense/compact - abundant pea gravels mod sorting (no odors) + larger rounded stones (abundant)	no observable odors
6	4-8		0 ppb			
			0 ppb			
7			0 ppb			
			0 ppb			
8			0 ppb			
			0 ppb		Stuck liner - Knocked out tried to keep as chronological as possible.	Stuck liner - had to knock out soils
9		soils knocked out on plastic				
10	8-12				all light browns - mediums to fines - parts saturated - very compact/dense Well sorted abundant pea gravels	
11						
12						

* ODORS were very minimal - nothing like compared to SB-32 - photovac PID 0ppm's *

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**WELL LOG** **Well No.** MW-1 **Page:** 1 of 5

Drilling Start Date: **2/14/2017**	Boring Depth (ft): **80.0**	Well Depth (ft): **80.0**
Drilling End Date: **2/14/2017**	Boring Diameter (in):	Well Diameter (in): **2.0**
Drilling Company:	Sampling Method(s): **Grab**	Screen Slot (in):
Drilling Method:	DTW During Drilling (ft): **70.0**	Riser Material: **Sch 40 PVC**
Drilling Equipment:	DTW After Drilling (ft): **67.0**	Screen Material: **Sch 40 PVC Slotted**
Driller:	Top of Casing Elev. (ft):	Seal Material(s): **Bent.-Cement Grout/Bent. Powder**
Logged By: **Alexandra Keenan**	Location (X,Y):	Filter Type: **#2 sand fill pro**



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**WELL LOG** **Well No.** MW-1 **Page:** 2 of 5

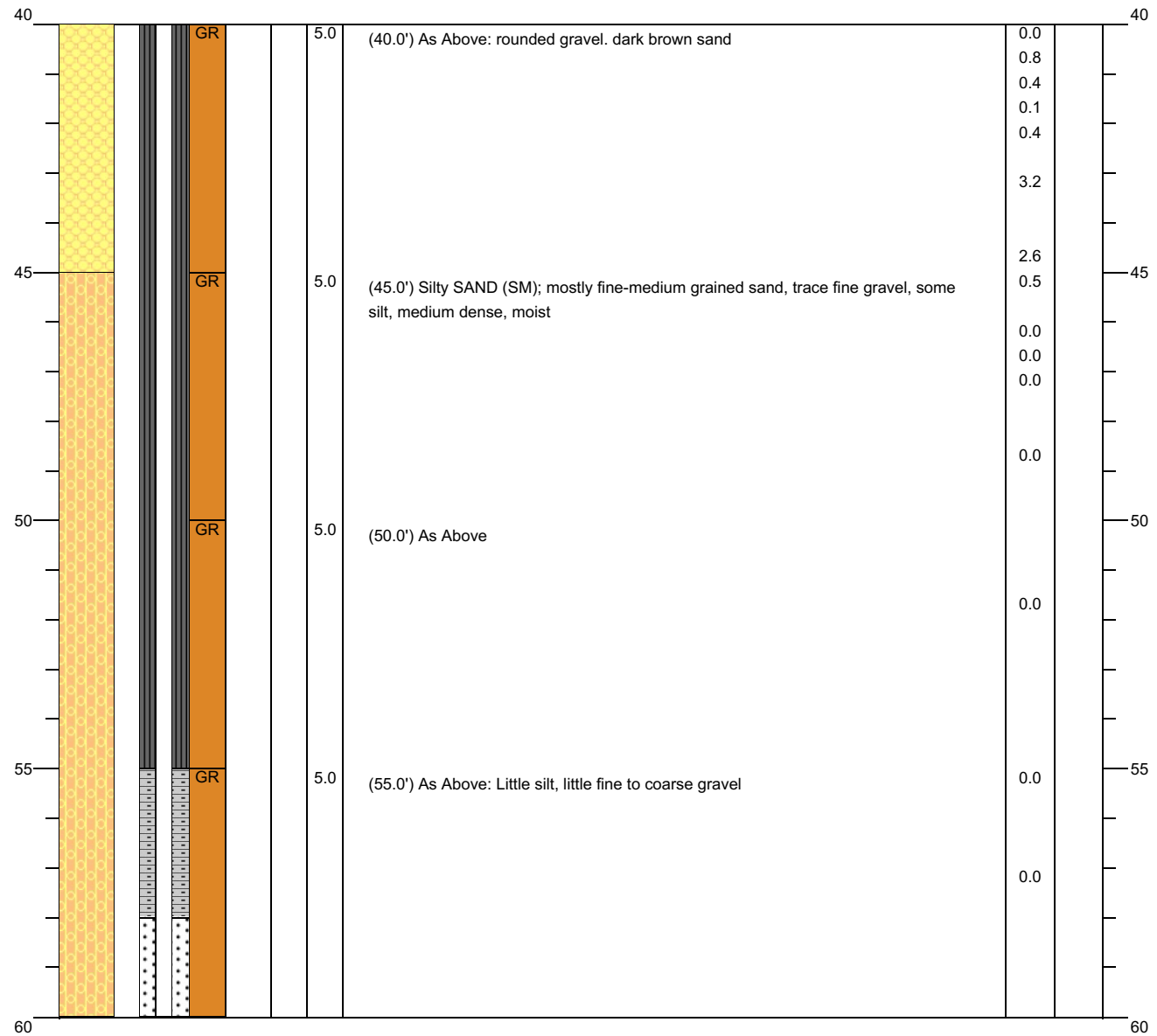
Drilling Start Date: **2/14/2017**	Boring Depth (ft): **80.0**	Well Depth (ft): **80.0**
Drilling End Date: **2/14/2017**	Boring Diameter (in):	Well Diameter (in): **2.0**
Drilling Company:	Sampling Method(s): **Grab**	Screen Slot (in):
Drilling Method:	DTW During Drilling (ft): **70.0**	Riser Material: **Sch 40 PVC**
Drilling Equipment:	DTW After Drilling (ft): **67.0**	Screen Material: **Sch 40 PVC Slotted**
Driller:	Top of Casing Elev. (ft):	Seal Material(s): **Bent.-Cement Grout/Bent. Powder**
Logged By: **Alexandra Keenan**	Location (X,Y):	Filter Type: **#2 sand fill pro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20				GR			5.0	(20.0') As Above	82.0 64.0 20.0 60.0 120.0 55.0 14.0 27.0 60.0 12.0		20
25				GR			5.0	(25.0') Poorly graded SAND with silt and gravel (SP-SM); some fine-coarse grained sand, little fine-coarse gravel, little silt, dense, wet, light to dark brown	10.0 0.5 1.2		25
								(28.0') As Above: dark brown sand	3.0 2.0		
30				GR			5.0	(30.0') As Above	2.5 2.8 1.7 0.0		30
								(32.0') encountered a large boulder (32.5') boulder (33.0') boulder (33.5') boulder (34.0') Poorly graded SAND with silt and gravel (SP-SM); some fine-coarse grained sand, little fine-coarse gravel, little silt, dense, wet, light to dark brown	0.0 0.0 0.0 0.0 0.0 0.0		
35				GR			5.0	(35.0') Poorly graded SAND with silt and gravel (SP-SM); some fine-coarse grained sand, little fine-coarse gravel, little silt, dense, wet, light to dark brown, rounded to sub-rounded gravels, some oxidation	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0		35
40											40

NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**WELL LOG** **Well No.** MW-1 **Page:** 3 of 5

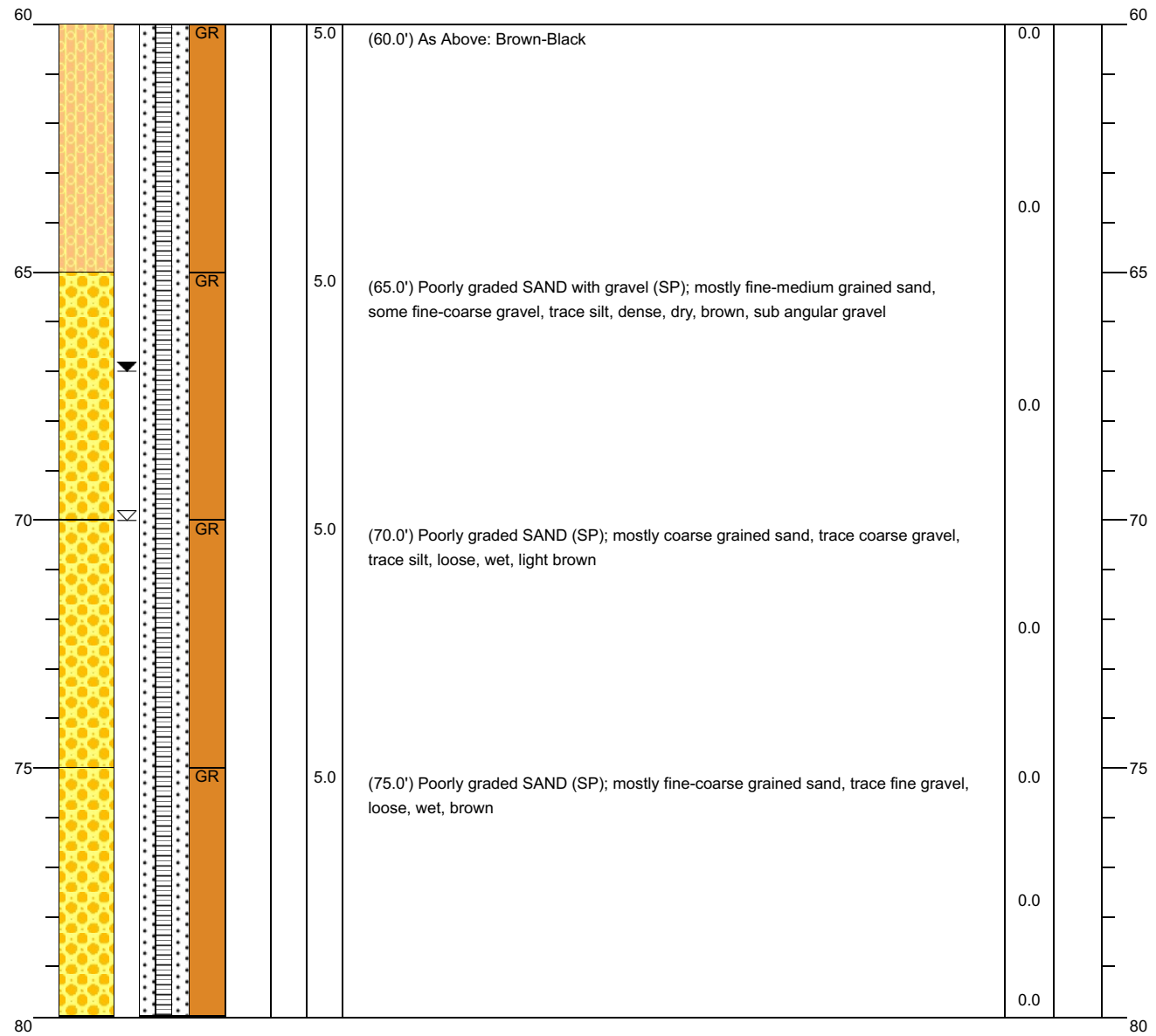
Drilling Start Date: **2/14/2017**	Boring Depth (ft): **80.0**	Well Depth (ft): **80.0**
Drilling End Date: **2/14/2017**	Boring Diameter (in):	Well Diameter (in): **2.0**
Drilling Company:	Sampling Method(s): **Grab**	Screen Slot (in):
Drilling Method:	DTW During Drilling (ft): **70.0**	Riser Material: **Sch 40 PVC**
Drilling Equipment:	DTW After Drilling (ft): **67.0**	Screen Material: **Sch 40 PVC Slotted**
Driller:	Top of Casing Elev. (ft):	Seal Material(s): **Bent.-Cement Grout/Bent. Powder**
Logged By: **Alexandra Keenan**	Location (X,Y):	Filter Type: **#2 sand fill pro**



NOTES:

Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**WELL LOG** **Well No.** MW-1 **Page:** 4 of 5

Drilling Start Date: **2/14/2017**	Boring Depth (ft): **80.0**	Well Depth (ft): **80.0**
Drilling End Date: **2/14/2017**	Boring Diameter (in):	Well Diameter (in): **2.0**
Drilling Company:	Sampling Method(s): **Grab**	Screen Slot (in):
Drilling Method:	DTW During Drilling (ft): **70.0**	Riser Material: **Sch 40 PVC**
Drilling Equipment:	DTW After Drilling (ft): **67.0**	Screen Material: **Sch 40 PVC Slotted**
Driller:	Top of Casing Elev. (ft):	Seal Material(s): **Bent.-Cement Grout/Bent. Powder**
Logged By: **Alexandra Keenan**	Location (X,Y):	Filter Type: **#2 sand fill pro**



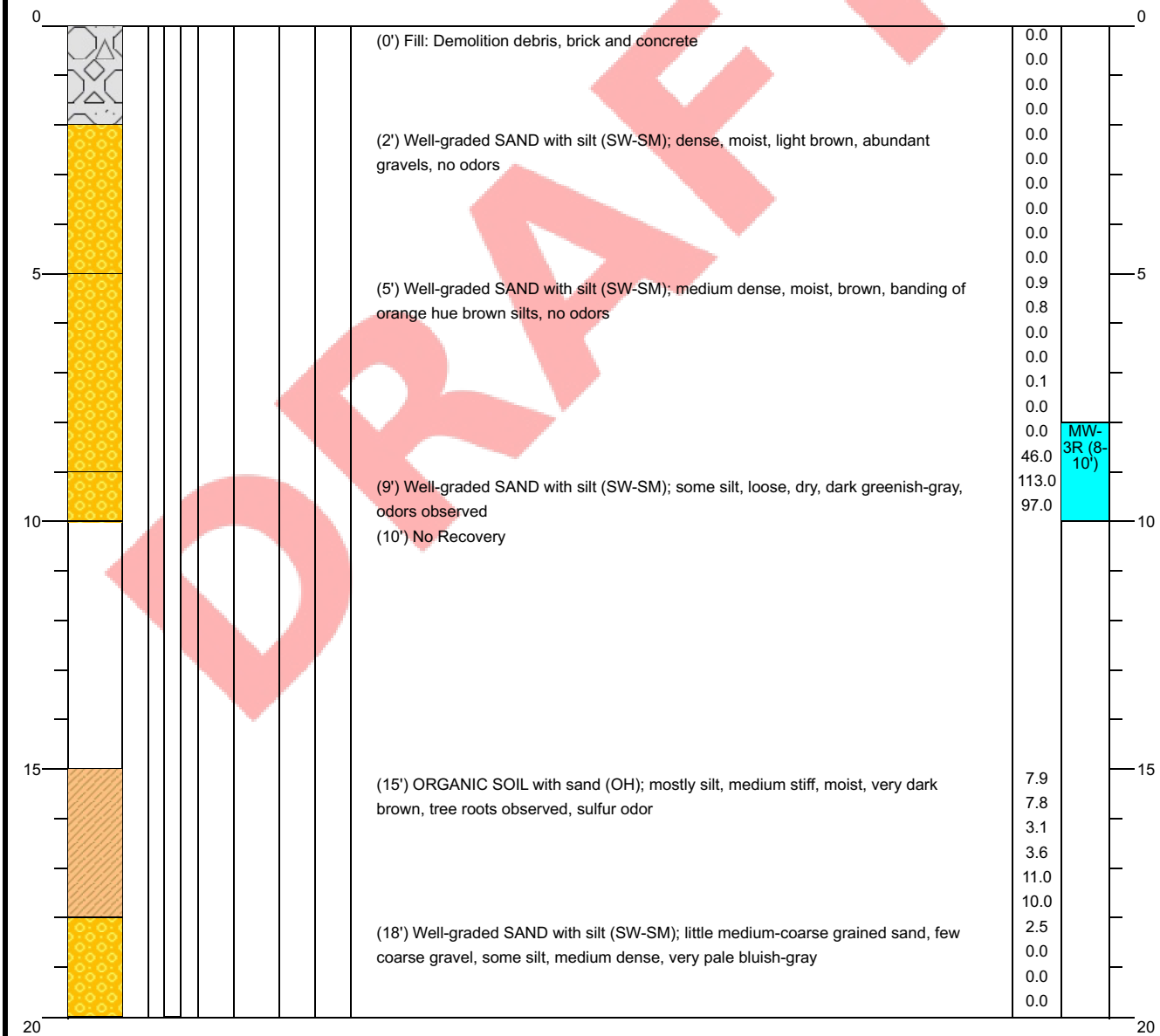
Advanced Cleanup Technologies, Inc. ENVIRONMENTAL CONSULTANTS	**Client:** ACT **Project:** 8172-kgny **Address:** 124-22 Queens Blvd, Kew Gardens, NY	**WELL LOG** **Well No.** MW-1 **Page:** 5 of 5

Drilling Start Date: **2/14/2017**	Boring Depth (ft): **80.0**	Well Depth (ft): **80.0**
Drilling End Date: **2/14/2017**	Boring Diameter (in):	Well Diameter (in): **2.0**
Drilling Company:	Sampling Method(s): **Grab**	Screen Slot (in):
Drilling Method:	DTW During Drilling (ft): **70.0**	Riser Material: **Sch 40 PVC**
Drilling Equipment:	DTW After Drilling (ft): **67.0**	Screen Material: **Sch 40 PVC Slotted**
Driller:	Top of Casing Elev. (ft):	Seal Material(s): **Bent.-Cement Grout/Bent. Powder**
Logged By: **Alexandra Keenan**	Location (X,Y):	Filter Type: **#2 sand fill pro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
80								(80.0') Boring terminated			80
85											85
90											90
95											95
100											100

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-3R
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 1 of 4

Drilling Start Date:	**07/23/2018 9:00**	Boring Depth (ft):	**75.0**	Well Depth (ft):	**75.0**
Drilling End Date:	**7/23/2018 14:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**65.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**



NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-3R
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 2 of 4

Drilling Start Date:	**07/23/2018 9:00**	Boring Depth (ft):	**75.0**	Well Depth (ft):	**75.0**
Drilling End Date:	**7/23/2018 14:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**65.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(20') As Above: abundance of large rounded stones	0.0		20
25								(25') As Above	0.0		25
30								(32') As Above: transition to very pale reddish-gray	0.0		30
35								(35') Well-graded SAND with gravel (SW); some fine-medium grained sand, some coarse gravel, dense, moist, very pale reddish-brown, abundances of rounded stones and pebbles	0.0		35
40								(39') Well-graded SAND with gravel (SW); some fine-medium grained sand, some coarse gravel, little silt, dense, moist, pale bluish-gray	0.0		40

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-3R
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 3 of 4

Drilling Start Date:	**07/23/2018 9:00**	Boring Depth (ft):	**75.0**	Well Depth (ft):	**75.0**
Drilling End Date:	**7/23/2018 14:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**65.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
40								(40') Well-graded SAND with silt (SW-SM); some medium-coarse grained sand, some silt, dense, pale bluish-gray, transitions into sands described in (42-45') via layering	0.0		40
									0.3		
									0.3		
									1.0		
								(42') Silty SAND (SM); some fine grained sand, few coarse gravel, well-graded, very dense, dry, very pale greenish-gray, to pale brown fine grained sand	2.2		
									6.0		
									1.4		
									4.0		
									0.0		
									0.4		
45								(45') Well-graded SAND with silt and gravel (SW-SM); mostly medium grained sand, some coarse gravel, very dense, moist, light reddish-brown	0.0		45
									0.8		
									0.0		
									0.4		
									2.3		
									0.3		
								(48') Well-graded SAND with silt (SW-SM); some medium grained sand, some silt, very dense, dry, dark gray, abundance of rounded pebbles	0.0		
									0.7		
									0.4		
									2.0		
50								(50') Well-graded SAND with silt (SW-SM); mostly medium grained sand, trace fine gravel, little silt, medium dense, moist, light bluish-gray, abundance of rounded pebbles	0.0		50
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.3		
									0.5		
									0.2		
									1.5		
55								(55') As Above	0.0		55
									0.0		
									0.0		
									1.2		
									0.0		
									0.0		
									0.0		
									0.0		
									0.4		
60									1.1		60

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-3R
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 4 of 4

Drilling Start Date:	**07/23/2018 9:00**	Boring Depth (ft):	**75.0**	Well Depth (ft):	**75.0**
Drilling End Date:	**7/23/2018 14:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**65.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
60								(60') Well-graded SAND with silt and gravel (SW-SM); mostly medium-coarse grained sand, some coarse gravel, little silt, loose, moist, light brown with orange hue, embedded olive grey silt nodules	2.1 0.5 1.0 0.2 1.1 2.1		60
								(63') As Above: with exception to embedded silt nodules	1.0 5.5 3.4 6.6	MW-3R (63-65')	
65		▽						(65') Well-graded SAND (SW); mostly coarse grained sand, little silt, very loose, wet, dark greenish-gray, presumed field observed GW table	2.0 0.2 0.3 1.7 0.3 0.7 0.2 7.5 4.9 2.6		65
70								(70') Poorly graded SAND (SP); mostly coarse grained sand, little silt, loose, wet, brown	5.4 4.4 2.4 2.6		70
								(72') Poorly graded SAND (SP); mostly medium grained sand, few silt, loose, wet, light brown with orange hue	0.6 0.6 0.0 0.0		
75								(74') Clayey SAND (SC); few medium grained sand, some silt, poorly graded, very dense, moist, orange brown	0.0 0.0		75
80											80

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-4
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 1 of 4

Drilling Start Date:	**7/24/18 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/24/2018 17:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0') street level - (0-13') excavated			0
5											5
10											10
15								(13') Silty GRAVEL (GM); some silt, very loose, saturated, dark brown, mud from surface/excavations	0.0		15
								(15') Well-graded SAND with silt and gravel (SW-SM); mostly medium-coarse grained sand, some coarse gravel, little silt, medium dense, wet, light bluish-gray	0.0		
								(18') Well-graded SAND with silt and gravel (SW-SM); mostly medium-coarse grained sand, some coarse gravel, some silt, medium dense, wet, reddish-brown, abundance of large rounded cobbles, no odors	0.0		
20											20

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-4
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 2 of 4

Drilling Start Date:	**7/24/18 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/24/2018 17:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(19') Well-graded SAND with silt and gravel (SW-SM); some medium-coarse grained sand, some coarse gravel, some silt, medium dense, wet, light brown, to greenish/blue, muddy, abundance of large rounded cobbles	0.0		20
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(23') As Above: abundance of large rounded cobbles	0.0		
									0.0		
									0.0		
									0.0		
25								(25') Silty SAND with gravel (SM); some medium grained sand, little fine gravel, some silt, dense, moist, light brown, gray brown, trace BR fragments (BANDED LAYERS)	0.0		25
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(28') Well-graded SAND with silt and gravel (SW-SM); mostly coarse grained sand, some coarse gravel, little silt, dense, moist, light reddish-brown, light gray-brown, abundance of large rounded cobbles (ALTERNATING BANDS)	0.0		
									0.0		
									0.0		
30									0.0		30
									0.5		
									0.0		
									0.3		
									1.0		
									6.2		
									2.4		
								(33') Well-graded SAND with silt (SW-SM); some medium grained sand, few coarse gravel, some silt, very dense, moist, reddish-brown, minor odors	4.5		
									5.5		
									8.9		
									8.3		
35									6.4		35
									1.5		
									3.9		
								(36') Well-graded SAND (SW); mostly medium grained sand, few coarse gravel, some silt, very dense, moist, light brown, minor odors	7.7		
									9.4		
									6.8		
									5.7		
								(38') Well-graded SAND with silt (SW-SM); mostly medium grained sand, few coarse gravel, little silt, very dense, moist, light reddish-brown, abundance of large rounded cobbles, high odors observed	2.3		
									0.7		
40									2.6		40

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-4
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 3 of 4

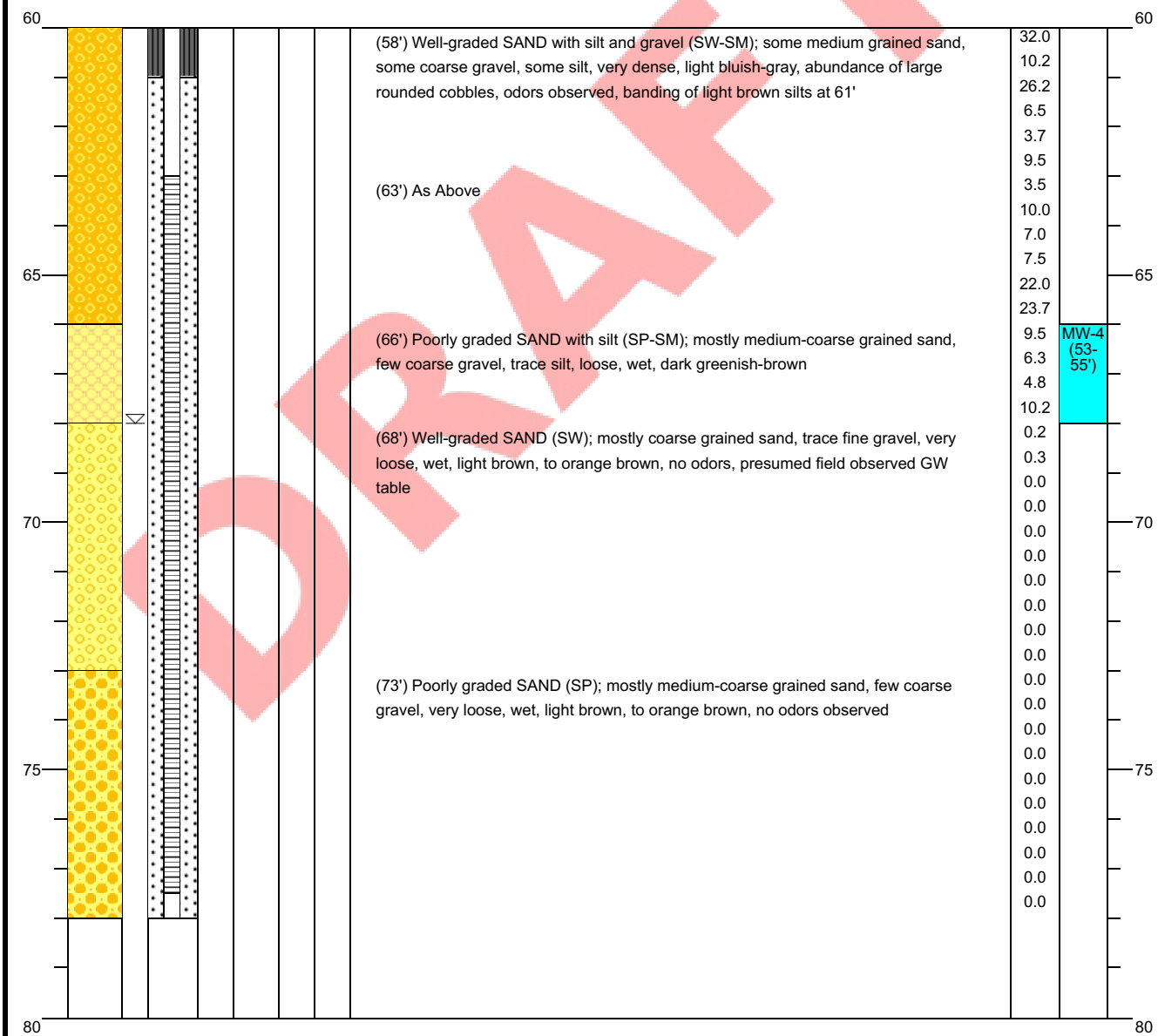
Drilling Start Date:	**7/24/18 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/24/2018 17:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
40								(38') Well-graded SAND with silt (SW-SM); mostly medium grained sand, few coarse gravel, little silt, very dense, moist, light reddish-brown, abundance of large rounded cobbles, high odors observed	26.0		40
									18.0		
									15.5		
									14.3		
									37.9		
									40.2		
								(43') As Above: with an abundance of large rounded cobbles, odors observed	2.7		
									7.3		
									14.6		
45									14.8		45
									2.0		
									2.9		
									2.2		
									2.2		
									0.2		
								(47') Poorly graded SAND with silt (SP-SM); mostly medium grained sand, trace coarse gravel, little silt, loose, moist, brown, minor odors observed	3.9		
								(48') Well-graded SAND with silt and gravel (SW-SM); some fine-medium grained sand, some fine gravel, little silt, dense, moist, light reddish-brown	2.0		
									1.6		
									0.3		
50									0.5		50
									3.1		
									3.8		
									26.0		
								(51') As Above: banding of gray, fine silts, high odors observed	7.5		
									10.4		
									10.2		
								(53') Well-graded SAND with silt (SW-SM); some fine-medium grained sand, few coarse gravel, some silt, very dense, moist, light gray, abundance of large rounded cobbles, high odors observed, banding of brown silts at 56'	1.2		
									7.9		
									9.0		
									14.9		
55									9.9		55
									19.6		
									15.5	MW-4 (43-45)'	
									60.0		
									6.9		
									30.0		
								(58') Well-graded SAND with silt and gravel (SW-SM); some medium grained sand, some coarse gravel, some silt, very dense, light bluish-gray, abundance of large rounded cobbles, odors observed, banding of light brown silts at 61'	2.4		
									10.6		
									5.5		
60									7.9		60

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-4
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 4 of 4

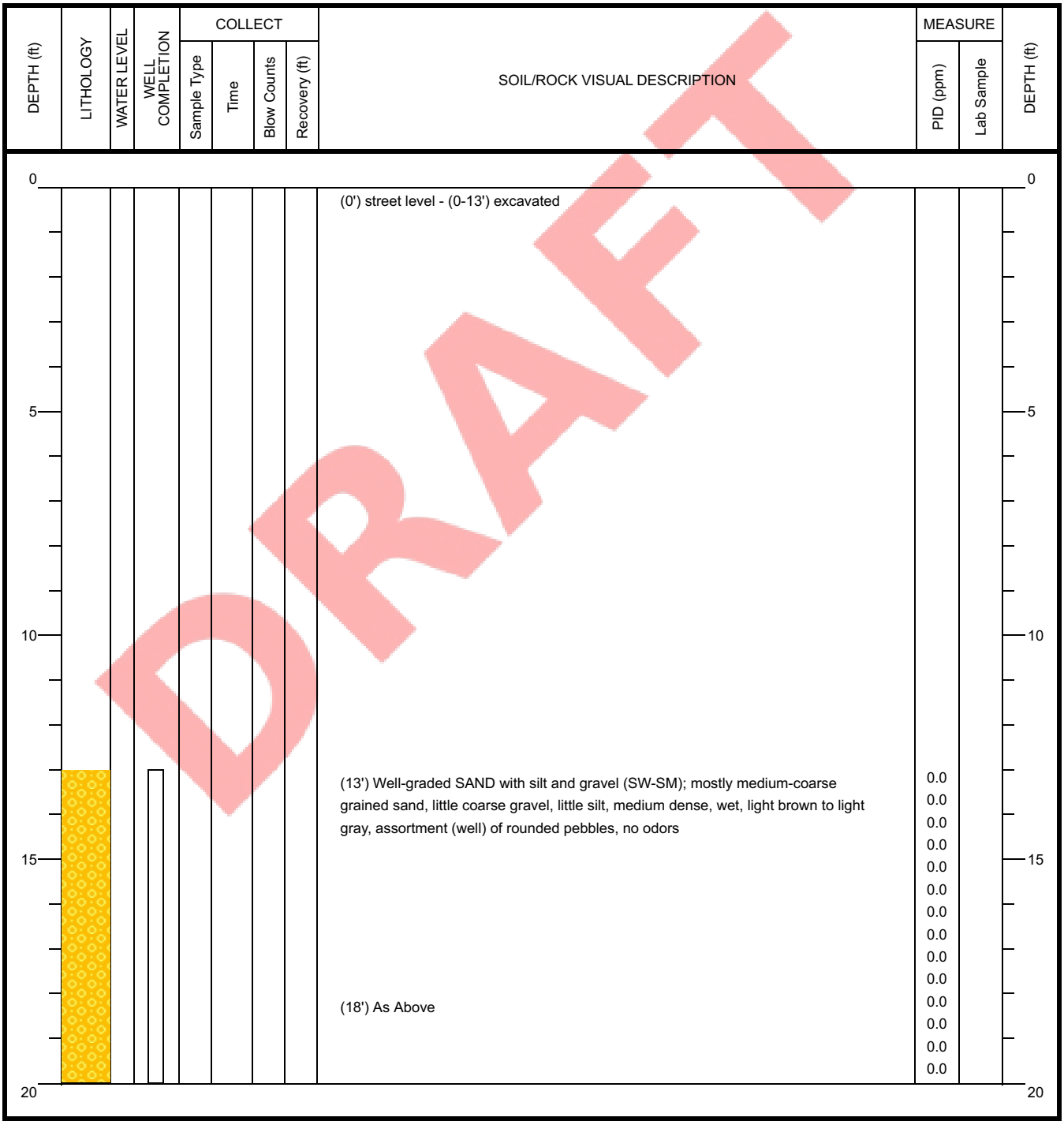
Drilling Start Date:	**7/24/18 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/24/2018 17:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**



NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-5
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 1 of 4

Drilling Start Date:	**7/25/2018 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/25/2018 16:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**



NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-5
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 2 of 4

Drilling Start Date:	**7/25/2018 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/25/2018 16:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(20') Well-graded SAND with silt and gravel (SW-SM); mostly medium-coarse grained sand, some coarse gravel, some silt, medium dense, moist, light brown, abundance of large rounded cobbles, minor odors observed	0.0		20
									0.0		
									0.0		
									0.0		
									5.0		
									2.3		
								(23') Well-graded SAND with silt (SW-SM); some medium grained sand, few coarse gravel, some silt, very dense, moist, light reddish-brown, abundance of large rounded cobbles, odors observed	1.6		
									2.8		
									9.3		
25									7.4		25
									10.2		
									19.0		
									18.7		
									12.0		
									2.7		
									0.0		
								(28') As Above: more light brown in color, strong odors observed	7.7		
									1.4		
									15.4	MW-5 (16-18')	
									26.0		
30									23.3		30
								(30') Well-graded SAND with gravel (SW); mostly medium grained sand, some fine gravel, little silt, very dense, moist, dark reddish-gray, odors observed	6.3		
									9.8		
									19.2		
									19.9		
									11.3		
								(33') Well-graded SAND with silt and gravel (SW-SM); some medium grained sand, some coarse gravel, little silt, dense, moist, light reddish-brown, abundant rounded cobbles, banded layering of brown silts, minor odors observed	11.5		
									6.6		
									1.2		
									15.3		
35									6.5		35
									2.9		
									6.1		
									2.2		
									6.4		
									9.8		
								(38') As Above	0.5		
									9.6		
									8.8		
									9.6		
40											40

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-5
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 3 of 4

Drilling Start Date:	**7/25/2018 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/25/2018 16:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
40								(40') Well-graded SAND (SW); mostly fine grained sand, few fine gravel, some silt, medium dense, moist, light brown, some rounded cobbles, odors observed	2.3		40
									1.2		
									8.8		
									10.0		
									5.2		
									0.6		
								(43') Well-graded SAND with silt and gravel (SW-SM); some medium grained sand, little coarse gravel, some silt, medium dense, light brown to light gray-brown, assortment (moderate) of rounded pebbles	0.3		
									2.7		
									1.5		
45									3.4		45
									2.3		
									3.0		
									6.0		
									3.7		
									2.5		
									0.6		
								(48') Poorly graded SAND with silt (SP-SM); mostly medium grained sand, trace fine gravel, trace silt, medium dense, light brown to brown, alternating layering of densities, BR fragments observed	0.1		
									0.0		
									0.0		
									0.0		
50									0.6		50
									0.0		
								(51') Silty SAND (SM); some fine-medium grained sand, few coarse gravel, little silt, very dense, light brown to green-gray	0.0		
									0.0		
									0.0		
									0.0		
								(53') Well-graded SAND with silt and gravel (SW-SM); mostly medium grained sand, little coarse gravel, little silt, medium dense, light brown to gray-brown, abundances of pebbles (rounded and angular)	0.0		
									0.0		
									0.0		
									0.0		
55									0.0		55
									0.0		
									0.0		
									0.0		
								(57') Well-graded GRAVEL with silt (GW-GM); some fine-coarse grained gravel, few fine sand, few silt, very dense, gray-brown, surplus of rock fragments (both rounded and angular)	2.0		
									1.8		
								(58') Well-graded SAND with silt (SW-SM); some medium-coarse grained sand, few coarse gravel, little silt, loose, moist, light brown	0.2		
									0.0		
									0.0		
60									0.0		60

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-5
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 4 of 4

Drilling Start Date:	**7/25/2018 08:00**	Boring Depth (ft):	**78.0**	Well Depth (ft):	**78.0**
Drilling End Date:	**7/25/2018 16:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**68.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
60								(58') Well-graded SAND with silt (SW-SM); some medium-coarse grained sand, few coarse gravel, little silt, loose, moist, light brown	0.0		60
									0.0		
									0.8	MW-5 (48-50')	
									1.1		
								(62') Silty SAND (SM); some fine grained sand, trace fine gravel, some silt, very dense, light gray, alternating bands of light brown silts	0.2		
								(63') Well-graded SAND (SW); some fine grained sand, few fine gravel, some silt, very loose, saturated, light brown, little to no solid soil volume due to saturation	0.0		
									0.0		
									0.0		
									0.0		
65									0.0		65
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
70								(68') Well-graded SAND (SW); mostly coarse grained sand, few coarse gravel, very loose, wet, orange-brown, presumed field observed GW table	0.0		70
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(72') Poorly graded SAND (SP); mostly coarse grained sand, trace fine gravel, very loose, wet, light brown	0.0		
								(73') As Above: very coarse, closely resembles pea gravel	2.4		
									0.0		
									0.0		
75									0.0		75
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(77') Poorly graded SAND (SP); mostly fine grained sand, very loose, wet, very pale brown, closely resembles beach sand	0.0		
									0.0		
80											80

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-6
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 1 of 4

Drilling Start Date:	**4/30/2018 08:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**4/30/2018 15:15**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**6.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0') Fill: construction debris, concretes, bricks, wood fragments	0.0		0
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(3') Fill: shallow drainage	0.0		
									0.0		
									0.0		
									0.0		
5								(5') Fill: construction debris, concretes, bricks, wood fragments	0.0		5
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
								(8') Well-graded SAND with silt (SW-SM); mostly medium grained sand, few fine gravel, little silt, medium dense, moist, dark brown	0.6		
									1.5		
									1.9		
									3.0		
10								(10') Poorly graded SAND with silt (SP-SM); mostly coarse grained sand, few coarse gravel, few silt, medium dense, moist, light bluish-gray, odor observed	50.0		10
									4.3		
									1.0		
									0.6		
								(12') ORGANIC SOIL with sand (OL); few fine gravel, little fine sand, mostly silt, medium plasticity, stiff, moist, dark brown sands to black organic soils, compacted	0.0		
									0.0		
								(13') Poorly graded SAND with silt (SP-SM); mostly fine-medium grained sand, few fine gravel, some silt, dense, moist, light brown, some organic soils	0.0		
									0.0		
									0.0		
									0.7		
15								(15') Well-graded SAND with silt (SW-SM); some fine grained sand, few coarse gravel, some silt, dense, saturated, light brown to brown, abundance of gray silts	0.0		15
									0.0		
									0.0		
									0.0		
								(17') Poorly graded SAND (SP); mostly fine grained sand, some silt, medium dense, moist, bluish-gray	0.0		
									0.0		
									0.0		
									0.0		
									0.0		
20									0.0		20

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-6
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 2 of 4

Drilling Start Date:	**4/30/2018 08:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**4/30/2018 15:15**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**6.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(20') Well-graded SAND with silt and gravel (SW-SM); mostly medium-coarse grained sand, little coarse gravel, some silt, dense, moist, gray to gray-brown, abundance of rounded cobbles	0.1		20
									0.3		
									1.6		
									12.3		
									14.9		
									0.8		
									0.0		
									0.3		
									0.9		
									2.0		
25								(25') Well-graded SAND with silt and gravel (SW-SM); mostly medium-coarse grained sand, some coarse gravel, some silt, dense, moist, gray to blue-gray, abundance of rounded pebbles	0.0		25
									0.0		
									0.0		
									0.0		
									0.0		
									1.5		
									0.0		
									0.0		
									0.0		
									0.6		
30								(30') Well-graded SAND with silt (SW-SM); some medium grained sand, few fine gravel, some silt, very dense, moist, gray to blue-gray, abundance of rounded pebbles, odors observed	1.5		30
									0.9		
									0.5		
									0.0		
									0.0		
									2.4		
								(33') As Above	41.0	MW-6 (33-35')	
									65.0		
									41.0		
									28.0		
35								(35') As Above: with exception to abundance of rounded pebbles	2.9		35
									2.7		
									1.9		
									2.1		
									1.3		
									2.0		
								(38') Well-graded SAND with silt and gravel (SW-SM); some coarse grained sand, little coarse gravel, some silt, dense, gray to gray-brown, rounded gravels, weathered BR fragments	5.3		
									1.9		
									1.5		
40									35.0		40

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-6
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 3 of 4

Drilling Start Date:	**4/30/2018 08:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**4/30/2018 15:15**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**6.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
40								(40') Well-graded SAND with silt and gravel (SW-SM); mostly coarse grained sand, little fine gravel, little silt, medium dense, light gray, rounded cobbles, presence of dark red and dark green sedimentary fragments	2.6		40
									1.0		
									2.3		
									1.0		
									1.3		
									3.4		
								(43') Poorly graded SAND (SP); mostly coarse grained sand, trace fine gravel, trace silt, medium dense, very pale reddish	2.5		
								(44') Poorly graded SAND with silt (SP-SM); some fine grained sand, few fine gravel, some silt, dense, gray, odors observed	5.5		
									3.7		
45									13.0		45
									1.4		
									1.0		
									0.6		
									0.5		
									0.4		
									1.0		
								(48') Well-graded SAND with silt and gravel (SW-SM); mostly medium grained sand, little coarse gravel, some silt, very dense, brown to light gray-brown, dark red and dark green sedimentary fragments, weathered BR fragments	1.7		
									2.4		
									2.7		
									5.1		
50								(50') Well-graded SAND with silt and gravel (SW-SM); some medium-coarse grained sand, little coarse gravel, some silt, dense, light reddish-brown to brown-gray, abundance of rounded cobbles	1.1		50
									0.5		
									1.2		
									1.5		
								(52') Well-graded SAND with silt (SW-SM); mostly coarse grained sand, few fine gravel, some silt, dense, light gray, abundance of large angular gravels	0.6		
									1.4		
									1.0		
									0.6		
									0.0		
									2.8		
55								(55') Well-graded SAND with silt and gravel (SW-SM); mostly coarse grained sand, some coarse gravel, little silt, very loose, moist, dark gray to gray-brown, abundance of large rounded cobbles	0.1		55
									2.3		
									0.6		
									0.0		
								(57') Well-graded SAND with silt and gravel (SW-SM); mostly coarse grained sand, little coarse gravel, some silt, dense, moist, gray, abundance of angular gravels	0.0		
									0.0		
									0.0		
									0.1		
									2.9		
									0.0		
60									0.0		60

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** MW-6
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 4 of 4

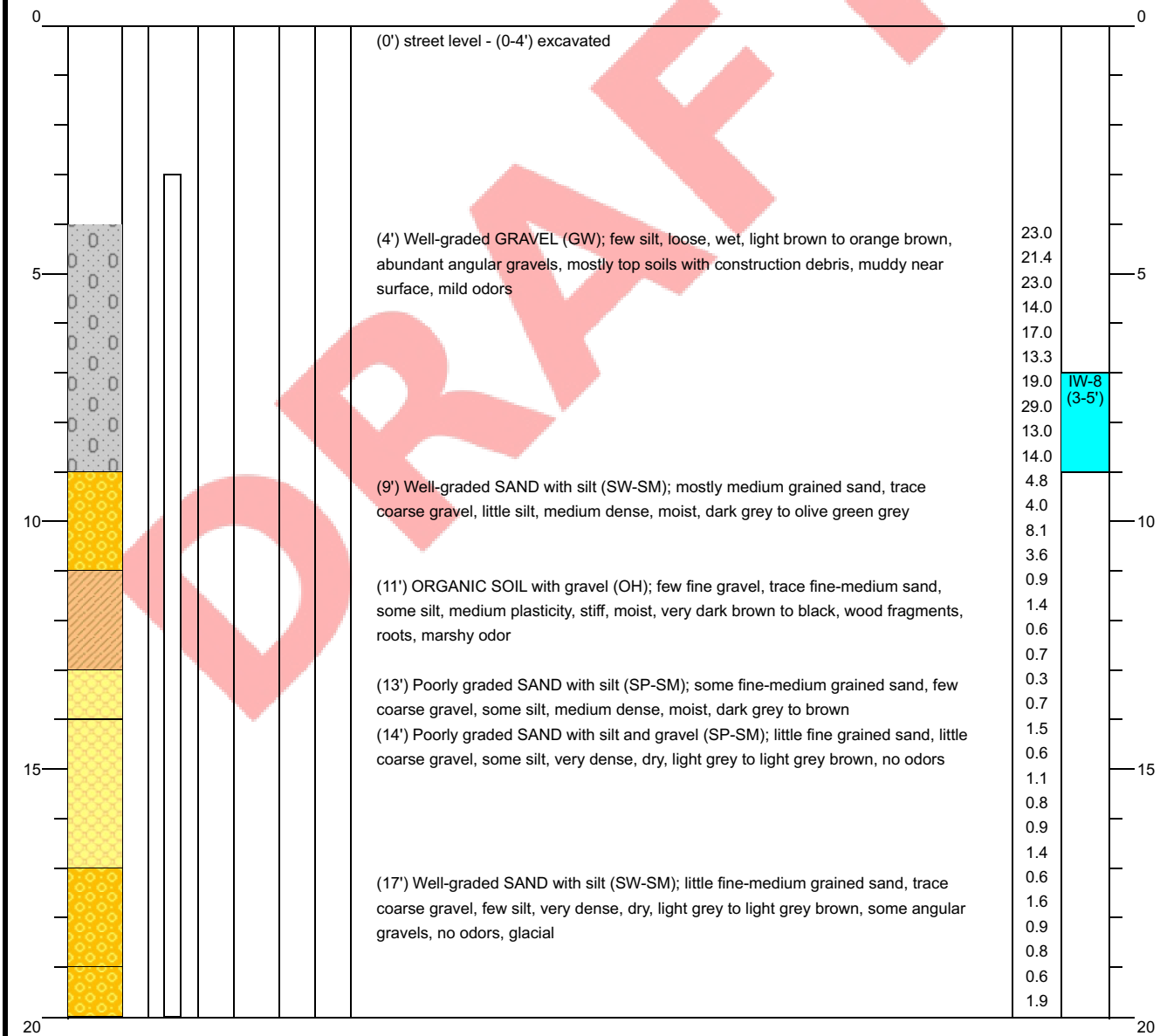
Drilling Start Date:	**4/30/2018 08:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**4/30/2018 15:15**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**6.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Brian Karsich**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**FilPro #2**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
60								(60') As Above: abundance of angular and rounded gravels	1.1		60
									0.3		
									1.0		
									1.2		
									3.0	MW-6 (62-64')	
									4.3		
									0.2		
									4.7		
								(64') Poorly graded SAND with silt (SP-SM); some fine grained sand, some silt, dense, dry, light brown	1.9		
65								(65') Well-graded SAND with silt and gravel (SW-SM); mostly coarse grained sand, little coarse gravel, very loose, wet, brown, presumed field observed GW table between (65-67')	5.7		65
									0.4		
									0.8		
									1.0		
									1.8		
								(67') Poorly graded SAND with silt (SP-SM); mostly medium grained sand, trace fine gravel, some silt, dense, wet, light brown	0.2		
									0.0		
									0.5		
									0.7		
									0.7		
70								(70') Well-graded SAND with silt (SW-SM); mostly coarse grained sand, few coarse gravel, very loose, wet, orange to orange-brown	1.0		70
									0.0		
									0.1		
									0.1		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
75								(74.5') As Above (75') No Recovery	0.0		75
80											80

NOTES: Continuous Log and Screen in 5'ft intervals

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** IW-8
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 1 of 4

Drilling Start Date:	**01/10/2019 10:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**1/10/2019 13:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Tony**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**



NOTES: Continuous log and screen in 5'ft intervals. Ground level was 4'ft below street level

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** IW-8
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 2 of 4

Drilling Start Date:	**01/10/2019 10:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**1/10/2019 13:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Tony**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(19') Well-graded SAND with silt (SW-SM); some medium grained sand, few silt, dense, dry, light grey to light blue grey, some red sandstone fragments, weathered BR, abundant rounded cobbles, no odors, glacial	0.7		20
									1.2		
									1.7		
									0.9		
									0.5		
									0.1		
									0.1		
									0.2		
25								(24') Well-graded SAND with silt (SW-SM); mostly medium-coarse grained sand, few coarse gravel, little silt, dense, moist, light grey to light grey brown mixed with light blue grey, some very rounded cobbles, no odors, glacial	0.3		25
									0.4		
									0.2		
									0.1		
									0.1		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
									0.0		
30								(29') Poorly graded SAND (SP); mostly medium-coarse grained sand, few coarse gravel, little silt, medium dense, dry, pale brown to very light brown, no odors	0.3		30
									0.0		
									0.1		
								(31') Poorly graded SAND with silt (SP-SM); some medium-coarse grained sand, few coarse gravel, some silt, dense, moist, light grey brown mix to pale brown, abundant round cobbles, no odors	0.0		
									0.0		
									0.5		
								(32.5') Sandy ORGANIC SOIL (OL); little silt, low plasticity, soft, dry, very dark brown to black, instantaneous odor	26.0		
									2.1		
								(33') Poorly graded SAND (SP); mostly fine-medium grained sand, very loose, dry, very pale yellowish-brown, closely resembles beach sand, no odors	0.9		
									2.7		
35									0.0		35
									0.0		
									0.0		
									0.0		
									0.2		
								(37') Poorly graded SAND with silt (SP-SM); mostly medium-coarse grained sand, few silt, medium dense, moist, light reddish-brown	0.0		
									0.0		
									0.0		
									0.0		
								(39') Well-graded SAND with silt and gravel (SW-SM); mostly fine-medium grained sand, some coarse gravel, little silt, medium dense, grey to olive grey, mild odor	2.0		
40									7.5		40

NOTES: Continuous log and screen in 5'ft intervals. Ground level was 4'ft below street level

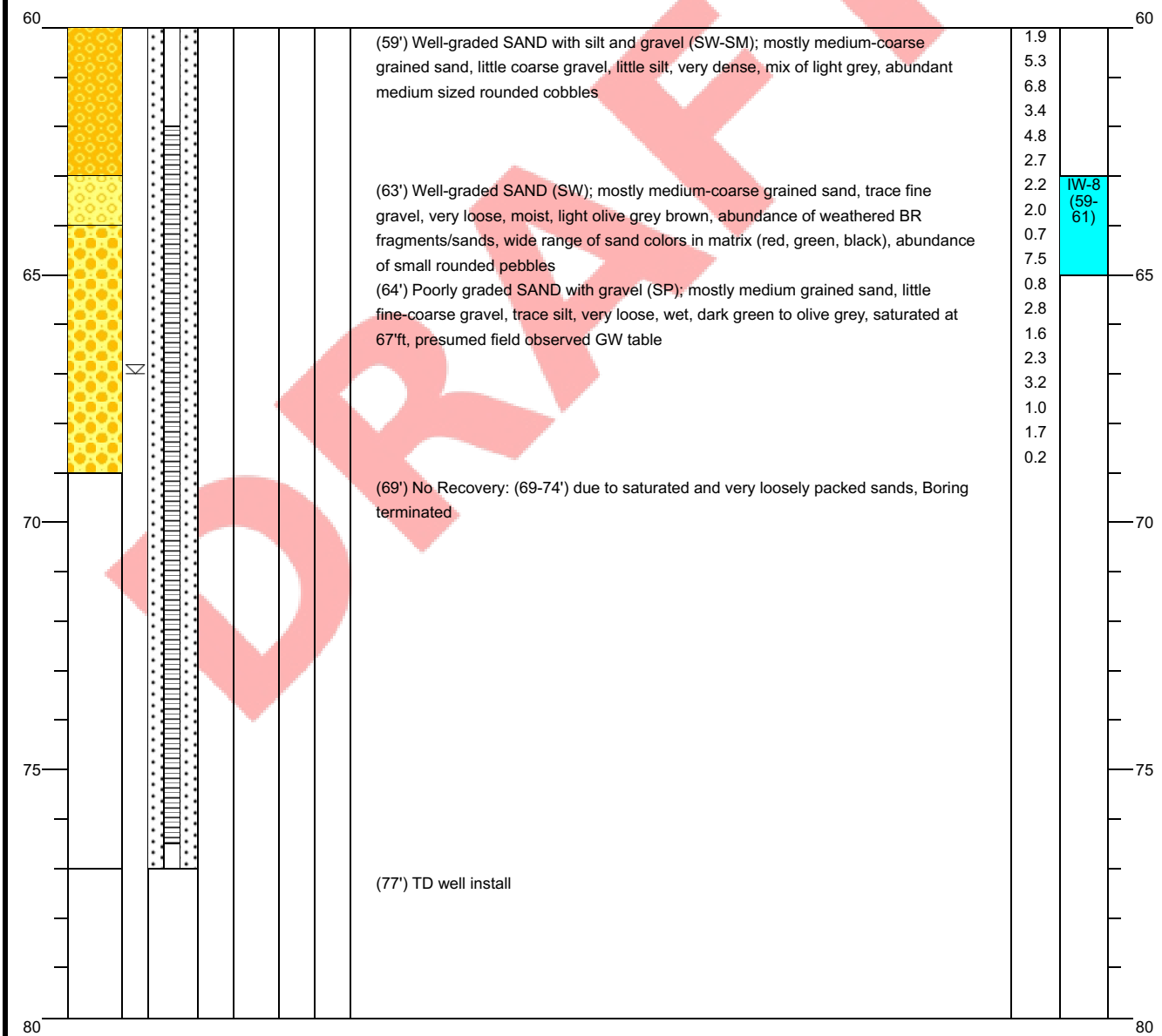
	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** IW-8
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 3 of 4

Drilling Start Date:	**01/10/2019 10:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**1/10/2019 13:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Tony**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**

NOTES: Continuous log and screen in 5'ft intervals. Ground level was 4'ft below street level

	Client: ACT	**WELL LOG**
	Project: 8172-kgny	**Well No.** IW-8
	Address: 124-22 Queens Blvd, Kew Gardens, NY	**Page:** 4 of 4

Drilling Start Date:	**01/10/2019 10:00**	Boring Depth (ft):	**77.0**	Well Depth (ft):	**77.0**
Drilling End Date:	**1/10/2019 13:00**	Boring Diameter (in):	**6.00**	Well Diameter (in):	**2.0**
Drilling Company:	**ADT**	Sampling Method(s):		Screen Slot (in):	**0.020**
Drilling Method:	**Sonic**	DTW During Drilling (ft):	**67.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Sonic XL Max**	DTW After Drilling (ft):		Screen Material:	**Sch 40 PVC Slotted**
Driller:	**Tony**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**Tim Young**	Location (X,Y):		Filter Type:	**#2 FilPro**



NOTES: Continuous log and screen in 5'ft intervals. Ground level was 4'ft below street level

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS

BORING AND WELL LOG LEGEND

LITHOLOGY	WATER LEVEL	WELL/BORING COMPLETION	Sample Type	DESCRIPTION
				ASPHALT
				CONCRETE
				BEDROCK
				IGNEOUS Rock
				METAMORPHIC Rock
				SEDIMENTARY Rock
				Well-graded GRAVEL (GW)
				Poorly graded GRAVEL (GP)
				Silty GRAVEL (GM)
				Clayey GRAVEL (GC)
				Well-graded GRAVEL with silt (GW-GM)
				Poorly graded GRAVEL with silt (GP-GM)
				Well-graded GRAVEL with clay (GW-GC)
				Poorly graded GRAVEL with clay (GP-GC)
				Well-graded SAND (SW)
				Poorly graded SAND (SP)
				Silty SAND (SM)
				Clayey SAND (SC)
				Well-graded SAND with silt (SW-SM)
				Poorly graded SAND with silt (SP-SM)
				Well-graded SAND with clay (SW-SC)
				Poorly graded SAND with clay (SP-SC)
				SILT (ML)
				Lean CLAY (CL)
				Organic SOIL (OL)
				Elastic SILT (MH)
				Fat CLAY (CH)
				Organic SOIL (OH)
				Organic SOIL (OL/OH)
				PEAT (PT)
				Volume Descriptors:
				Trace = <5%
				Few = 5-10%
				Little = 15-25%
				Some = 30-45%
				Mostly = >=50%
	▽			Water Level During Drilling
	▼			Water Level at End of Drilling/in Completed Well
				Cap
				Riser
				Screen
				End Plug
				Annular Seal (Bentonite-Cement Grout, Bentonite Slurry/Chips/Pellets/Powder, Other)
				Sanitary Seal (Bentonite Slurry/Chips/Pellets/Powder, Other)
				Filter Pack (Sand, Gravel, Other)
				Backfill
			GR	Grab
			EN	Encore
			SS	Split Spoon
			SH	Shelby Tube
			CO	Core Barrel
			DP	Direct Push
			ID	Lab Sample and ID

NOTES:

WELL CONSTRUCTION LOG

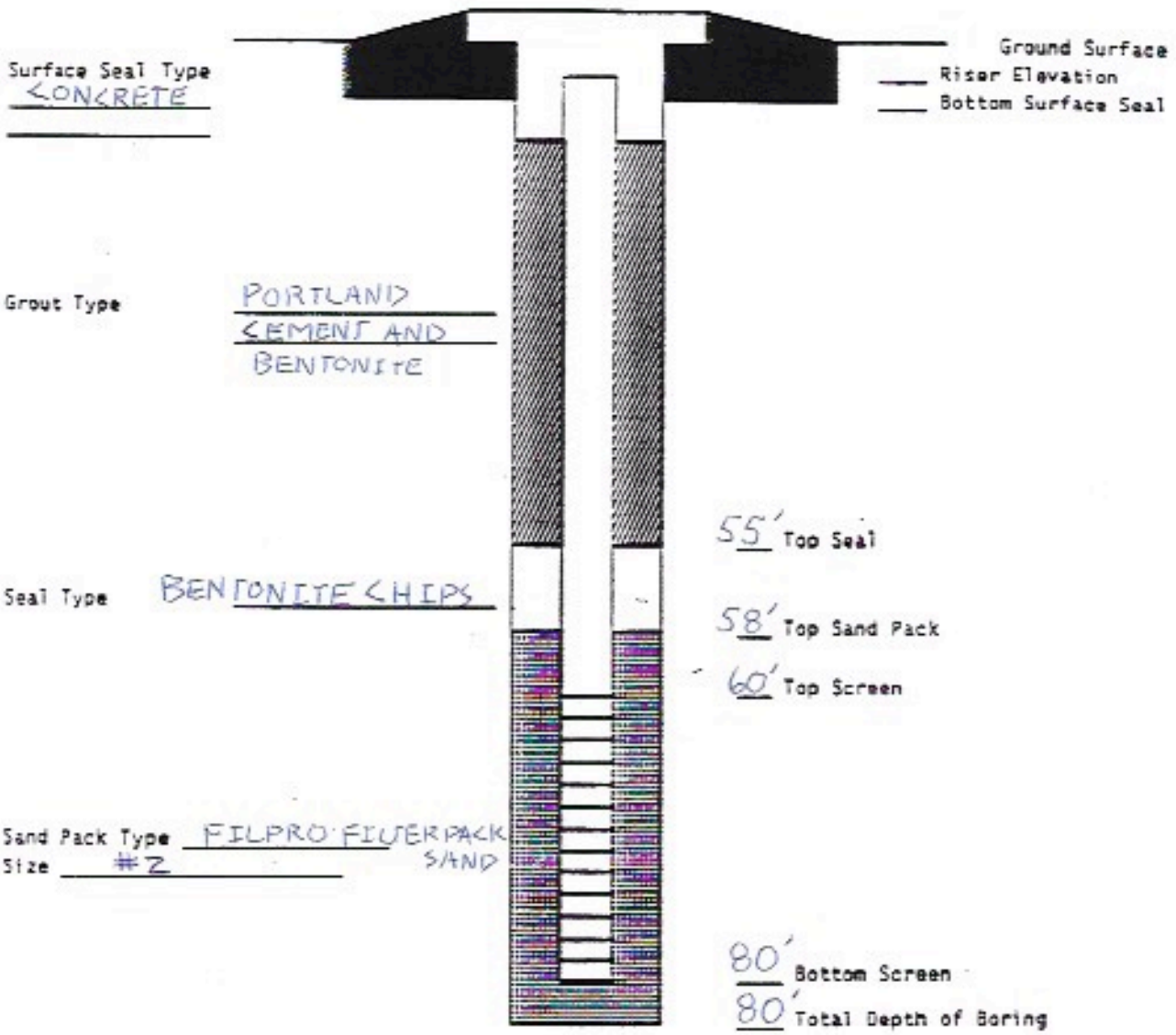
SITE 8172-KGNY JOB NO. _____ WELL NO. MW-1

TOTAL DEPTH 80' SURFACE ELEV. _____ TOP RISER ELEV. RELATIVE ELEVATION OF TOC: 4.76'

WATER LEVELS (DEPTH, DATE, TIME) 67.51, 3/30/2017 DATE INSTALLED 2/14/2017

RISER DIA 2" MATERIAL PVC LENGTH 60'
SCREEN DIA 2" MATERIAL PVC LENGTH 20' SLOT SIZE 0.020

SCHEMATIC



WELL CONSTRUCTION LOG

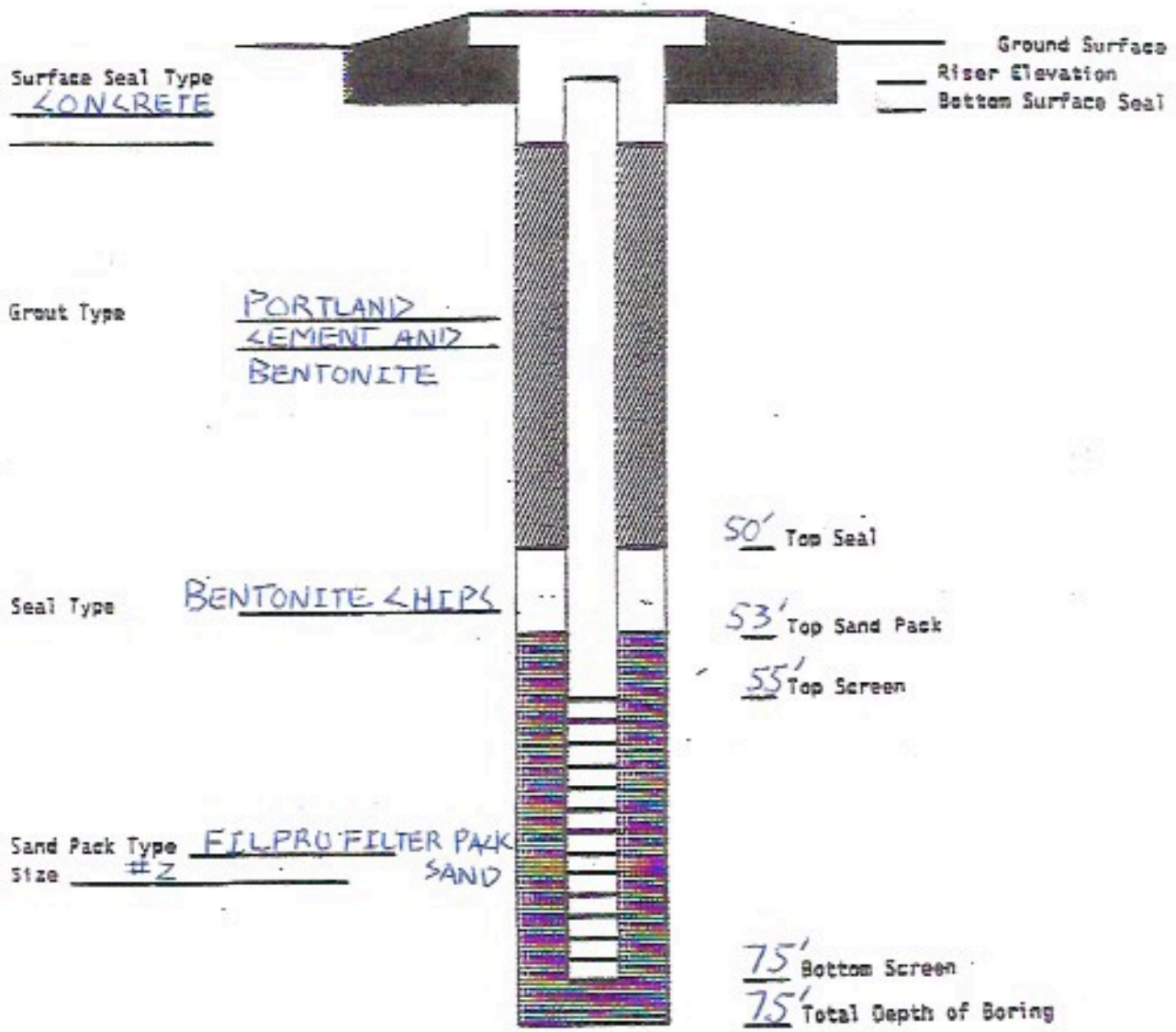
SITE 817Z-KG-NY JOB NO. _____ WELL NO. MW-Z

TOTAL DEPTH 75' SURFACE ELEV. _____ TOP RISER ELEV. RELATIVE ELEVATION OF TOC: 4.50'

WATER LEVELS (DEPTH, DATE, TIME) 67.34', 3/30/2017 DATE INSTALLED 2/15/2017

RISER DIA 2" MATERIAL PVC LENGTH 55'
SCREEN DIA 2" MATERIAL PVC LENGTH 20' SLOT SIZE 0.020

SCHEMATIC



WELL CONSTRUCTION LOG

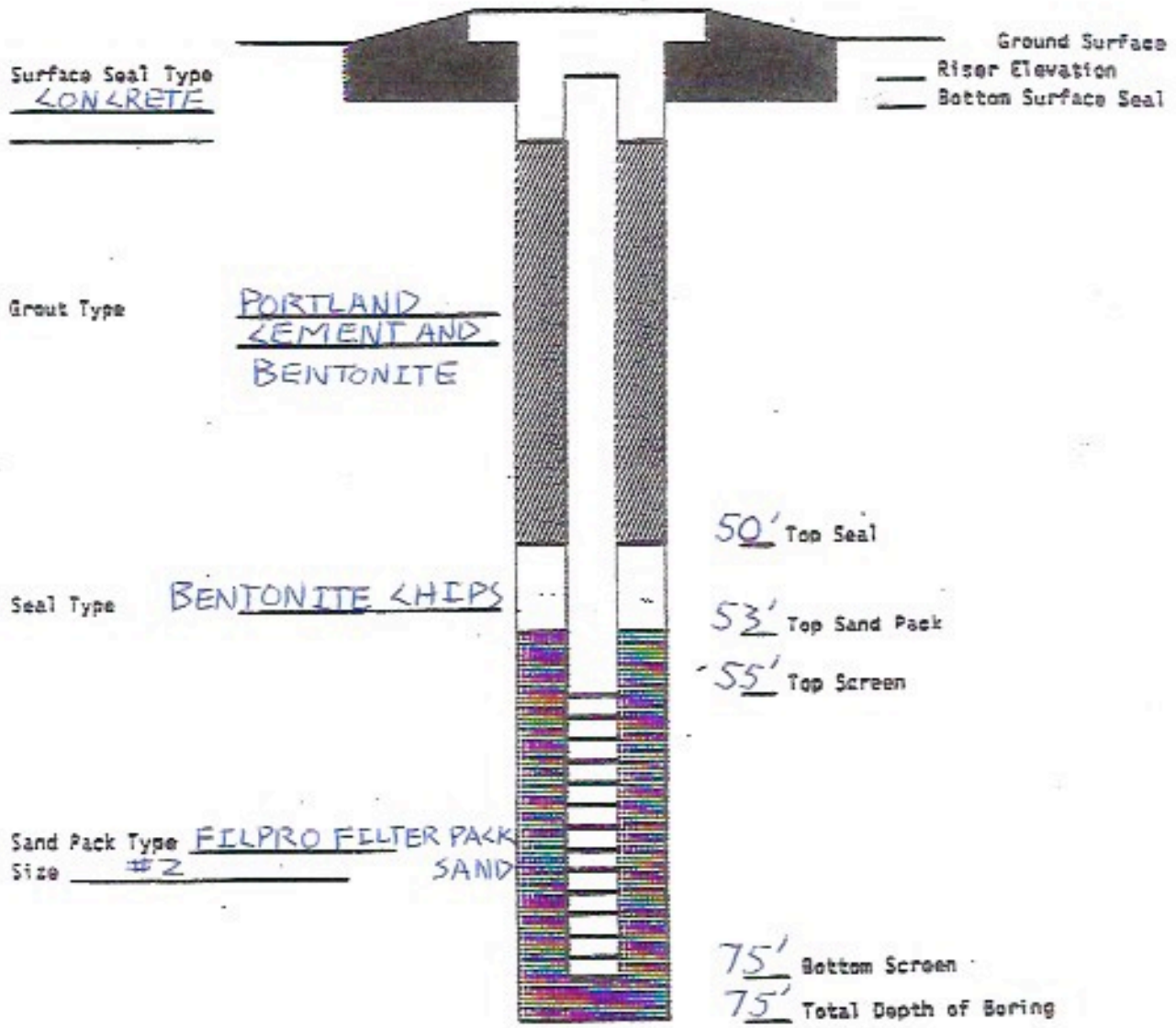
SITE 8172-KGNY JOB NO. _____ WELL NO. MW-3

TOTAL DEPTH 75' SURFACE ELEV. _____ TOP RISER ELEV. RELATIVE ELEVATION OF TOC: 4.99'

WATER LEVELS (DEPTH, DATE, TIME) 67.31, 3/30/2017 DATE INSTALLED 2/15/2017

RISER DIA 2" MATERIAL PVC LENGTH 55'
SCREEN DIA 2" MATERIAL PVC LENGTH 20' SLOT SIZE 0.020

SCHEMATIC



WELL CONSTRUCTION LOG

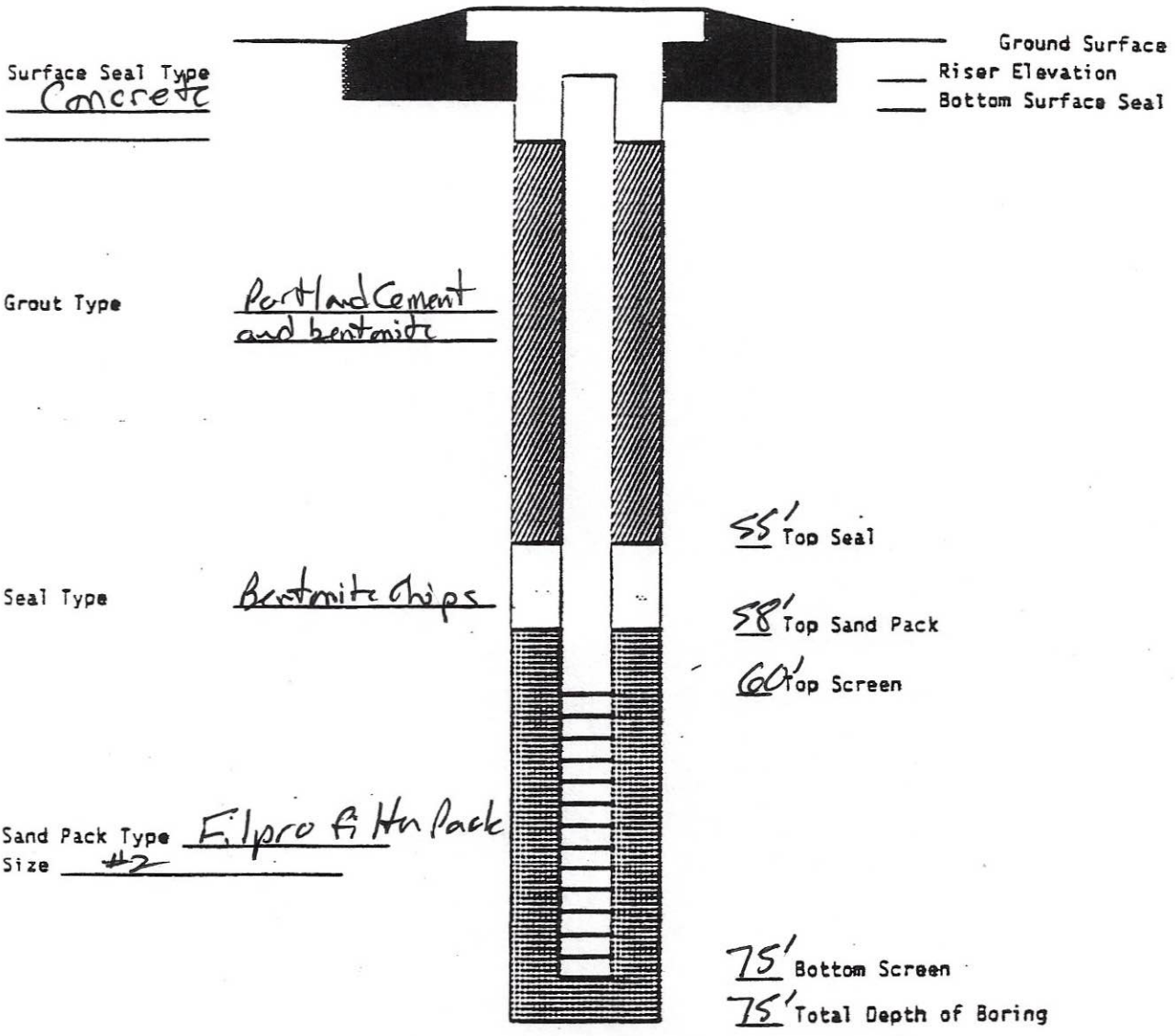
SITE 8172-KGNY JOB NO. _____ WELL NO. MW-3R

TOTAL DEPTH 75' SURFACE ELEV. 0 TOP RISER ELEV. 5'

WATER LEVELS (DEPTH, DATE, TIME) 65.1 (7/30/18) DATE INSTALLED 7/23/18

RISER DIA 2" MATERIAL PVC LENGTH 60'
SCREEN DIA 2" MATERIAL PVC LENGTH 15' SLOT SIZE 0.020

SCHEMATIC



WELL CONSTRUCTION LOG

SITE 8172-KGM JOB NO. _____ WELL NO. MW-4

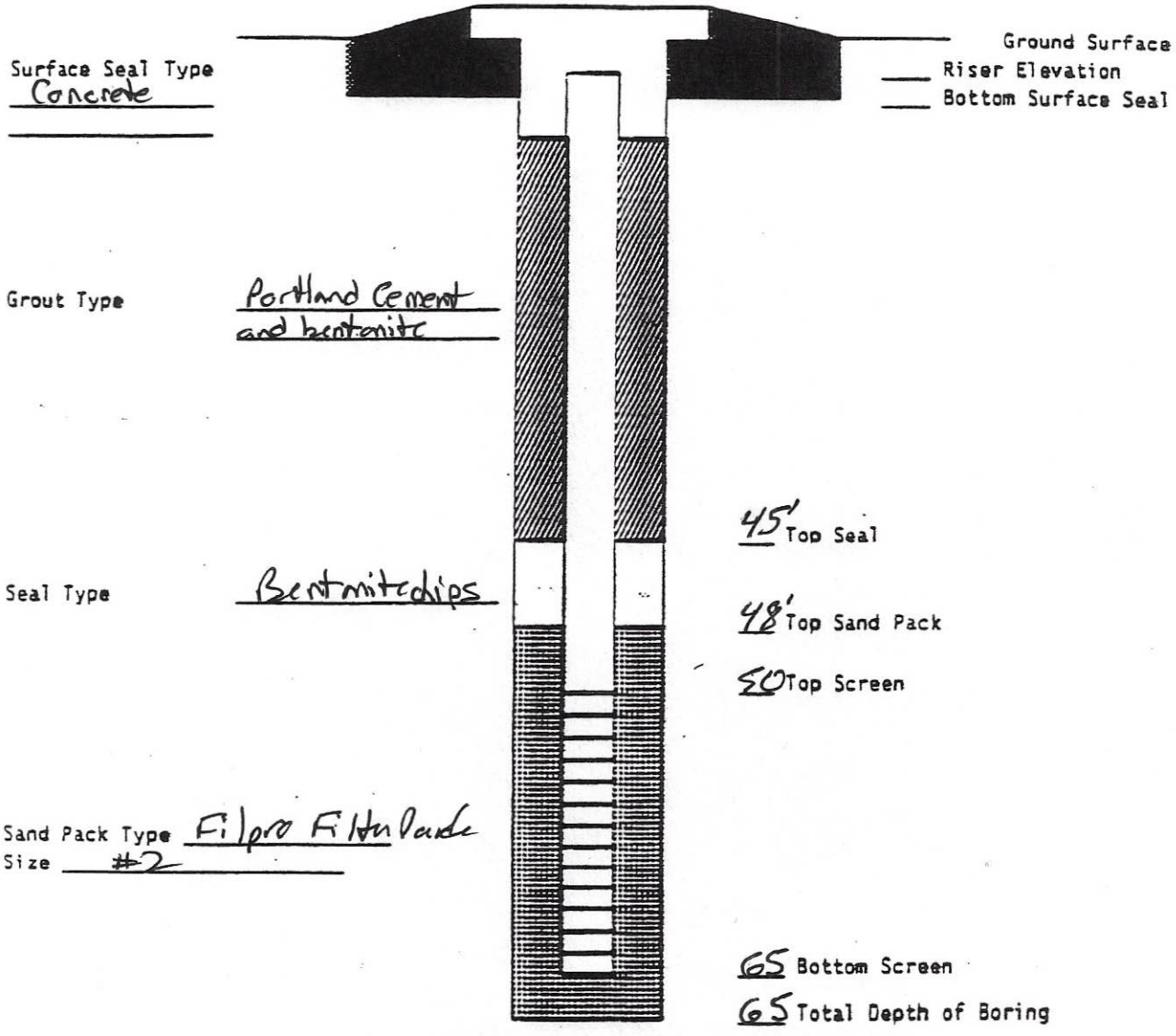
TOTAL DEPTH 65' SURFACE ELEV. -13 TOP RISER ELEV. -10

WATER LEVELS (DEPTH, DATE, TIME) 54' (7/30/18 DATE INSTALLED 7/24/18

RISER DIA 2" MATERIAL PVC LENGTH 50'

SCREEN DIA 2" MATERIAL PVC LENGTH 15' SLOT SIZE 0.020

SCHEMATIC



WELL CONSTRUCTION LOG

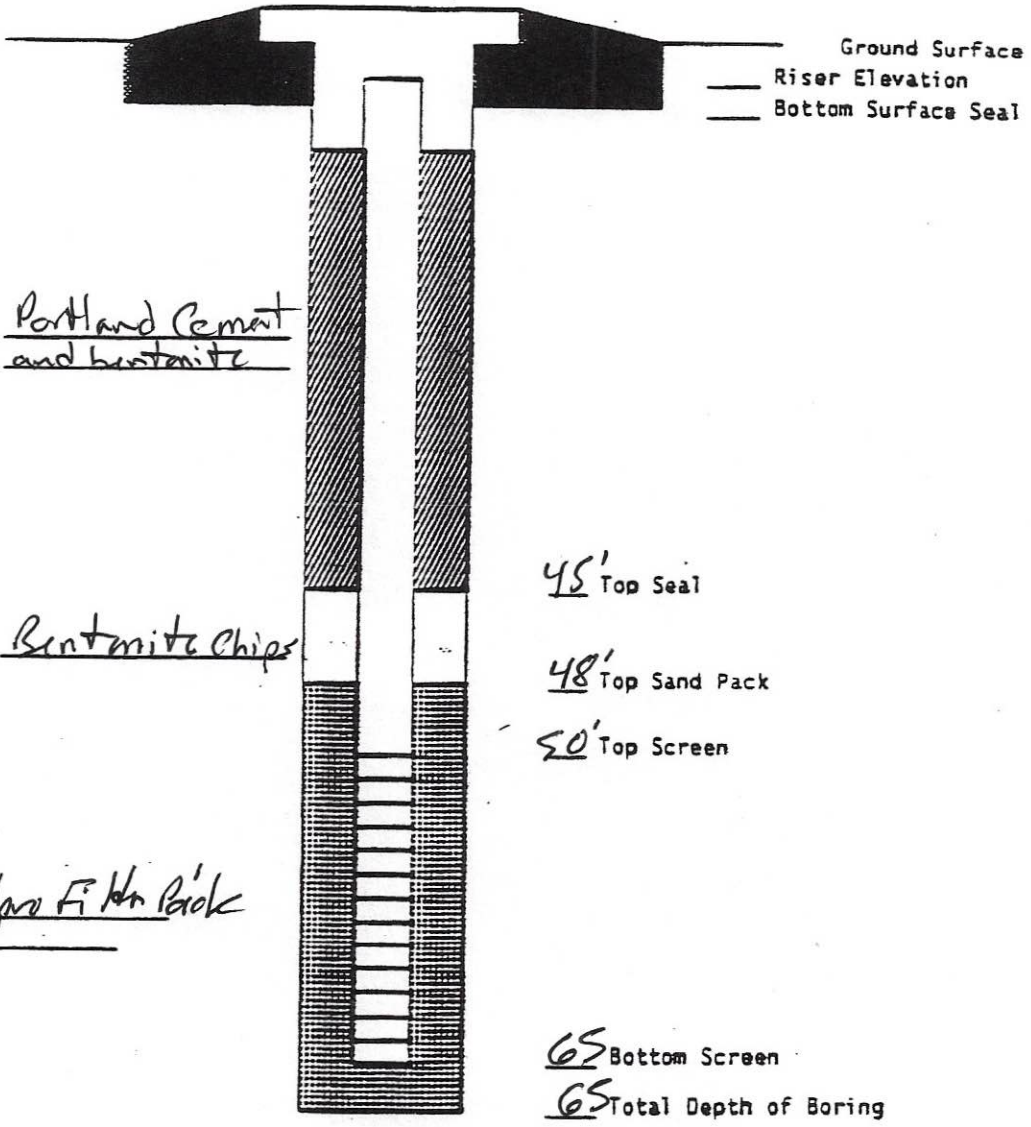
SITE 8172-KGNY JOB NO. _____ WELL NO. MW-5

TOTAL DEPTH 65 SURFACE ELEV. -13 TOP RISER ELEV. -11

WATER LEVELS (DEPTH, DATE, TIME) 54.5' (7/30/18) DATE INSTALLED 7/25/18

RISER DIA 2" MATERIAL PVC LENGTH 50'
SCREEN DIA 2" MATERIAL PVC LENGTH 15' SLOT SIZE 0.020

SCHEMATIC



WELL CONSTRUCTION LOG

SITE 8172-KCANY JOB NO. _____ WELL NO. MW-6

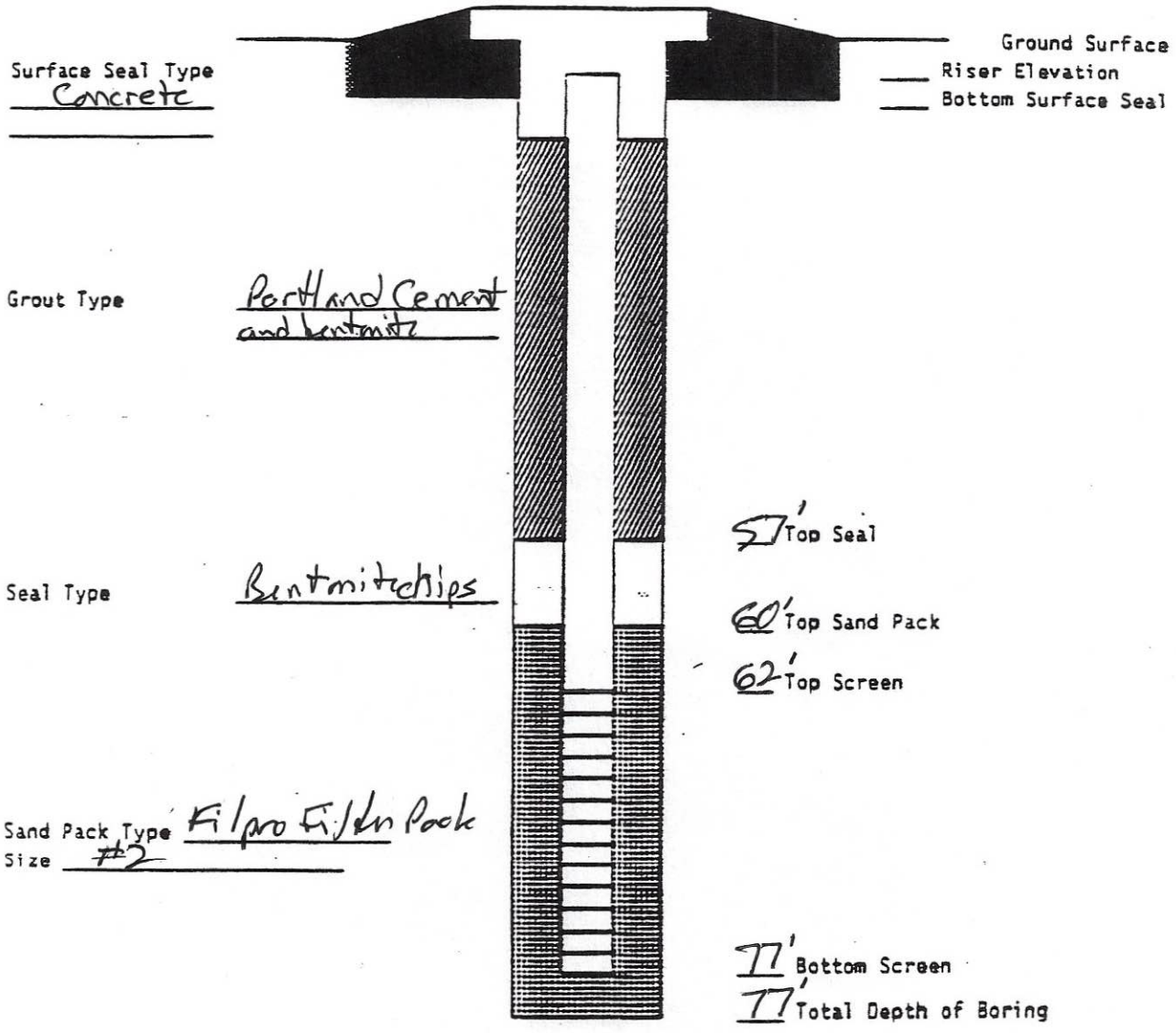
TOTAL DEPTH 77' SURFACE ELEV. 0 TOP RISER ELEV. +3'

WATER LEVELS (DEPTH, DATE, TIME) 66'(7/30/18) DATE INSTALLED 4/30/18

RISER DIA 2" MATERIAL PVC LENGTH 62'

SCREEN DIA 2" MATERIAL PVC LENGTH 15' SLOT SIZE 0.020

SCHEMATIC



APPENDIX F– QUALITY ASSURANCE PROJECT PLAN

124-22 QUEENS BOUEVARD
KEW GARDENS, NEW YORK
NYSDEC BCP ID: C241177
BLOCK: 3359, LOT: 21

QUALITY ASSURANCE PROJECT PLAN

SUBMITTED TO:

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

ON BEHALF OF:

Luciano, LLC
25 Aldgate Drive East
Manhasset, New York 11030

PREPARED BY:

P.W. Grosser Consulting, Inc.
630 Johnson Avenue, Suite 7
Bohemia, New York 11716
Phone: 631-589-6353
Fax: 631-589-8705

Kris Almskog, Principal krisa@pwgrosser.com
Ryan Morley, Project Manager thomasm@pwgrosser.com

PWGC Project Number: ACT1701

NOVEMBER 2020

124-22 QUEENS BOULEVARD, KEW GARDENS, NEW YORK
NYSDEC BCP ID C241177
QUALITY ASSURANCE PROJECT PLAN

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124-22 QUEENS BOULEVARD, KEW GARDENS, NEW YORK
NYSDEC BCP ID C241177
QUALITY ASSURANCE PROJECT PLAN

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TABLES **Page**

1.0 INTRODUCTION

P.W. Grosser Consulting, Inc. (PWGC) has prepared this Quality Assurance Project Plan (QAPP) for remedial activities to be undertaken at the property located at 124-22 Queens Boulevard in Kew Gardens, New York (BCP ID: C241177). This QAPP has been prepared to define the quality assurance (QA) and quality control (QC) measures to be implemented, to verify the integrity of the work to be performed at the site, and that the data collected will be of the appropriate type and quality needed for the intended use. Specifically, this QAPP addresses the following:

- Description of Project
- Organization and Responsibilities of Project Personnel
- Project Objectives, including Quality Assurance Objectives for Data
- Overview of Field Sampling Program and Procedures
- Sample Packaging and Shipping
- Sample Documentation
- Sample Analytical Program
- Quality Assurance/Quality Control Procedures

Remedial activities, as specified in the Remedial Action Work Plan (RAWP) for the site, will include:

- In situ verification sampling/waste characterization
- Soil excavation and disposal

1.1 Site Location and Description

The subject site is located at 124-22 Queens Boulevard in the Kew Gardens neighborhood of the Borough of Queens, New York. The site is situated on the southwest side of Queens Boulevard, between 82nd Road and 82nd Avenue. The property is identified as Block: 03359 Lot: 0021 by the New York City Department of Assessment. The site measures approximately 7,700 square feet (0.18 acre).

The property is currently occupied by a two-story commercial building with a partial basement. The building is currently vacant with the exception of a drycleaner in the northernmost first-floor unit; the drycleaner is expected to vacate the building in the near future.

The subject site was recently purchased by Luciano LLC with plans for redevelopment consisting of an 11-story mixed use building with a basement. The building will consist of an open-air parking garage on the basement level (along with machine/utility spaces), commercial space on the first through third floors, and residential space on

the fourth through eleventh floors. Construction of the proposed building foundation will require that the majority of the site be excavated to approximately 11 feet below grade, with portions excavated slightly deeper (footings, elevator pit, etc.).

An application for the New York State Brownfield Clean-up Program (BCP) for the project was submitted in August 2015. NYSDEC issued a letter of incompleteness on September 14, 2015; a revised BCP application for the site is currently pending. BCP number C241177 has been assigned to the site.

1.2 Site History

The northern portion of the site has been occupied by a dry cleaner since at least 1986. Environmental investigations performed in April and July of 2015 identified tetrachloroethene (PCE) impact in soil and soil vapor beneath the site. Additional information regarding the history of the site, including details of previous environmental investigations is included in the RAWP.

2.0 PROJECT ORGANIZATION AND PERSONNEL RESPONSIBILITIES

The investigative efforts defined in the Site Management Plan (SMP) will be coordinated by PWGC on behalf of Luciano, LLC. The New York State Department of Environmental Conservation (NYSDEC) is the lead regulatory agency overseeing monitoring and inspections at the site. An organization structure has been developed to identify the roles and responsibilities of the various parties involved with the project, as discussed below.

The **NYSDEC Project Manager** will be responsible for reviewing and approving work plans and amendments, coordinating approval of requested modifications, and providing guidance on regulatory requirements.

The **Project Director** will provide technical expertise for review of the project plans, reports and ongoing field activities. The program manager will be responsible for the coordination of the overall post-BCP activities with the NYSDEC. The Project Director will act as the project's Quality Assurance Manager.

The **Project Manager** will be responsible for the day to day project management, task leadership, and project engineering support and for the implementation of the SMP. The Project Manager is responsible for ensuring that the requirements of the remediation are implemented. The project manager will also act as the site Health and Safety Manager (HSM).

The **Field Team Leader** will be responsible for sample collection, oversight of subcontractor personnel, and coordination of field activities. The Field Team Leader will act as the Site Health and Safety Officer ensuring implementation of the Site Health and Safety Plan.

A NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified laboratory (to be determined) will be contracted to perform required analyses and reporting, including Analytical Services Protocol (ASP) Category B Deliverables, which will allow for data validation.

Subcontractors will perform remedial construction, surveying, drilling, and/or sampling at the direction of the Field Team Leader in accordance with this work plan.

3.0 QUALITY ASSURANCE PROJECT OBJECTIVES

The objective of this QA/QC plan is to ensure proper and consistent inspection and sampling measures are performed during field activities during the continued monitoring phase for the duration of this SMP's lifespan.

3.1 Data Quality Objective Process

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions during routine monitoring activities. DQOs can be defined as what the end user expects to obtain from the analysis results, and are developed through a seven-step process:

- Step 1 State the problem
- Step 2 Identify the decision
- Step 3 Identify inputs to the decision
- Step 4 Define the study boundaries
- Step 5 Develop a decision rule
- Step 6 Specify limits on decision errors
- Step 7 Optimize the decision for obtaining data

For the site, screening data generated by rapid, less precise methods of analysis (PID screening, collection of groundwater field parameters, etc.) will achieve a data use level for site characterization and monitoring. Definitive laboratory analytical data generated during endpoint soil sampling will achieve a data use level to support an assessment of the overall effectiveness of the site remedy. Specifically, these data will be used to:

- Monitor the extent of soil impact at the site and confirm that soils with VOC concentrations in excess of NYSDEC SCOs have been removed.

Known contaminants present in samples collected from the site include VOCs. The principal contaminants of concern at the site is PCE. Site contaminants and their respective site cleanup objectives are discussed in greater detail in the RAWP.

3.2 Data Quality Categories

DQOs are composed of written expectations for precision, accuracy, representativeness, completeness and comparability of a data set (see Section 3.3). The DQO process provides a logical basis for linking the QA/QC procedures to the intended use of the data, primarily through the decision maker's acceptable limits on decision error. Two descriptive data categories - screening data and definitive data - will be used for the site.

Screening data are generated by rapid, less precise methods of analysis and are deemed non-critical to project objectives. Portable instruments to be used during remedial action to collect screening data include:

- Photoionization detector (PID) or Flame ionization detector (FID)
- Aerosol/dust monitor

Definitive data are generated using specific analytical methods and guidelines and have satisfied known QA/QC requirements. Analytical data provided by an off-site laboratory shall be definitive data, and are deemed critical to project objectives. QA/QC elements of definitive data include determination and documentation of calibrations, detection limits, method blanks, and matrix spike recoveries.

3.3 QA/QC Characteristics

The overall QA/QC objective for remediation monitoring activities is to develop and implement procedures that will provide data of known and documented quality. QA/QC characteristics for data include precision, accuracy, representativeness, completeness, and comparability (PARCC). Data quality objectives for each of these parameters are determined based on the level of data required. Descriptions of these characteristics are provided below, and specific QA objectives for both screening and definitive data are presented in Table 3-1. Analytical matrices and methods are provided on the table.

Table 3-1
QA Objectives for Field and Laboratory Data

Parameter	Measurement	Matrix	Method	Units	Precision	Accuracy	CRQL/MDL	Completeness
VOCs	Screening	Air	Field Measurement	ppm	±1%	N/A	N/A	90%
VOCs	Definitive	Soil	EPA Method 8260	ppm	±25% RPD	172%R	1-5 ppb	90%

Notes:
Abbreviations include:

%R = Percent Recovery
GC = Gas Chromatography
N/A = Not Applicable
NTU = Nephelometric Turbidity Units
TAL = Target Analyte List
TCL = Target Compound List
CRQL = Contract Required Quantitation Limit
MDL = Method Detection Limit
VOCs = Volatile Organic Compounds
RPD = Relative Percent Difference

* Precision dependent on meter and scale.

Precision is the measurement of agreement in repeated tests of the same or identical samples, under prescribed conditions. Analytical precision can be expressed in terms of Standard Deviation (SD), Relative Standard Deviation (RSD) and/or Relative Percent Difference (RPD). The precision of analytical environmental samples has two components - laboratory precision and sampling precision. Laboratory precision is determined by replicate measurements of laboratory duplicates and by analysis of reference materials. The objectives for laboratory precision are specified in the analytical methodologies and are presented on Table 3-1. The precision of the field sampling effort is determined by the analysis of field duplicate samples. Field duplicate analysis will be performed at a rate of five percent (i.e., one duplicate collected for every 20 samples). Acceptance criteria for duplicates analyzed by an off-site laboratory shall be an RPD of 25 percent. The precision limits provided in Table 3-1 for the screening measurements are acceptance criteria for duplicate and calibration analyses of field measurement parameters.

Accuracy is the degree of agreement of a measured sample result or average of results with an accepted reference or true value. It is the quantitative measurement of the bias of a system, and is expressed in terms of percent recovery (%R). Measurements of accuracy for the laboratory include surrogate spike, laboratory control spike, matrix spike and matrix spike duplicate samples. The laboratory must meet or exceed control limit objectives, as stated in Table 3-1 and the applicable methodologies.

Representativeness is the degree to which the results of the analyses accurately and precisely represent a characteristic of a population, a process condition, or an environmental condition. In this case, representativeness is the degree to which the data reflect the contaminants present and their concentration magnitudes in the sampled site areas. Representativeness of data will be ensured through the selection of sampling locations and implementation of approved sampling procedures. Results from environmental field duplicate sample analyses can be used to assess representativeness, in addition to precision.

Completeness is defined as the percentage of samples that meet or exceed all the criteria objective levels for accuracy, precision and detection limits within a defined time period or event. It is the measure of the number of data "points" which are judged to be valid, usable results. The objective for completeness for this project is 90 percent, and will be calculated by dividing the number of usable data results (i.e., all results not considered to be "rejected" and all samples able to be analyzed) by the number of possible data results (i.e., the total number of field samples collected), and then multiplying by 100 percent.

Comparability is the degree of confidence with which results from two or more data sets, or two or more laboratories, may be compared. To achieve comparability, standard environmental methodologies will be employed in the field and in the laboratory. See Table 3-1 and Section 6.0 for analysis methods and detection limits for this field investigation.

3.4 Impact of Failure to Meet Data Quality Objectives

The QA objectives presented in Table 3-1 represent the data quality necessary to meet the project's technical goals. The QA/QC efforts discussed in this QAPP focus on controlling measurement error, and ultimately providing a database for estimating the uncertainty in the measurement data for the project. QA objectives will be evaluated throughout the RA monitoring effort to see if the results for the project meet the stated objectives. If these objectives are not being met, the precision and/or accuracy of the sampling data will be decreased, and corrective actions shall be taken, as documented in Section 13.0.

4.0 REMEDIAL ACTION MONITORING ACTIVITIES

This section provides an overview of the planned monitoring operations by matrix and type of procedures. It also includes activities that may be necessary in the future to supplement the existing groundwater monitoring well network (i.e., site survey; monitoring well installation, etc.). Field monitoring and sampling activities include the following:

- Mobilization and demobilization
- In situ verification sampling/waste characterization
- Soil excavation and removal
- Final verification sampling

4.1 SMP Monitoring Procedures

SMP monitoring activities to be performed at the site will be conducted in accordance with established technical guidelines, methods, policies and Standard Operating Procedures (SOPs). The subsections below present an overview of the sampling program procedures; a more detailed discussion of the monitoring activities is presented in the SMP.

4.1.1 Mobilization and Demobilization

The mobilization effort will consist of logistical planning, identification of sampling locations, equipment mobilization to the site, and field personnel orientation. The orientation meeting will familiarize the sampling team with a brief history of the site, health and safety requirements, and SMPmonitoring procedures. Mobilization and demobilization will take place before and after completion of routine periodic RA monitoring events. Demobilization will consist of site area clean-up, staging and inventory of monitoring-derived wastes, decontamination and demobilization of field equipment, and organization of monitoring records.

4.1.2 In Situ Verification Sampling/Waste Characterization

If impacted soils are to be excavated and removed from the site for disposal, waste characterization samples will be collected to allow for a disposal facility to be selected a waste approval granted prior to the start of excavation activities. Verification sampling procedures and frequency will be in accordance with the requirements of the prospective disposal facility.

4.1.3 Soil Excavation and Removal

Soils will be excavated from the proposed excavation area utilizing an excavator. Soils will be screened during excavation and stockpiled on the eastern portion of the site. Soils will be screened utilizing a photoionization detector (PID) capable of detecting the presence of VOCs. Soils exhibiting significantly elevated PID responses or

odors may be segregated and stockpiled from other soils being excavated. Trees, shrubs and underbrush within the excavation area will be cleared and disposed of as necessary.

5.0 SAMPLE CUSTODY AND DOCUMENTATION

For samples collected from the site for laboratory analysis, a chain-of-custody/request for analysis form will be completed and submitted to the laboratory with samples to be analyzed. A copy of the chain-of-custody will be retained by the Project Manager. The chain-of-custody will include the project name, sampler's signature, sample IDs, date and time of sample collection, and analysis requested.

Samples will be packaged and shipped in a manner that maintains sample preservation requirements during transport (i.e., ice to keep samples cool until receipt at the laboratory), ensures that sample holding times can be achieved by the laboratory, and prevents samples from being tampered with.

If a commercial carrier ships samples, a bill of lading (waybill) will be used as documentation of sample custody. Receipts for bills of lading and other documentation of shipment shall be maintained as part of the permanent custody documentation. Commercial carriers are not required to sign the chain-of-custody as long as it is enclosed in the shipping container and evidence tape (custody seal) remains in place on the shipping container.

Identification and documentation of samples are important in maintaining data quality. Strict custody procedures are necessary to ensure the integrity of the environmental samples. Sections below address sample identification, packaging, shipping, and documentation.

5.1 Sample Identification System

The method of identification of a sample depends on the type of measurement or analysis performed. When field screening measurements (e.g., pH, conductivity) are made, data are recorded directly in logbooks. Identifying information such as project name, sample location and depth, date and time, name of sampler, field observations, remarks, etc. shall be recorded.

Each sample collected for off-site laboratory analysis during the field investigation will be specifically designated by PWGC for unique identification. Samples will be identified using a letter code to indicate sample collection methodology. A letter code (see below) will follow, along with the name and/or number that identifies the specific location where the sample was collected. Field equipment blanks will be denoted by the letter code "FB" and trip blanks with "TB". Sample collection date and time will be recorded in the field logbook, chain of custody as well as the sample label.

Letter code prefixes for RA monitoring activities are as follows:

- EP Verification Soil Sample
- FB Field Blank Sample
- TB Trip Blank Sample

At a minimum, all location and identification information for the samples shall be recorded in the field sampling logbook, and on the appropriate chain of custody record form for shipment.

5.2 Sample Custody, Packaging and Shipping

Sample custody shall be strictly maintained and carefully documented each time sample material is collected, transported, received, prepared, and analyzed. Custody procedures are necessary to ensure the integrity of the samples, and samples collected during RA monitoring activities must be traceable from the time the samples are collected until they are disposed of and/or stored, and their derived data are used in the subsequent monitoring report. Sample custody is defined as (1) being in the sampler's possession; (2) being in the sampler's view, after being in the sampler's possession; (3) being locked in a secured container, after being in the sampler's possession; and (4) being placed in a designated secure area.

5.2.1 Field Custody, Packaging and Shipping Procedures

Field custody procedures shall be implemented for each sample collected. The field sampler shall be responsible for the care and custody of the samples until they are properly transferred or dispatched. To maintain the integrity of the samples, the samples are to be stored in a designated, secure area and/or be custody sealed in the appropriate containers prior to shipment.

Each environmental sample will be properly identified and individually labeled. Labels will be filled out in indelible ink with at least the following information: sample identification (see Section 5.1), type and matrix of sample, date and time of sample acquisition, name of sampler, analysis required, and preservation (as necessary). The sample label will be securely attached to the sample container.

Environmental samples being analyzed by off-site laboratories will be properly packaged and shipped for analysis. Samples are to be packed with sufficient wet ice to cool the samples to 4°C. Additionally, each cooler will be

packed with a cooler temperature blank. Lastly, the cooler should be filled with adequate cushioning material to minimize the possibility of container breakage.

A laboratory supplied completed chain of custody form will be included with all sample shipments.

When the samples are being shipped by an overnight delivery service to the laboratory, the chain of custody form and any other paperwork shall be checked against the sample labels and field documentation, and then placed in a waterproof sealable plastic bag and taped securely to the inside lid of the cooler. The cooler must then be secured, with custody seals affixed over the lid opening in at least two locations, and the cooler wrapped with strapping tape (without obscuring the custody seals). Orientation "this end up" arrows shall be drawn or attached on two sides of the cooler, and a completed overnight delivery service shipping label shall be attached to the top of the cooler.

Samples to be shipped by an overnight delivery service shall be shipped within 24 hours of sample collection and arrive at the laboratory within 24 hours of sample shipment. A member of the field team will notify the laboratory of a sample shipment.

5.2.2 Laboratory Custody Procedures

The following generally summarizes laboratory custody procedures; more detailed operations are presented in the laboratory's SOPs.

- A designated sample custodian will accept custody of the shipped samples and will verify that the information on the sample labels matches that on the chain of custody record(s),
- The laboratory custodian will use the sample label number or assign a unique laboratory number to each sample label and will assure that all samples are transferred to the proper analyst or stored in the appropriate secure area; and,
- Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted or returned to the custodian or sample storage area. Internal chain of custody records shall be maintained by the laboratory.

The laboratory shall communicate with PWGC personnel by telephone, email or facsimile, as necessary, throughout the process of sample scheduling, shipment, analysis and data reporting, to ensure that samples are properly processed. If a problem occurs during sample shipment or receipt (e.g., a sample container arrives

broken or with insufficient sample volume, a sample was not preserved correctly, a sample was not listed on the chain of custody, etc.), the laboratory shall immediately notify the appropriate person for resolution.

Samples received by the laboratory will be retained until analyses and QA checks are completed. When sample analyses and necessary QA checks have been completed, the unused portion of the sample and the sample container must be disposed of properly by the laboratory. All identifying tags, data sheets, and laboratory records shall be retained as part of the permanent documentation.

6.0 ANALYTICAL REQUIREMENTS

Analytical services will be provided by a NYSDOH ELAP approved laboratory. The laboratory will follow NYSDEC Analytical Sampling Protocol (ASP) and provide data in results only format, with the exception of the final round of sampling in which data will be reported with Category B deliverables (ASP-B). Analyses not available using ASP-B will be provided in results only format. Samples will be analyzes as follows:

6.1.1 Groundwater Samples

Groundwater samples collected from monitoring wells will be collected as described in the SMP. Each verification soil sample will be analyzed for VOCs by USEPA Method 8260. Glassware will be supplied pre-cleaned and pre-preserved by the analytical laboratory. Sample preservation will consist of: storage in a cooler on ice to a temperature of 4ºC. The hold time for VOC analysis is 14 days.

6.1.2 Vapor Samples

Vapor samples will be collected from the SVE/SSDS monitoring points as described in the SMP. Each sample will be analyzed for VOCs by USEPA Method TO-15. Samples will be collected in laboratory supplied batch-certified SUMMA canisters. The hold time for VOC analysis is 14 days.

7.0 DECONTAMINATION PROCEDURES

In order to minimize the potential for cross-contamination, non-dedicated drilling and sampling equipment shall be properly decontaminated prior to and between sampling/possible drilling locations.

7.1.1 General Procedures

Drilling equipment will be decontaminated in a designated area. Sampling equipment and probes will be decontaminated in an area covered with plastic sheeting near the sampling location. Waste material generated during decontamination activities will be containerized, stored and disposed of in accordance with the procedures detailed in Section 5.9. Decontamination of sampling equipment shall be kept to a minimum, and wherever possible, dedicated sampling equipment shall be used. Personnel directly involved in equipment decontamination shall wear appropriate protective equipment.

7.1.2 Drilling Equipment

Drilling equipment shall be decontaminated by steam cleaning prior to performance of the first boring/excavation and between all subsequent borings/excavations. This shall include hand tools, casing, augers, drill rods, temporary well material and other related tools and equipment. Water used during drilling and/or steam cleaning operations shall be from a potable source.

7.1.3 Sampling Equipment

Sampling equipment (i.e., trowels, knives, split-spoons, bowls, hand augers, etc...) will be decontaminated prior to each use as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
- Generous tap water rinse
- Distilled water rinse

7.1.4 Meters and Probes

All meters and probes that are used in the field (other than those used solely for air monitoring purposes, e.g., PID meters) will be decontaminated between uses as follows:

- Laboratory-grade detergent and tap water solution wash
- Tap water rinse
- Distilled water rinse (triple rinse)

Decontamination of sampling equipment will be kept to a minimum in the field, and wherever possible, dedicated disposable sampling equipment will be used. Decontamination fluids will be stored in US Department of Transportation (DOT)-approved 55-gallon drums or in an on-site storage tank (liquids only) until proper disposal.

Personnel directly involved in equipment decontamination will wear protective clothing in accordance with the project Health and Safety Plan (HASP).

8.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLE REQUIREMENTS

This section will discuss the type and quantities of QA/QC samples to be utilized during implementation of the field program.

8.1 Field Quality Control Samples

The subsections below present general information and guidance on field QC samples, including definition and frequency of QC blanks. Field QC samples will be labeled and shipped according to the procedures outlined in Section 5.0.

8.1.1 Field Blanks

A field blank will be collected to evaluate the potential for contamination of environmental samples from inadequate decontamination of field equipment. Field blanks shall be collected by pouring laboratory supplied distilled/deionized (DI) water over and/or through decontaminated non-disposable equipment or disposable equipment, and collecting the rinsate. Field blanks will be collected at a frequency of one per decontamination event per type of sampling equipment, not to exceed one per day per sample matrix. Preservation and analysis of field blanks will be identical to that of the associated environmental samples.

8.1.2 Trip Blanks

A trip blank serves to detect possible cross-contamination of samples resulting from handling, storage and shipment procedures. In the event that VOC analysis is necessary, trip blanks will accompany VOC glassware in transit through sample collection and shipment to the laboratory. In addition, trip blanks are stored by the laboratory under the same conditions as the environmental samples. A trip blank will accompany each cooler containing samples submitted for VOC analysis (if any), and will be preserved as per the groundwater samples and analyzed identically to the associated environmental samples. VOC samples will be consolidated in one cooler for daily shipment, if possible, to minimize the number of trip blanks required in the field program. Due to the lack of VOC impact identified at the site, it is not anticipated that trip blanks will be necessary during remedial action.

8.1.3 Temperature Blanks

A temperature blank will be sent with each cooler of samples to verify that the cooler temperature has been maintained at 4ºC. One non-preserved VOA vial shall be filled with either potable or DI water, and labeled with "USEPA cooler temperature indicator" and the date. If supplied, the laboratory's temperature blank will be used in place of the VOA vial. The laboratory shall record the temperature of the blank water on the chain of custody immediately upon cooler arrival.

8.1.4 Field Environmental Duplicate Samples

Duplicate environmental samples will be analyzed by the off-site laboratories to evaluate the reproducibility of the sampling procedures. Duplicate samples will be collected at a rate of five percent of the total samples for each specific matrix for each type of analysis (i.e., one duplicate for up to every 20 samples). The duplicate samples will be collected from the same location and at the same time as the original environmental sample; however, the duplicated samples will be "coded" in such a manner that the laboratory will not be able to determine of which original field sample they are duplicated (i.e., "blind" duplicates). For example, the duplicate sample of location EP001 may be "coded" as location EP051, as long as there are not more than fifty endpoint samples being collected (i.e., the coded sample name should not be assigned a legitimate sample location identification). An explanation of the duplicate "coding" must be written in the field logbook. Preservation and analysis of duplicate samples will be identical to those for the environmental samples. Precision of field data will be evaluated based on the calculation of Relative Percent Difference (RPD), with acceptance criteria of 25 percent for the off-site laboratory samples. Blind duplicate samples will be collected in the same manner as the environmental samples.

8.2 Laboratory Quality Control Samples

General information and guidance on laboratory QC samples are presented in the subsections below. A summary of QC procedures, frequencies, criteria, and corrective actions for the samples, as determined by the applicable method guidelines.

8.2.1 Method Blanks/Preparation Blanks

A method blank (for organics) or a preparation blank (for inorganics) will be analyzed with every batch of samples to ensure that contamination has not occurred during the analytical process. Method blanks consist of a portion of analyte-free water or solid that is processed through the entire sample procedure the same as an environmental sample.

8.2.2 Matrix Spikes/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate samples (also known as spike/duplicate samples) will be used to assess precision and accuracy of the analytical methods. In this procedure, three aliquots of an actual field sample are collected at a specific location, and two aliquots are “spiked” by the addition of known amounts of an analyte or analytes and these samples are then analyzed identically to the field samples. A comparison of the resulting concentration to the original sample concentration and among the two “spiked” sample concentrations provides information on the ability of the analytical procedure to generate a correct result from the sample. Matrix spike/matrix spike duplicate samples will be collected in the field at a rate of five percent, and will be analyzed on a per batch basis, with up to 20 samples per week constituting a batch. The validity of matrix spike/matrix spike duplicate recovery and relative percent difference values will be determined using the acceptance criteria

8.2.3 Laboratory Control Samples

A laboratory control sample (LCS) consists of an analyte-free water or solid phase sample that is spiked with target analytes at a known concentration. The LCS shall be analyzed for every batch of samples (i.e., 1 per 20) to assess the ability of the analytical procedure to generate a correct result without matrix effects/interferences affecting the analysis. The percent recoveries for the LCS compounds will be compared to QC limits stated in the appropriate methods.

8.2.4 Surrogate Compounds

Surrogates (also known as System Monitoring Compounds) are compounds of known concentrations added to every organic analysis sample for analytical chromatography methods at the beginning of the sample preparation to monitor their recovery. Surrogate recoveries will be used to assess potential matrix interferences and to monitor any potential effects of sample preparation and analysis on final analyte concentrations. The recovery values will be compared to values established in the applicable methodologies to determine the validity of the data.

8.2.5 Internal Standards

Internal standards are used to provide instrument correction for variation in instrument performance and injection volumes. Internal standards also establish relative response factors for the analytes.

8.2.6 Interference Check Samples

An interference check sample (ICS), which contains target analytes at known concentrations, verifies the laboratory's interelement and background correction factors. Analysis of ICS samples is unique to metals analysis using the inductively coupled plasma (ICP) method.

9.0 INSTRUMENT CALIBRATION AND PREVENTIVE MAINTENANCE

9.1 Calibration

Equipment will be inspected and approved by the Field Team Leader before being used. Equipment will be calibrated to factory specifications, if required. Monitoring equipment will be calibrated following manufacturers recommended schedules. Daily field response checks and calibrations will be performed as necessary (i.e. PID calibrations) following manufacturers standard operating procedures. Equipment calibrations will be documented in a designated field logbook.

The Field Team Leader or his designee will be responsible for ensuring that instrumentation are of the proper range, type and accuracy for the measurement/test being performed, and that all of the equipment are calibrated at their required frequencies, according to their specific calibration protocols/procedures.

All field measurement instruments must be calibrated according to the manufacturer's instructions prior to the commencement of the day's activities. Exceptions to this requirement shall be permitted only for instruments that have fixed calibrations pre-set by the equipment manufacturer. Calibration information shall be documented on in a designated field logbook. Information to be recorded includes the date, the operator, and the calibration standards (concentration, manufacturer, lot number, expiration date, etc.). All project personnel using measuring equipment or instruments in the field shall be trained in the calibration and usage of the equipment and are personally responsible for ensuring that the equipment has been properly calibrated prior to its use.

In addition, all field instruments must undergo response verification checks at the end of the day's activities and at any other time that the user suspects or detects anomalies in the data being generated. The checks consist of exposing the instrument to a known source of analyte (e.g., the calibration solution), and verifying a response. If an unacceptable instrument response is obtained during the check the data shall be labeled suspect, the problem documented in the site logbook, and appropriate corrective action taken.

Any equipment found to be out of calibration shall be recalibrated. When instrumentation is found to be out of calibration or damaged, an evaluation shall be made to ascertain the validity of previous test results since the last calibration check. If it is necessary to ensure the acceptability of suspect items, the originally required tests shall be repeated (if possible), using properly calibrated equipment. Any instrument consistently found to be out of calibration shall be repaired or replaced.

9.2 Preventive Maintenance

Field equipment shall be maintained at its proper functional status in accordance to manufacturer manual specifications. A check of the equipment shall be performed before field activities begin, and any potential spare parts (e.g., batteries, connectors, etc.) and maintenance tools will be brought on site, to minimize equipment downtime during the field activities. Visual checks of the equipment will be conducted on a daily basis. Routine preventive maintenance shall be performed to assure proper operation of the equipment. Any maintenance performed on field equipment will be documented in the designated field logbook, and shall be undertaken by personnel who have the appropriate skills and/or training in the type of maintenance required.

10.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLE REQUIREMENTS

Quality Control (QC) procedures will be followed in the field and at the laboratory to ensure that reliable data are obtained. When performing field sampling, care shall be taken to prevent the cross-contamination of sampling equipment, sample bottles, and other equipment that could compromise sample integrity. QC samples, including blind duplicates, equipment blanks, trip blanks, method blanks, matrix spike and matrix spike duplicates, and their frequency to be collected in the field are detailed below. Field QC samples will be labeled and shipped according to the procedures outlined in Section 8.0.

10.1 Field Blanks

A field blank will be collected to evaluate the potential for contamination of environmental samples from inadequate decontamination of field equipment. Field blanks shall be collected by pouring laboratory supplied distilled/deionized (DI) water over and/or through decontaminated non-disposable equipment or disposable equipment, and collecting the rinsate. Field blanks will be collected at a frequency of one per day per sample matrix. Preservation and analysis of field blanks will be identical to that of the associated environmental samples.

10.2 Trip Blanks

A trip blank serves to detect possible cross-contamination of samples resulting from handling, storage and shipment procedures. Trip blanks will accompany VOC glassware in transit through sample collection and shipment to the laboratory. In addition, trip blanks are stored by the laboratory under the same conditions as the environmental samples. A trip blank will accompany each cooler containing samples submitted for VOC analysis, and will be preserved as per the groundwater samples and analyzed identically to the associated environmental samples. VOC samples will be consolidated in one cooler for daily shipment, if possible, to minimize the number of trip blanks required in the field program. Due to the lack of VOC impact identified at the site, it is not anticipated that trip blanks will be necessary during remedial action.

10.3 Temperature Blanks

A temperature blank will be sent with each cooler of samples to verify that the cooler temperature has been maintained at 4ºC. One non-preserved VOA vial shall be filled with either potable or DI water, and labeled with "cooler temperature indicator" and the date. If supplied, the laboratory's temperature blank will be used in place of the VOA vial. The laboratory shall record the temperature of the blank water on the chain of custody immediately upon cooler arrival.

10.4 Field Environmental Blind Duplicate Samples

Blind duplicate environmental samples will be analyzed by the off-site laboratories to evaluate the reproducibility of the sampling procedures. Duplicate samples will be collected at a rate of five percent of the total samples for

each specific matrix for each type of analysis (i.e., one duplicate for up to every 20 samples). The duplicate samples will be collected from the same location and at the same time as the original environmental sample; however, the duplicated samples will be "coded" in such a manner that the laboratory will not be able to determine of which original field sample they are duplicated. For example, the duplicate sample of location MW01 may be "coded" as location MW21, as long as there are not more than twenty groundwater monitoring wells being sampled (i.e., the coded sample name should not be assigned a legitimate sample location identification). An explanation of the duplicate "coding" must be written in the field logbook. Preservation and analysis of duplicate samples will be identical to those for the environmental samples. Blind duplicate samples will be collected in the same manner as the environmental samples.

11.0 DATA REDUCTION, VALIDATION AND REPORTING

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

11.1 Data Reduction

11.1.1 Field Data Reduction

Field instrumentation data will be reported by site personnel in field logbooks associated with the monitoring event. At the end of each monitoring event, the field screening data results shall be summarized in tabulated form, as warranted.

11.1.2 Laboratory Data Reduction

All data generated by the off-site laboratory will be reported in a specified format containing all required elements to perform data validation. Analytical results shall be presented on standard NYSDEC ASP-B forms (when necessary) or equivalents, and include the dates the samples were received and analyzed, and the actual methodology used. Laboratory QA/QC information required by the method protocols will be compiled, including the application of data QA/QC qualifiers as appropriate. In addition, laboratory worksheets, laboratory notebooks, chains-of-custody, instrument logs, standards records, calibration records, and maintenance records, as applicable, will be provided in the laboratory data packages to determine the validity of data.

11.1.3 Project Data Reduction

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

11.1.4 Non-Direct Measurements

If information necessary for the project has not been measured directly in the field, non-direct measurement data may be obtained from literature files, texts, computer databases, etc. References utilized will be acknowledged sources within the specific discipline. An explanation of the rationale behind using the reference and a description of any concern regarding the use of the referenced data (e.g., uncertainty, conflicting literature, etc.) shall be made within the report. Non-direct measurement data, after usage, will be filed within the project files for the length of the project.

11.2 Data Usability and Validation

The main purpose of the data is for use in defining the extent of contamination at the site, to aid in evaluation of potential human health and ecological exposure assessments, and to support remedial action decisions. Based upon this, data use usability and validation will be performed as described below. Complete data packages will be archived in the project files, and if deemed necessary additional validation can be performed using procedures in the following sections. It is anticipated that data validation will be performed on data collected during the final round of sampling, only.

11.2.1 Data Usability and Validation Requirements

Data usability and validation are performed on analytical data sets, primarily to confirm that sampling and chain-of-custody documentation are complete, sample IDs can be tied to specific sampling locations, samples were analyzed within the required holding times, and analyses are reported in conformance to NYSDEC ASP, Category 2 data deliverable requirements as applicable to the method utilized.

11.2.2 Data Usability and Validation Methods

If deemed necessary by NYSDEC, a data usability evaluation for the data collected during the RA and a data usability summary report (DUSR) will be prepared. The DUSR will be prepared in accordance with NYSDEC DER-10, Appendix 2B.

Independent third party data validation will be performed on 5% of the sample data, or on one sample from each sample delivery group (SDG), whichever is greater. Data validation will be performed by a qualified subcontractor independent of the project.

12.0 CORRECTIVE ACTION

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

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

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

During the project, all changes to the RA monitoring program or GWET system operation will be documented in field logs/sheets and the PWGC PM will be advised.

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

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

TRUCK ROUTE MAP

124-22 QUEENS BLVD
KEW GARDENS, NY

0 500 1,000 1,500 2,000 Feet

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Approved by:	JP
Figure No:	12

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APPENDIX G – HEALTH AND SAFETY PLAN

124-22 QUEENS BOUEVARD
KEW GARDENS, NEW YORK
NYSDEC BCP ID: C241177
BLOCK: 3359, LOT: 21

HEALTH AND SAFETY PLAN

SUBMITTED TO:

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

ON BEHALF OF:

Luciano, LLC
25 Aldgate Drive East
Manhasset, New York 11030

PREPARED BY:

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PWGC Project Number: ACT1701

NOVEMBER 2020

P.W. GROSSER CONSULTING INC.
PROJECT No. ACT1701

HEALTH AND SAFETY PLAN

122-24 QUEENS BOULEVARD
KEW GARDENS, NEW YORK
BCP Site # C241177

Submitted:
November 2020

Prepared for:
The New York State Department of Environmental Conservation
Division of Environmental Remediation

On behalf of:
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124-22 QUEENS BOULEVARD, KEW GARDENS, NEW YORK
NYSDEC BCP ID C241177
HEALTH AND SAFETY PLAN

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TABLES

APPENDICES

1.0 STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to chemical, biological and physical hazards during the post-remedial activities to be performed at 124-22 Queens Boulevard, Kew Gardens, New York. P.W. Grosser Consulting Inc.'s (PWGC's) policy is to minimize the possibility of work-related exposure through awareness and qualified supervision, health and safety training, medical monitoring, use of appropriate personal protective equipment, and the following activity specific safety protocols contained in this HASP. PWGC has established a guidance program to implement this policy in a manner that protects personnel to the maximum reasonable extent.

This HASP, which applies to persons present at the site actually or potentially exposed to safety or health hazards, describes emergency response procedures for actual and potential physical, biological and chemical hazards.

2.0 INTRODUCTION

2.1 Purpose

This HASP addresses the minimum health and safety practices that will be employed by site workers participating in post-remedial activities at the project site located at 124-22 Queens Boulevard, Kew Gardens, New York.

The HASP takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by P.W. Grosser Consulting, Inc. (PWGC), its' subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. PWGC sub-contractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in this HASP and must be made available to PWGC for review and acceptance.

Activities performed under this HASP will comply with applicable parts of Occupational Safety and Health Administration (OSHA) Regulations, primarily 29 CFR Parts 1910 and 1926 and all other applicable federal, state, and local regulations. Modifications to the HASP may be made with the approval of the PWGC Health and Safety Manager (HSM) and/or Project Manager (PM). A copy of this HASP will be maintained on-site during all work activities.

Refusal to comply with the HASP or violation of any safety procedures by field personnel may result in their immediate removal from the site following consultation with the HSM and the Field Team Leader (FTL).

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section specifies the project organization and responsibilities.

3.1 Project Manager

- Participates in major incident investigations;
- Ensures that the HASP has all of the required approvals before site work is conducted; and
- Has the overall project responsibility for project health and safety.

3.2 Field Team Leader (FTL)/ Site Health and Safety Officer (SHSO)

- Ensures that the HASP is implemented in conjunction with the Health and Safety Manager (HSM);
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Enforces site health and safety rules;
- Ensures that proper personal protective equipment is utilized;
- Ensures that the HSM is informed of project changes that require modifications to the HASP;
- Ensures that the procedure modifications are implemented;
- Investigates incidents;
- Conducts the site safety briefing;
- Reports to HSM to provide summaries of field operations and progress; and
- Acts as Emergency Coordinator.

3.3 Health and Safety Manager

- Provides for the development of the HASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves individuals who are assigned SHSO responsibilities;
- Coordinates revisions of this HASP with field personnel; and
- Assists in the investigation of major accidents.

3.4 Site Personnel

- Report any unsafe or potentially hazardous conditions to the FTL/SHSO;
- Maintain knowledge of the information, instructions and emergency response actions contained in this HASP; and
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions.

4.0 POTENTIAL HAZARDS OF THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during SMP monitoring activities and/or soil disturbing events. Additional information can be found in **Appendix A** - Material Safety Data Sheets or in **Appendix B** - Activity Hazard Analyses.

4.1 Chemical Hazards

Soil and soil vapor at the site is contaminated with PCE and other chlorinated solvents above NYSDEC and NYSDOH standards and guidance levels. Additionally, based on the presumed presence of historic fill material at the site, SVOC and metals impact exceeding NYSDEC standards is likely present in soils at the site as well. These compounds may present an occupational exposure hazard during site operations.

The chemicals identified above may have an effect on the central nervous system, respiratory system and may cause chronic liver and kidney damage. Acute exposure symptoms may include headache, dizziness, nausea, diarrhea and skin and eye irritation. Specific information on the chemicals identified at the Site can be found in Table 5-1 as well as on the Chemical Data Sheets found in **Appendix A**.

Table 5-1

Chemical Hazards

COMPOUND	CAS#	OSHA PEL	ROUTES OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Tetrachloroethene (PCE)	127-48-4	TWA 100 mg/m^3	Inhalation Ingestion Skin/Eye	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; potential occupational carcinogen	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid with a mild, chloroform-like odor.

Abbreviations

C = Ceiling limit, not to be exceeded

CNS = Central Nervous System

PEL=Permissible Exposure Limit

TWA = Time-weighted average (8 hours)

OSHA = Occupational Safety and Health Administration

ppm = parts per million

VP = vapor pressure at approximately 68□ F in mm Hg (mercury)

4.2 Biological Hazards

Work will be performed in a highly urban area within the City of New York. Potential exists for workers to come into contact with biological hazards such as animals, insects and plants. The Activity Hazard Analyses found in **Appendix B** includes specific hazards and control measures for each task, if applicable.

4.2.1 Animals

Sites are located in predominantly commercial/urban areas. It is unlikely that significant amounts of wildlife will be encountered. However, workers shall use discretion and avoid contact with animals, if necessary.

4.2.2 Insects

Insects, such as mosquitoes, ticks, bees and wasps may be present during certain times of the year. Workers will be encouraged to wear repellents and PPE, if deemed necessary, when working in areas where insects are expected to be present.

During the months of April through October, particular caution must be exercised to minimize exposure to deer ticks and the potential for contracting Lyme disease. Specific precautionary work practices that are recommended include the following:

- Cover your body as much as possible. Wear long pants and long sleeved shirts. Light color clothing makes spotting of ticks easier.
- Try to eliminate possible paths by which the Deer Tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles). If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized for added protection when the potential for heat stress is not a concern.
- Conduct periodic and frequent, (e.g., hourly), surveys of your clothing for the presence of ticks. Remove any tick, save it and report to the clinic with the tick.
- Use insect /tick repellents that contain the chemical DEET (n,n-Diethyltoluamide). Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF and Maximum Strength OFF.

4.2.3 Plants

Hazardous plants such as poison ivy and poison oak may be present at the site. In the event that these plants are present, the FTL/SHSO should identify susceptible individuals and workers shall avoid contact with these plants.

4.3 Physical Hazards

Most safety hazards are discussed in the Activity Hazard Analyses (AHA) in **Appendix B** for the different phases of the project. In addition to the AHAs, general work rules and other safety procedures are described in Section 10 of this HASP.

4.3.1 Temperature Extremes

Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke.

Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, and poor judgment.

PWGC's Heat/Cold Stress Protocols are specified in **Appendix C**.

4.3.2 Steam, Heat and Splashing

Exposure to steam/heat/splashing hazards can occur during steam cleaning activities. Splashing can also occur during well development and sampling activities. Exposure to steam/heat/splashing can result in scalding/burns, eye injury, and puncture wounds.

4.3.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, drill rigs, pumps and engines. Workers will wear hearing protection while in the work zone when these types of machinery are operating.

4.3.4 Fire and Explosion

When conducting excavation or drilling activities, the opportunity of encountering fire and explosion hazards may exist from encountering underground utilities, from the use of diesel engine equipment, and other potential ignition sources. During dry periods there is an increased chance of forest and brush fires starting at the job site. If these conditions occur no smoking will be permitted at the site and all operations involving potential ignition sources will be monitored continuously (fire watch).

4.3.5 Manual Lifting/Material Handling

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common work place injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

4.3.6 Slips, Trips and Falls

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be oil covered, or from rough terrain, surfaces that are steep inclines, surfaced debris, or surfaces which are wet from rain or ice. Falls may result in twisted ankles, broken bones, head trauma or back injuries.

4.3.7 Heavy Equipment Operation

An excavator/backhoe will be used to excavate where required. Working with or near heavy equipment poses many potential hazards, including electrocution, fire/explosion, being struck by or against, or pinched/caught/crushed by, and can result in serious physical harm.

4.3.8 Electrocution

Encountering underground utilities may pose electrical hazards to workers. Additionally, overhead electrical lines can be a concern during drilling operations. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

5.0 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control and mitigate those hazards. The AHAs will be used to train work crews in proper safety procedures during phase preparatory meetings.

AHAs have been developed by PWGC for the following phases of work:

1. Site Mobilization/Demobilization.
2. Excavation.
3. Soil and Groundwater sampling.
4. Decontamination.

Copies of these AHAs are included in **Appendix B** of this HASP.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) specified in **Table 7-1** represents the hazard analysis and PPE selection required by 29 CFR 1910.132. Specific information on known potential hazards can be found under Section 4.0 and **Appendix B** - Activity Hazard Analyses. For the purposes of PPE selection, the HSM and FTL/SHSO are considered competent persons. The signatures on the approval page of the HASP constitute certification of the hazard assessment. For activities not covered by **Table 7-1**, the FTL/SHSO will conduct the hazard assessment, select the PPE, and document changes in the appropriate field logs. PPE selection will be made in consultation with the HSM.

Modifications for initial PPE selection may also be made by the FTL/SHSO in consultation with the HSM and changes documented accordingly. If major modifications occur, the HSM will notify the PM.

6.1 PPE Abbreviations

HEAD PROTECTION

HH = Hard Hat

HEARING PROTECTION

EP = ear plugs

EM = ear muffs

HAND PROTECTION

Cot = cotton

But = Butyl

LWG = Leather Work Gloves

Neo = Neoprene

Nit = Nitrile

Sur = Surgical

EYE/FACE PROTECTION

APR = Full Face Air Purifying Respirator

MFS = Mesh Face shield

PFS =Plastic Face shield

SG = ANSI approved safety glasses with side shields

BODY PROTECTION

WC = work clothes

Cot Cov = Cotton Coveralls

Poly = Polyethylene coated Tyvek® coveralls

Saran = Saranex coated coveralls

Tyvek® = Uncoated Tyvek® coveralls

FOOT PROTECTION

Neo = Neoprene

OB = Overboot

Poly = polyethylene coated boot

Rub = rubber slush boots

STB = Leather work boots with steel toe

RESPIRATORY PROTECTION

APR = Full-face air purifying respirator with organic vapor cartridges

ASR = Full face air supplied respirator with escape bottle

SCBA = Self-contained breathing apparatus

6.2 Hazard Assessment for Selection of Personal Protective Equipment

The initial selection of personal protective equipment for each task was done by performing a hazard assessment taking into consideration the following:

- Potential chemical and physical present.
- Work operations to be performed.
- Potential routes of exposure.
- Concentrations of contaminants present.
- Characteristics, capabilities and limitations of PPE and any hazard that the PPE presents or magnifies.

A review of the analytical data from previous sampling events indicates that PCE (see **Table 5-**1) is the primary contaminant of concern. The maximum concentration detected for PCE in soil at the site is 82,000 ppb. Additionally, based on the presumed presence of historic fill material at the site, SVOC and metals impact exceeding NYSDEC standards is likely present in soils at the site as well.

Exposure routes for these chemicals include are inhalation, skin absorption, skin/eye contact and ingestion. Chemical protective gloves will be required for all activities that involve sample handling and the likelihood for skin contact. The proper use of PPE and strict adherence to decontamination and personal hygiene procedures will effectively minimize skin contact and ingestion as potential routes of exposure.

Table 7-1

Personal Protective Equipment Selection

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization/ Demobilization	HH	SG	STB	WG	WC	None	None
Excavation, loading and backfilling	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Drilling Activities	HH	SG	STB	WG	WC	EM or EP	None initially APR if action levels exceeded
Soil/GW sampling	HH	SG	STB	WG, Nit & Sur as needed	WC, Tyvek® as needed	None	None initially APR if action levels exceeded
Decontamination	HH	SG	STB	Nit + Sur	WC, Tyvek® as needed	None	None initially APR if action levels exceeded

6.3 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. If the use of respirators is necessary, the respirator cartridge change-out schedule for this project will be as follows:

1. Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first; and
2. If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short of time period they were used the day before.

The schedule was developed based on the following scientific information and assumptions:

- Analytical data that is available regarding site contaminants.
- Using the Rule of Thumb provided by the AIHA.
- All of the chemicals have boiling points greater than 70°C.
- Total airborne concentration of contaminants is anticipated to be less than 200 ppm.
- The humidity is expected to be less than 85%.
- Desorption of the contaminants (including those with poor warning properties) after partial use of the chemical cartridge can occur after a short period (hours) without use (e.g., overnight) and result in a non-use exposure.

The following is a partial list of factors that may affect the usable cartridge service life and/or the degree of respiratory protection attainable under actual workplace conditions. These factors have been considered when developing the cartridge change-out schedule.

Type of contaminant(s);

- Contaminant concentration.
- Relative humidity.
- Breathing rate; Temperature; Changes in contaminant concentration, humidity, breathing rate and temperature.
- Mixtures of contaminants.
- Accuracy in the determination of the conditions.

- The contaminant concentration in the workplace can vary greatly. Consideration must be given to the quality of the estimate of the workplace concentration;
- Storage conditions between multiple uses of the same respirator cartridges. It is recommended that the chemical cartridges be replaced after each work shift. Contaminants adsorbed on a cartridge can migrate through the carbon bed without airflow;
- Age of the cartridge;
- Condition of the cartridge and respirator;
- Respirator and cartridge selection respirator fit;
- Respirator assembly, operation, and maintenance;
- User training, experience and medical fitness;
- Warning properties of the contaminant; and
- The quality of the warning properties should be considered when establishing the chemical cartridge change schedule. Good warning properties may provide a secondary or back-up indication for cartridge change-out.

7.0 ZONES, PROTECTION AND COMMUNICATION

7.1 Site Control

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin.

This project is a hazardous waste remediation project, and any person working in an area where the potential for exposure to site contaminants exists, will only be allowed access after providing the FTL/SHSO with proper training and medical documentation.

The zones are based upon current knowledge of proposed site activities. It is possible that the zone configurations may be altered due to work plan revisions. Should this occur, the work zone will be adjusted accordingly, and documented through use of a field-change request form.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

Support Zone - The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

Contamination Reduction Zone - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

Exclusion Zone - All activities, which may involve exposure to site contaminants, hazardous materials and/or conditions, should be considered an EZ. The FTL/SHSO may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the site HSO allowing adequate space for the activity to be completed, field members and emergency equipment.

7.2 Contamination Control

Decontamination areas will be established for the following activities.

- Drilling/Sampling Activities
- Excavation

7.2.1 Personnel Decontamination Station

All personnel and portable equipment used in the EZ shall be subject to a thorough decontamination process, as deemed necessary by the FTL/SHSO. Sampling equipment shall be decontaminated. As necessary, all boots and gloves will be decontaminated using soap and water solution and scrub brushes or simple removal and disposal. All used respiratory protective equipment will be decontaminated daily and sanitized with appropriate sanitizer solution.

All drums generated as a result of sampling and decontamination activities will be marked and stored at a designated area at the site until the materials can be property disposed of off-site.

All non-expendable sampling equipment will be decontaminated. This usually entails the use of Alconox, solvent and distilled/deionized water rinses to eliminate contaminants.

7.3 Communication

- Each team member will have a Nextel cell phone/radio for communication with the PM, HSO and other team members during field activities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip on a partner's wrist or placement of both hands around a partner's waist.	Leave the area immediately, no debate.
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand.
Thumbs down	No, negative.

8.0 MEDICAL SURVEILLANCE PROCEDURES

All contractor and subcontractor personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f).

8.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the HSM before an employee can work in the exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the HSM in consultation with the Corporate Medical Consultant and the FTL/SHSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance.

8.2 Medical Data Sheet

A medical data sheet is provided in **Appendix D**. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

9.0 SAFETY CONSIDERATIONS

9.1 General Health and Safety Work Practices

A list of general health and safety work practices is included as an included in **Appendix E**. The work rules will be posted in a conspicuous location at the site.

9.2 The Buddy System

At a minimum, employees shall work in groups of two in such a manner that they can observe each other and maintain line-of-sight for each employee within the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

9.3 Sample Handling

Personnel responsible for the handling of samples should wear the prescribed level of protection. Samples should be identified as to their hazard and packaged as to prevent spillage or breakage. Sample containers shall be decontaminated in the CRZ or EZ before entering a clean Support Zone area. Any unusual sample conditions, odors, or real-time readings should be noted. Laboratory personnel should be advised of sample hazard level and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling, in order to assure that the practices are appropriate for the suspected contaminants in the sample.

9.4 Drill Rigs

When conducting drilling activities, the opportunity of encountering fire and explosion hazards exists from underground utilities and gases. The locations of underground utilities will be verified prior to performing any intrusive activities. Additionally, because of the inherently hazardous nature of drilling operations, safety and accident prevention are crucial when drilling operations are performed. Most drilling accidents occur as a direct result of lack of training and supervision, improper handling of equipment, and unsafe work practices. Hazards include: assembling and disassembling rigs, rotary and auger drilling, and grouting. The drilling contractor shall perform drilling in accordance with its own Health & Safety Program for Drill Rig Safety.

9.4.1 Safety During Drilling Operations

- Safety requires the attention and cooperation of every worker and site visitor.
- Do not drive the drill rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick), look up to check for overhead obstructions.
- Maintain a minimum of 15 feet clearance from all overhead electric lines.

- Before raising the mast (derrick), all drill rig personnel (with the exception of the operator) and visitors shall be cleared from the areas immediately to the rear and the sides of the mast. All drill rig personnel and visitors shall be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig must first be leveled and stabilized with leveling jacks and/or solid cribbing. Lower the mast (derrick) only when the leveling jacks are down and do not raise the leveling jack pads until the mast (derrick) is lowered completely.
- The operator of a drill rig shall only operate a drill rig from the position of the controls.
- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line shall be used.
- Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a drill rig or while on the job.
- All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, site visitors, or animals form stepping or falling into the hole.
- Terminate drilling operations during an electrical storm and move the entire crew away from the drill rig.

9.5 Excavation

Although extensive excavation is not anticipated for the scope of this project, excavations will be conducted in accordance with the requirements contained in 29 CFR 1926, Subpart P-Excavations. It provides for the designation of a "Competent Person" and general requirements for safe excavating practices. The program also incorporates company standards for the monitoring of potentially hazardous atmospheres; protection from water hazards; analyzing and maintaining the stability of adjacent structures; daily competent person inspections; soil classification; sloping and benching; protective systems; and training.

The Competent Person will be the FTL or other designee with appropriate training and experience. The Competent Person will be assisted in his/her duties by other technical personnel such as the HSM, geologists, structural engineers and soils engineers.

No entry into excavations will be allowed for this phase of the project.

10.0 DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site.

All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials will be collected and bagged for appropriate disposal as non-hazardous solid waste. Additional waste disposal procedures may be developed as applicable.

11.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures.

11.1 Responsibilities

11.1.1 Health and Safety Manager (HSM)

The HSM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The HSM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

11.1.2 Field Team Leader/Site Health and Safety Officer (FOL/HSO)

The FTL/SHSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The FTL/SHSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can ensure that OSHA is notified within the required time frame. The HSM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of $500 within 24 hours.

11.1.3 Emergency Coordinator

The Emergency Coordinator for the project is the FTL/SHSO.

The Emergency Coordinator shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the emergency coordinator will inform interested parties about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. The emergency coordinator will locate emergency phone numbers and identify hospital routes prior to beginning work on site. The emergency coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator will implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

11.1.4 Site Personnel

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency.

11.2 Communication

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

11.2.1 Hand Signals

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 8.3.

11.2.2 Field Radios and Cell Phones

PWGC field personnel are provided cellular phones with telephone and two-way radio capabilities for site communication and emergency use.

11.3 Local Emergency Support Units

A route map from the site to the nearest hospital can be found in **Appendix F**. This map will be placed with the above emergency telephone numbers in all on-site vehicles.

11.4 Pre-Emergency Planning

PWGC will communicate directly with administrative personnel from the emergency room at the hospital to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

Before the field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency. Before fieldwork on the site commences, each person who will be working there or observing the operations will complete a medical data sheet (**Appendix D**). These data sheets will be filled out during site-specific training and will be kept on the site.

In the event of an incident where a team member becomes exposed or suffers from an acute symptom of exposure to site materials and has to be taken to a hospital, a copy of his/her medical data sheet will be presented to the attending physician.

Table 13-1

Emergency Telephone Numbers

Contact	Firm or Agency	Telephone Number
Police		911
Fire		911
Hospital	Jamaica Hospital Medical Center	(718) 206-6000
Ambulance		911
Project Manager/Health and Safety Manager	Thomas Melia PWGC	(631) 589-6353
Field Team Lead/Site Health & Safety Officer	Ryan Morley PWGC	(631) 589-6353
NYSDEC Site Contact	Sadique Ahmed	(518) 402-9656
Poison Control Center		(800) 962-1253
Chemtrec		(800) 424-9300

11.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the FTL/SHSO immediately. First aid equipment will be available on site at the following locations:

- First Aid Kit: Support Zone (or designated by FTL/SHSO upon arrival)
- Emergency Eye Wash: Support Zone (or designated by FTL/SHSO upon arrival)

During site-specific training, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-

response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

There will be at least two people with current First Aid and CPR certification on each active work shift. When personnel are transported to the hospital, the FTL/SHSO will provide a copy of the Medical Data Sheet to the paramedics and treating physician.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance. **A map and directions to the hospital can be found in Appendix F.**

11.6 Emergency Site Evacuation Routes and Procedures

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the EC also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, an air horn will be sounded on the site. The horn will sound continuously for one blast, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the evacuation meeting point, which will be determined upon arrival at the site by the FTL/SHSO, prior to work beginning. This will then be conveyed to all crew members during the site-specific briefing.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the EC will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team

member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. A map showing evacuation routes, meeting places and the location of emergency equipment will be posted in all trailers and used during site-specific training.

11.7 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

11.7.1 Fire Prevention

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

11.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

SKIN AND EYE CONTACT: Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.

INHALATION: Move to fresh air. Decontaminate and transport to hospital or local medical provider.

INGESTION: Decontaminate and transport to emergency medical facility.

PUNCTURE WOUND OR LACERATION: Decontaminate and transport to emergency medical facility.

11.9 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or postponed. The FTL/SHSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

11.10 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

- Health and Safety Manager;
- Project Manager; and
- The employer of any injured worker who is not a PWGC employee.

Written confirmation of verbal reports are to be completed by the FTL/SHSO using the Incident Report Form and submitted within 24 hours. The incident report and investigation form is found in **Appendix G**. If the employee involved is not a PWGC employee, his employer will receive a copy of the report.

11.11 Adverse Weather Conditions

In the event of adverse weather conditions, the FTL/SHSO will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds);
- Limited visibility (fog);
- Potential for electrical storms;
- Earthquakes; and
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The FTL/SHSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

11.12 Spill Control and Response

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill. The following seven steps should be taken by the Emergency Coordinator:

- Determine the nature, identity and amounts of major spill components;
- Make sure all unnecessary persons are removed from the spill area;
- Notify appropriate response teams and authorities;
- Use proper PPE in consultation with the FTL/SHSO;

- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- If possible, try to stop the leak with appropriate material; and,
- Remove all surrounding materials that can react or compound with the spill.

11.13 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on-site:

- Industrial first aid kit;
- Burn kit and portable eye washes (one per field team);
- Fire extinguishers (one per work area); and
- Absorbent material /spill kit.

12.0 TRAINING

12.1 General Health and Safety Training

In accordance with PWGC corporate policy, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard. Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

12.1.1 Three Day Supervised On the Job Training

In addition to the required initial hazardous waste operations training, each employee shall have received three days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

12.2 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 1910.120 requirements and related company programs and procedures.

12.3 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

12.4 On-Site Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings daily by the FTL/SHSO to assist site personnel in safely conducting their work activities. A copy of the Daily Briefing Sign-In Sheet is contained in **Appendix H**. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the crews on monitoring results. Prior to starting any new

activity, a training session using the Activity Hazard Analysis will be held for crew members involved in the activity.

12.5 First Aid and CPR

The HSM will identify those individuals requiring first aid and CPR training to ensure that emergency medical treatment is available during field activities. It is anticipated that a minimum of one field person on-site at any one time will have first aid and CPR training. The training will be consistent with the requirements of the American Red Cross Association or American Heart Association. If none are available on-site, then the HSM shall be notified.

12.6 Supervisory Training

Supervisors and health and safety personnel shall have completed an additional eight hours of specialized training in accordance with 29 CFR 1910.120.

13.0 LOGS, REPORTS AND RECORDKEEPING

Changes to the HASP will be documented in the Health and Safety log book and as appropriate, the HSM and/or PM will be notified. Daily tailgate meetings will be documented in the H&S log book as well as personnel on-site.

13.1 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training and documentation of three day OJT) and medical clearance for hazardous waste site work and respirator use will be maintained on-site. Records for all subcontractor employees will also be kept on-site.

13.2 Incident Report and Investigation Form

The incident report and investigation form is to be completed for all accidents and incidents, including near misses. The form can be found in **Appendix G**.

13.3 Health and Safety Logbooks

The FTL/SHSO will maintain a logbook during site work. The daily site conditions, personnel, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

14.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of the HASP. It is maintained on site by the FTL/SHSO as a project record. Each field team member shall sign this section after site-specific training is completed and before being permitted to work on site.

I have read, or have been informed of, the Health and Safety Plan and understand the information presented. I will comply with the provisions contained therein.

Name (Print and Sign)	***Date***

APPENDIX A
CHEMICAL DATA SHEETS

Tetrachloroethylene

Synonyms & Trade Names Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene

CAS No. 127-18-4	**RTECS No.** KX3850000 (/niosh-rtecs/KX3ABF10.html)	**DOT ID & Guide** 1897 160 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx/guide160/) (http://www.cdc.gov/Other/disclaimer.html)
Formula $Cl_2C=CCl_2$	**Conversion** 1 ppm = 6.78 mg/m3	**IDLH** Ca [150 ppm] See: 127184 (/niosh/idlh/127184.html)

Exposure Limits **NIOSH REL** : Ca
Minimize workplace exposure concentrations. See Appendix A (nengapdxa.html)
OSHA PEL † (nengapdxg.html) : TWA 100 ppm
C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm

Measurement Methods
NIOSH 1003 (/niosh/docs/2003-154/pdfs/1003.pdf) ;
OSHA 1001 (http://www.osha.gov/dts/sltc/methods/mdt/mdt1001/1001.html) (http://www.cdc.gov/Other/disclaimer.html)
See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)

Physical Description Colorless liquid with a mild, chloroform-like odor.

MW:	BP:	FRZ:	Sol:	VP:	IP:
165.8	250°F	-2°F	0.02%	14 mmHg	9.32 eV

Sp.Gr:	Fl.P:	UEL:	LEL:		
1.62	NA	NA	NA		

Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.

Incompatibilities & Reactivities Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver tumors]

Personal Protection/Sanitation (See protection codes (protect.html))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures (firstaid.html))
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also: INTRODUCTION (/niosh/npg/pgintrod.html) See ICSC CARD: 0076 (/niosh/ipcsneng/neng0076.html) See MEDICAL TESTS: 0179 (/niosh/docs/2005-110/nmed0179.html)

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Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA 30329-4027, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - Contact CDC–INFO

APPENDIX B
ACTIVITY HAZARD ANALYSES

Project Identification 124-22 Queens Blvd	Location Various	Estimated Dates TBD
Phase of Work Mobilization/ Demobilization	**Page 1 of 1**	**Analysis Approved by** Paul Boyce, PE, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1. Mobilization and demobilization of equipment site tools, personnel	Slips/trips/falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.
	Manual lifting and material handling	• Instruct personnel on proper lifting techniques; • Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Vehicular traffic	• Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
	Overhead hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • Ground personnel will stay clear of suspended loads; • Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • Overhead hazards will be identified prior to commencing work operations.
	Noise	• Ear plugs or ear muffs shall be worn for operations that exceed 85 decibels.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.2 for tick bites; • FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.

Project Identification 124-22 Queens Blvd.	Location Various	Estimated Dates TBD
Phase of Work Excavation	**Page 1 of 2**	**Analysis Approved by** Paul Boyce, PE, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1. Excavate to required depths; soil handing and transport	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Perform air monitoring per Community Air Monitoring Plan; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Hand and power tool usage	• Equip electrical equipment with GFCI's; • Inspect electrical equipment and tools prior to use; • Daily inspections will be performed; • Remove broken or damaged tools from service; • Use the tool for its intended purpose; • Use in accordance with manufacturer instructions; and Tag and remove defective equipment.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and, • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Instruct personnel on proper lifting techniques; • Use proper lifting techniques; and • Team lifting will be used for heavy loads or use mechanical lifting devices.
	Fire/Explosion	• ABC type fire extinguishers shall be readily available; • No smoking in work area.
	Biological hazards	• Be alert to the presence of biological hazards; • Wear insect repellent; • Follow procedures in Section 4.2.2 for tick bites; • FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.
	Heavy equipment	• Ground personnel will stay clear of suspended loads; • Ground personnel will stay out of the swing radius; • Eye contact with operators will be made before approaching equipment; • Equipment will not be approached on blind sides; • Equipment will be equipped with backup alarms or spotters shall be used.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and mark and repair if possible tripping hazards are present.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.

Project Identification 124-22 Queens Blvd.	**Location** Various	**Estimated Dates** TBD
Phase of Work Drilling	**Page 2 of 2**	**Analysis Approved by** Paul Boyce, PE, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
	Noise	• Hearing protection mandatory at or above 85 dBA. • Instruct personnel how to properly wear heating protective devices. •Disposable ear plugs or other hearing protection required when working near noisy equipment..
	Steam/Heat/Splashing	• Use face shield and safety glasses or goggles; • Stay out of the splash/steam radius; • Do not direct steam at anyone; • Do not hold objects with your foot and steam area near it; • Direct spray to minimize spread of constituents of concern; and • Use shielding as necessary.
	Excavation hazards	• Follow 29 CFR 1926 Subpart P.
	Overhead hazards	• Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; • Ground personnel will stay clear of suspended loads; • Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and • Overhead hazards will be identified prior to commencing work operations.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Track Hazards	• Caution will be used when working in close proximity to the electrified third rail (see “Electrocution” above). • Workers are required to have completed NYCT Track Safety Training • Flag men will be used when necessary (e.g., working in limited access track areas).

Project Identification 124-22 Queens Blvd.	**Location** Various	**Estimated Dates** TBD
Phase of Work Soil/Groundwater Sampling	**Page 1 of 1**	**Analysis Approved by** Paul Boyce, PE, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1.Collect soil/groundwater samples.	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Track Hazards	• Caution will be used when working in close proximity to the electrified third rail (see "Electrocution" above). • Workers are required to have completed NYCT Track Safety Training • Flag men will be used when necessary (e.g., working in limited access track areas).

Project Identification 124-22 Queens Blvd.	**Location** Various	**Estimated Dates** TBD
Phase of Work Decontamination	**Page 1 of 1**	**Analysis Approved by** Paul Boyce, PE, PM/HSM
TASKS	**HAZARDS**	**CONTROL MEASURES**
1.Decontaminate equipment	Chemical hazards	• Wear appropriate PPE per Table 6-1; • Practice contamination avoidance; • Follow proper decontamination procedures; and • Wash hands/face before eating, drinking or smoking.
	Temperature extremes	• Drink plenty of fluids: • Train personnel of signs/symptoms of heat/cold stress; • Monitor air temperatures when extreme weather conditions are present; and • Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	• Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	• Maintain alertness to slip/trip/fall hazards; • Maintain good housekeeping; • Walk, do not run; • Wear footwear with soles that grip; • Unloading areas should be on even terrain; and • Mark and repair if possible tripping hazards.
	Electrocution	• Equipment will be equipped with GFCI; • A licensed electrician will conduct electrical work; • Equipment will stay a minimum of 15 feet from overhead-energized electrical lines and the electrified third rail (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50 kV.
	Track Hazards	• Caution will be used when working in close proximity to the electrified third rail (see "Electrocution" above). • Workers are required to have completed NYCT Track Safety Training • Flag men will be used when necessary (e.g., working in limited access track areas).

APPENDIX C
HEAT/COLD STRESS PROTOCOLS

HEAT STRESS

Heat Stress (Hyperthermia)

Heat stress is the body's inability to regulate the core temperature. A worker's susceptibility to heat stress can vary according to his/her physical fitness, degree of acclimation to heat, humidity, age and diet.

1. Prior to site activity, the field team leader may make arrangements for heat stress monitoring (i.e., monitoring heart rate, body temperature, and body water loss) during actual site work if conditions warrant. In addition, the FTL is to ensure that each team member has been acclimatized to the prevailing environmental conditions, that personnel are aware of the signs and symptoms of heat sickness, that they have been adequately trained in first aid procedures, and that there are enough personnel on-site to rotate work assignments and schedule work during hours of reduced temperatures. Personnel should not consume alcoholic or caffeinated beverages but rather drink moderate levels of an electrolyte solution and eat well prior to commencing site work.
2. Although there is no specific test given during a baseline physical that would identify a person's intolerance to heat, some indicators are tobacco or medication use, dietary habits, body weight, and chronic conditions such as high blood pressure or diabetes.
3. *Heat cramps*, caused by profuse perspiration with inadequate fluid intake and salt replacement, most often afflict people in good physical condition who work in high temperature and humidity. Heat cramps usually come on suddenly during vigorous activity. Untreated, heat cramps may progress rapidly to heat exhaustion or heat stroke. First aid treatment: remove victim to a cool place and replace lost fluids with water.
4. Thirst is not an adequate indicator of heat exposure. Drinking fluid by itself does not indicate sufficient water replacement during heat exposure. A general rule, the amount of water administered should replace the amount of water lost, and it should be administered at regular intervals throughout the day. For every half pound of water lost, 8 ounces of water should be ingested. Water should be replaced by drinking 2 – 4 ounce servings during every rest period. A recommended alternative to water is an electrolyte drink split 50/50 with water.
5. Heat exhaustion results from salt and water loss along with peripheral pooling of blood. Like heat cramps, heat exhaustion tends to occur in persons in good physical health who are working in high temperatures and humidity. Heat exhaustion may come on suddenly as dizziness and collapse. Untreated, heat exhaustion may progress to heat stroke.
6. Treatment for heat exhaustion: Move the victim to a cool environment (e.g. air-conditioned room/car), lay victim down and fan him/her. If the air-conditioning is not available, remove the victim to a shaded

area, remove shirt, and fan. If symptoms do not subside within an hour, notify 911 to transport to hospital.

7. Heat stroke results from the body's inability to dissipate excess heat. A true medical emergency that requires immediate care, it usually occurs when one ignores the signs of heat exhaustion and continues strenuous activities. Working when the relative humidity exceeds 60% is a particular problem. Workers in the early phase of heat stress may not be coherent of they will be confused, delirious or comatose. Changes in behavior, irritability and combativeness are useful early signs of heat stroke.
8. Treatment of heat stroke: Move the victim to a cool, air-conditioned environment. Place victim in a semi-reclined position with head elevated and strip to underclothing. Cool victim as rapidly as possible, applying ice packs to the arms and legs and massaging the neck and torso. Spray victim with tepid water and constantly fan to promote evaporation. Notify 911 to transport to hospital as soon as possible.

SYMPTOMS OF HEAT STRESS

Heat cramps are caused by heavy sweating with inadequate fluid intake. Symptoms include;

- Muscle cramps
- Cramps in the hands, legs, feet and abdomen

Heat exhaustion occurs when body organs attempt to keep the body cool. Symptoms include;

- Pale, cool moist skin
- Core temperature elevated 1-2o
- Thirst
- Anxiety
- Rapid heart rate
- Heavy sweating
- Dizziness
- Nausea

Heat stroke is the most serious form of heat stress. Immediate action must be taken to cool the body before serious injury and death occur. Symptoms are;

- Red, hot, dry skin
- Lack of perspiration

- Seizures
- Dizziness and confusion
- Strong, rapid pulse
- Core temperature of 104o or above
- Coma

HEAT STRESS INDICATORS

Heat stress indicator:	When to measure:	If Exceeds:	Action:
Heart rate (pulse)	Beginning of rest period	110 beats per minute	Shorten next work period by 33%
Oral temperature	Beginning of rest period	99°F (after thermometer is under tongue for 3 minutes) 100.6°F (after thermometer is under tongue for 3 minutes)	Shorten next work period by 33% Prohibit work in impermeable clothing
Body Weight	1. Before workday begins 2. After workday ends		Increase fluid intake

COLD STRESS

Cold stress (Hypothermia)

In hypothermia the core body temperature drops below 95°F. Hypothermia can be attributed to a decrease in heat production, increased heat loss or both.

Prevention

Institute the following steps to prevent overexposure of workers to cold:

1. Maintain body core temperature at 98.6oF or above by encouraging workers to drink warm liquids during breaks (preferably not coffee) and wear several layers of clothing that can keep the body warm even when the clothing is wet.
2. Avoid frostbite by adequately covering hands, feet and other extremities. Clothing such as insulated gloves or mittens, earmuffs and hat liners should be worn. To prevent contact frostbite (from touching metal and cold surfaces below 20°F), workers should wear gloves. Tool handles should be covered with insulating material.
3. Adjust work schedules to provide adequate rest periods. When feasible, rotate personnel and perform work during the warmer hours of the day.
4. Provide heated shelter. Workers should remove their outer layer(s) of clothing while in the shelter to allow sweat to evaporate.
5. In the event that wind barriers are constructed around an intrusive operation (such as drilling), the enclosure must be properly vented to prevent the buildup of toxic or explosive gases or vapors. Care must be taken to keep a heat source away from flammable substances.
6. Using a wind chill chart such as the one included below, obtain the equivalent chill temperature (ECT) based on actual wind speed and temperature. Refer to the ECT when setting up work warm-up schedules, planning appropriate clothing, etc. Workers should use warming shelters at regular intervals at or below an ECT of 20°F. For exposed skin, continuous exposure should not be permitted at or below an ECT of -25°F.

FROSTBITE

Personnel should be aware of symptoms of frostbite/hypothermia. If the following symptoms are noticed in any worker, he/she should immediately go to a warm shelter.

Condition	Skin Surface	Tissue Under Skin	Skin Color
Frostnip	Soft	Soft	Initially red, then white
Frostbite	Hard	Soft	White and waxy
Freezing	Hard	Hard	Blotchy, white to yellow-grey to grey

1. Frostnip is the incipient stage of frostbite, brought about by direct contact with a cold object or exposure of a body part to cool/cold air. Wind chill or cold water also can be major factors. This condition is not serious. Tissue damage is minor and the response to care is good. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostnip.
2. Treatment of frostnip: Care for frostnip by warming affected areas. Usually the worker can apply warmth from his/her bare hands, blow warm air on the site, or, if the fingers are involved, hold them in the armpits. During recovery, the worker may complain of tingling or burning sensation, which is normal. If the condition does not respond to this simple care, begin treatment for frostbite.
3. Frostbite: The skin and subcutaneous layers become involved. If frostnip goes untreated, it becomes superficial frostbite. This condition is serious. Tissue damage may be serious. The worker must be transported to a medical facility for evaluation. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostbite. The affected area will feel frozen, but only on the surface. The tissue below the surface must still be soft and have normal response to touch. DO NOT squeeze or poke the tissue. The condition of the deeper tissues can be determined by gently palpating the affected area. The skin will turn mottled or blotchy. It may also be white and then turn grayish-yellow.
4. Treatment of frostbite: When practical, transport victim as soon as possible. Get the worker inside and keep him/her warm. Do not allow any smoking or alcohol consumption. Thaw frozen parts by immersion, re-warming in a 100°F to 106°F water bath. Water temperature will drop rapidly, requiring additional warm water throughout the process. Cover the thawed part with a dry sterile dressing. Do not puncture or drain any blisters. NOTE: Never listen to myths and folk tales about the care of frostbite. Never rub a frostbitten or frozen area. Never rub snow on a frostbitten or frozen area. Rubbing the area may cause

serious damage to already injured tissues. Do not attempt to thaw a frozen area if there is any chance it will be re-frozen.

5. General cooling/Hypothermia: General cooling of the body is known as systemic hypothermia. This condition is not a common problem unless workers are exposed to cold for prolonged periods of time without any shelter.

Body Temp (°F)	Body Temp (°C)	Symptoms
99-96	37-35.5	Intense uncontrollable shivering
95-91	35.5-32.7	Violent shivering persists. If victim is conscious, has difficulty speaking.
90-86	32.6-30	Shivering decreases and is replaced by strong muscular rigidity. Muscle coordination is affected. Erratic or jerkey movements are produced. Thinking is less clear. General comprehension is dulled. There may be total amnesia. The worker is generally still able to maintain the appearance of psychological contact with his surroundings.
85-81	29.9-27.2	Victim becomes irrational, loses contact with his environment, and drifts into a stupor. Muscular rigidity continues. Pulse and respirations are slow and the worker may develop cardiac arrhythmias.
80-78	27.1-25.5	Victim becomes unconscious. He does not respond to the spoken word. Most reflexes cease to function. Heartbeat becomes erratic
Below 78	Below 25.5	Cardiac and respiratory centers of the brain fail. Ventricular fibrillation occurs; probably edema and hemorrhage in the lungs; death.

6. Treatment of hypothermia: Keep worker dry. Remove any wet clothing and replace with dry clothes, or wrap person in dry blankets. Keep person at rest. Do not allow him/her to move around. Transport the victim to a medical facility as soon as possible.

COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS AN EQUIVALENT TEMPERATURE (UNDER CALM CONDITIONS)

Estimated wind Speed (in mph)	Actual Temperature Reading (^{0}F)P											
	50	40	30	20	10	0	10	20	30	40	50	60
	Equivalent Chill Temperature (^{0}F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	15	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-146
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER in < hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and imersion foot may occur at any point on this chart											

Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

(1) Reproduced from American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1985-1986, p.01.

APPENDIX D
MEDICAL DATA SHEET

MEDICAL DATA SHEET

The brief medical data sheet should be completed by on-site personnel and will be kept in the Support Zone by the HSO as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required. This form is optional, but recommended.

Project Site:			
Name:			
Age:	Height:	Weight:	Blood Type:
Employer:			
Employer Phone #:			
Emergency Contact Name:			
Emergency Contact Phone #:			
Personal Physician Name:			
Personal Physician Phone #:			
Allergies or Sensitivities:			
Previous and/or Chronic Illnesses:			
Medications:			
Medical Restrictions:			

APPENDIX E
GENERAL HEALTH AND SAFETY WORK PRACTICES

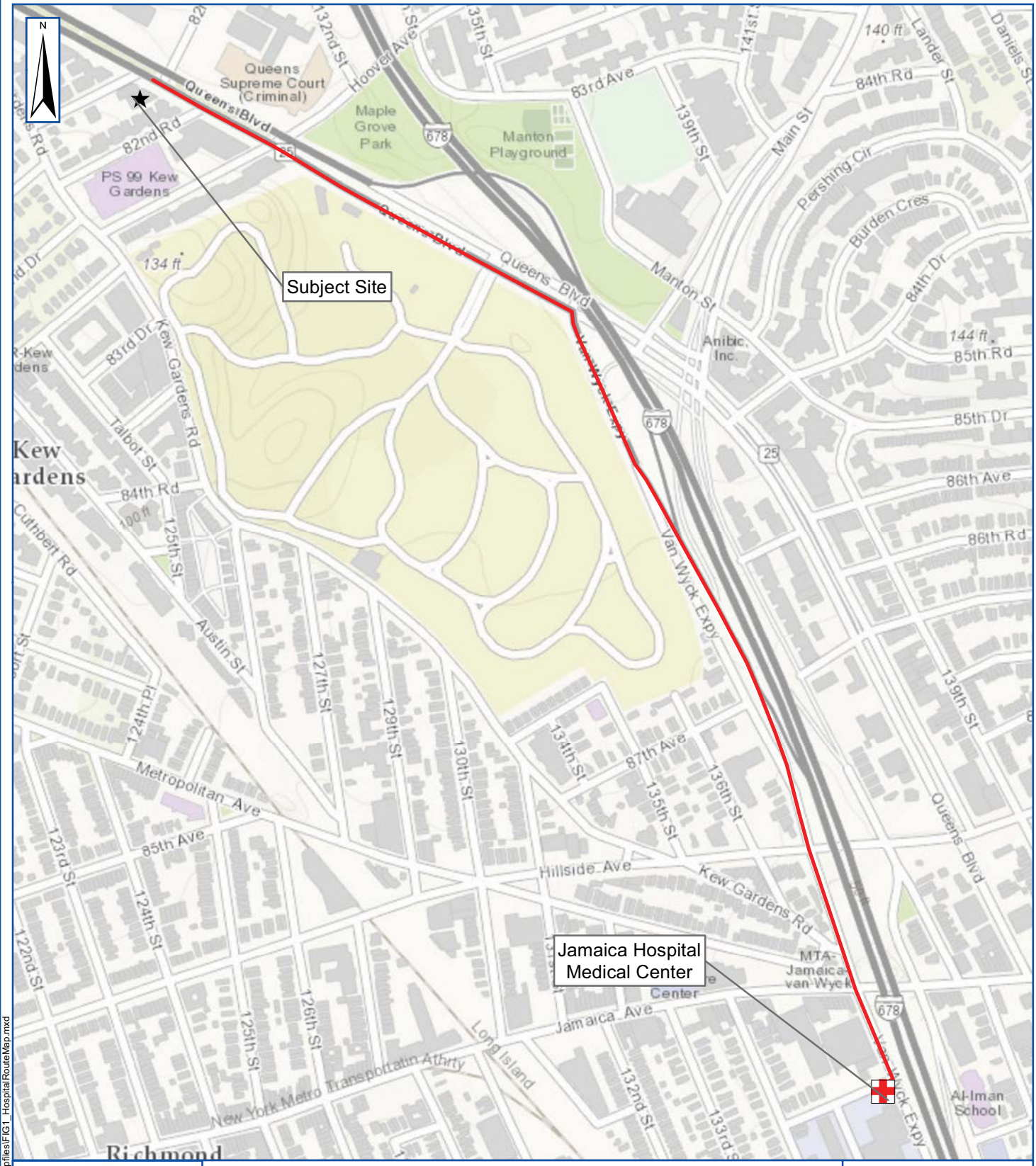
GENERAL HEALTH AND SAFETY WORK PRACTICES

1. Site personnel must attend each day's Daily Briefing and sign the attendance sheet.
2. Any individual taking prescribed drugs shall inform the FTL/HSO of the type of medication. The FTL/HSO will review the matter with the HSM and the Corporate Medical Consultant (CMC), who will decide if the employee can safely work on-site while taking the medication.
3. The personal protective equipment specified by the FTL/HSO and/or associated procedures shall be worn by site personnel. This includes hard hats and safety glasses which must be worn in active work areas.
4. Facial hair (beards, long sideburns or mustaches) which may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.
5. Personnel must follow proper decontamination procedures and shower as soon as possible upon completion of work shift.
6. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the exclusion zone or the contamination reduction zone. (Exceptions may be permitted by the HSM to allow fluid intake during heat stress conditions).
7. Lighters, matches, cigarettes and other forms of tobacco are prohibited in the Exclusion Zone.
8. Signs and demarcations shall be followed. Such signs and demarcation shall not be removed, except as authorized by the FTL/HSO.
9. No one shall enter a permit-required confined space without a permit and appropriate training. Confined space entry permits shall be implemented as issued.
10. Personnel must follow Hot Work Permits as issued.
11. Personnel must use the Buddy System in the Exclusion Zone.
12. Personnel must follow the work-rest regimens and other practices required by the heat stress program.
13. Personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.
14. No person shall operate equipment unless trained and authorized.
15. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.
16. Ladders and scaffolds shall be solidly constructed, in good working condition, and inspected prior to use. No one may use defective ladders or scaffolds.

17. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.
18. Safety belts, harnesses and lanyards must be selected by the Supervisor. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Personal fall protection that has been shock loaded must be discarded.
19. Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.
20. Ground fault interrupters shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out walkways and puddles unless protected and rated for the service.
21. Improper use, mishandling, or tampering with health and safety equipment and samples is prohibited.
22. Horseplay of any kind is prohibited.
23. Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.
24. Incidents, no matter how minor, must be reported immediately to the Supervisor.
25. Personnel shall be familiar with the Site Emergency Action Plan, which is contained in Section 12 of the HASP/EAP.

The above Health and Safety Rules are not all inclusive and it is your responsibility to comply with regulations set forth by OSHA, the client, PWGC Supervisors, and the FTL/HSO.

APPENDIX F
HOSPITAL ROUTE MAP AND DIRECTIONS



Document Path: G:\Projects\A-D\ACT1501\mapfiles\FIG1_HospitalRouteMap.mxd

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E-mail: INFO@PWGROSSER.COM

HOSPITAL ROUTE MAP

124-22 QUEENS BLVD
KEW GARDENS, NY

0 0.1 0.2 0.3 0.4 Miles

Project:	ACT1501
Date:	2/25/2016
Designed by:	TM
Drawn by:	JCG
Approved by:	TM
Figure No:	1

APPENDIX G
INCIDENT REPORT FORM / INVESTIGATION FORM

INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 1 OF 2
TYPE OF INCIDENT - CHECK ALL THAT APPLY
☐ INJURY/ILLNESS ☐ VEHICLE DAMAGE ☐ PROPERTY DAMAGE ☐ FIRE
☐ SPILL/RELEASE ☐ PERMIT EXCEEDENCE ☐ NEAR MISS ☐ OTHER
GENERAL INFORMATION
PROJECT NAME: DATE OF REPORT: REPORT NO.:
DATE OF INCIDENT: TIME: DAY OF WEEK:
LOCATION OF INCIDENT:
WEATHER CONDITIONS: ADEQUATE LIGHTING AT SCENE? ☐ YES ☐ NO ☐ N/A
DESCRIBE WHAT HAPPENED (STEP BY STEP - USE ADDITIONAL PAGES IF NECESSARY)
AFFECTED EMPLOYEE INFORMATION
NAME: EMPLOYEE: ☐ YES ☐ NO
HOME ADDRESS:
SOCIAL SECURITY NO.: HOME PHONE NO.:
JOB CLASSIFICATION: YEARS IN JOB CLASSIFICATION:
HOURS WORKED ON SHIFT PRIOR TO INCIDENT: AGE:
DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION? ☐ YES ☐ NO
INJURY/ILLNESS INFORMATION
NATURE OF INJURY OR ILLNESS:
OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM:
FIRST AID PROVIDED? ☐ YES ☐ NO
IF YES, WHERE WAS IT GIVEN: ☐ ON-SITE ☐ OFF-SITE
IF YES, WHO PROVIDED FIRST AID:
WILL THE INJURY/ILLNESS RESULT IN: ☐ RESTRICTED DUTY ☐ LOST TIME ☐ UNKNOWN

INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 2 OF 2 REPORT NO.
MEDICAL TREATMENT INFORMATION
WAS MEDICAL TREATMENT PROVIDED? ☐ YES ☐ NO
IF YES, WAS MEDICAL TREATMENT PROVIDED: ☐ ON-SITE ☐ DR.'S OFFICE ☐ HOSPITAL
NAME OF PERSON(S) PROVIDING TREATMENT:
ADDRESS WHERE TREATMENT WAS PROVIDED:
TYPE OF TREATMENT:
VEHICLE AND PROPERTY DAMAGE INFORMATION
VEHICLE/PROPERTY DAMAGED:
DESCRIPTION OF DAMAGE:
SPILL AND AIR EMISSIONS INFORMATION:
SUBSTANCE SPILLED OR RELEASED: FROM WHERE: TO WHERE:
ESTIMATED QUANTITY/DURATION:
CERCLA HAZARDOUS SUBSTANCE? ☐ YES ☐ NO
REPORTABLE TO AGENCY? ☐ YES ☐ NO SPECIFY:
WRITTEN REPORT: ☐ YES ☐ NO TIME FRAME:
RESPONSE ACTION TAKEN:
PERMIT EXCEEDENCE
TYPE OF PERMIT: PERMIT #:
DATE OF EXCEEDENCE: DATE FIRST KNOWLEDGE OF EXCEEDENCE:
PERMITTED LEVEL OR CRITERIA:
EXCEEDENCE LEVEL OR CRITERIA:
REPORTABLE TO AGENCY? ☐ YES ☐ NO SPECIFY:
WRITTEN REPORT: ☐ YES ☐ NO TIME FRAME:
RESPONSE ACTION TAKEN:
NOTIFICATIONS
NAMES OF PERSONNEL NOTIFIED: DATE/TIME:
CLIENT NOTIFIED: DATE/TIME:
AGENCY NOTIFIED: DATE/TIME:
CONTACT NAME:
PERSONS PREPARING REPORT
EMPLOYEE'S NAME:(PRINT) SIGN:
SUPERVISOR'S NAME:(PRINT) SIGN:

INVESTIGATIVE REPORT			
DATE OF INCIDENT:	DATE OF REPORT:	REPORT NUMBER:	
INCIDENT COST: ESTIMATED: $_____	ACTUAL: $_____		
OSHA RECORDABLE(S): ☐ YES ☐ NO # RESTRICTED DAYS ____ # DAYS AWAY FROM WORK ____			
CAUSE ANALYSIS			
IMMEDIATE CAUSES - WHAT ACTIONS AND CONDITIONS CONTRIBUTED TO THIS EVENT?			
BASIC CAUSES - WHAT SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT?			
ACTION PLAN			
REMEDIAL ACTIONS - WHAT HAS AND OR SHOULD BE DONE TO CONTROL EACH OF THE CAUSES LISTED?			
ACTION	PERSON RESPONSIBLE	TARGET DATE	COMPLETION DATE
PERSONS PERFORMING INVESTIGATION			
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
MANAGEMENT REVIEW			
PROJECT MANAGER: (PRINT)	SIGN:	DATE:	
COMMENTS:			
H&S MANAGER: (PRINT)	SIGN:	DATE:	
COMMENTS:			

EXAMPLES OF IMMEDIATE CAUSES

Substandard Actions

1. Operating equipment without authority
2. Failure to warn
3. Failure to secure
4. Operating at improper speed
5. Making safety devices inoperable
6. Removing safety devices
7. Using defective equipment
8. Failure to use PPE properly
9. Improper loading
10. Improper placement
11. Improper lifting
12. Improper position for task
13. Servicing equipment in operation
14. Under influence of alcohol/drugs
15. Horseplay

Substandard Conditions

1. Guards or barriers
2. Protective equipment
3. Tools, equipment, or materials
4. Congestion
5. Warning system
6. Fire and explosion hazards
7. Poor housekeeping
8. Noise exposure
9. Exposure to hazardous materials
10. Extreme temperature exposure
11. Illumination
12. Ventilation
13. Visibility

EXAMPLES OF BASIC CAUSES

Personal Factors

1. Capability
2. Knowledge
3. Skill
4. Stress
5. Motivation
6. Work Standards
7. Wear and tear
8. Abuse or misuse

Job Factors

1. Supervision
2. Engineering
3. Purchasing
4. Maintenance
5. Tools/equipment

MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS

1. Leadership and administration
2. Management training
3. Planned inspections
4. Task analysis and procedures
5. Task observation
6. Emergency preparedness
7. Organizational rules
8. Accident/incident analysis
9. Personal protective equipment
10. Health control
11. Program audits
12. Engineering controls
13. Personal communications
14. Group meetings
15. General promotion
16. Hiring and placement
17. Purchasing controls

APPENDIX H
DAILY BRIEFING SIGN-IN SHEET

DAILY BRIEFING SIGN-IN SHEET

Date: _____ Project Name/Location: _____

Person Conducting Briefing: _____

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

_____

_____

_____

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

_____

_____

_____

3. ATTENDEES (Print Name):

1.	21.
2.	22.
3.	23.
4.	24.
5.	25.
6.	26.
7.	27.
8.	28.
9.	29.
10.	30.
11.	31.
12.	32.
13.	33.
14.	34.
15.	35.
16.	36.
17.	37.
18.	38.
19.	39.
20.	40.

APPENDIX H

SITE MANAGEMENT FORMS

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		

Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

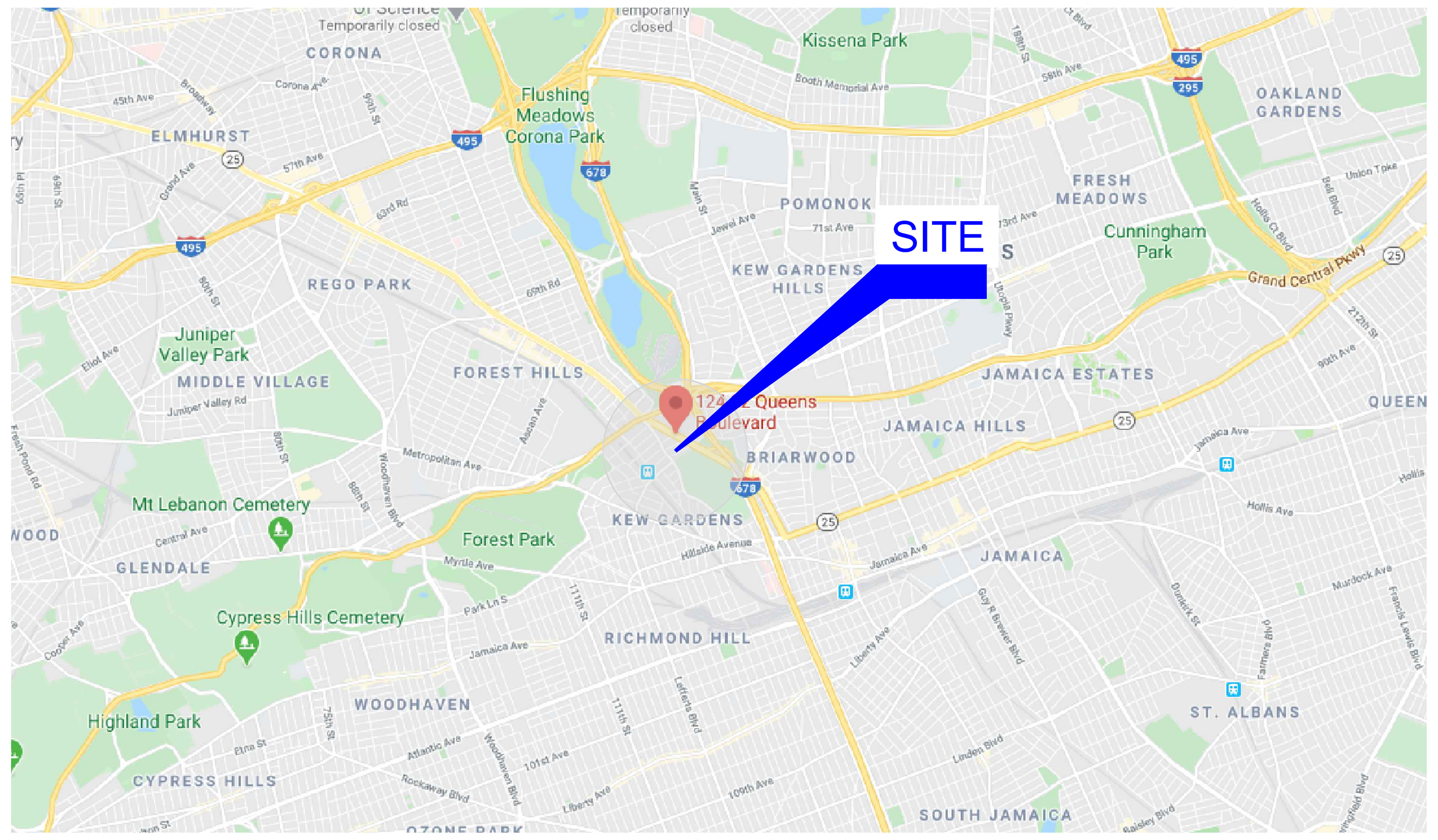
Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**

APPENDIX I

O&M MANUAL FOR SSDS and SVE



VICINITY MAP
SCALE: NOT TO SCALE

SCOPE OF WORK

INSTALLATION OF SOIL VAPOR EXTRACTION (SVE) SYSTEM AT 124-22 QUEENS BOULEVARD QUEENS, KEW GARDENS 11415 AS SHOWN ON THESE PLANS.

PROJECT BACKGROUND:

1. DURING CONSTRUCTION OF THE BUILDING FOOTPRINT 4" DIA. PVC SLEEVES WERE INSTALLED IN THE CONCRETE SLAB. THE SLEEVES WERE INSTALLED SO THAT FUTURE WORK RELATED TO THE INSTALLATION OF AN SVE SYSTEM OR IN-SITU CHEMICAL INJECTION SYSTEM COULD BE DONE WITHOUT NEEDING TO CORE-DRILL THE CONCRETE SLAB.
2. THIS PROJECT IS INSTALL AN SVE SYSTEM UTILIZING THESE PVC SLEEVES.
3. THERE ARE TWO AREAS TO NOTE. MW-1 WHICH IS SURROUNDED BY 15 PVC SLEEVES AND MW-5 WHICH IS SURROUND BY 6 PVC SLEEVES ALL WITH 5' SPACING.
4. THIS SVE SYSTEM IS TO BE CONSIDERED TEMPORARY AS PART OF A PILOT TEST PER THE REMEDIAL ACTION WORK PLAN (RAWP). IN THE EVENT THE SYSTEM PROVES EFFECTIVE THE SYSTEM WILL BE CHANGED TO A PERMANENT SVE SYSTEM.

THE WORK INCLUDES:

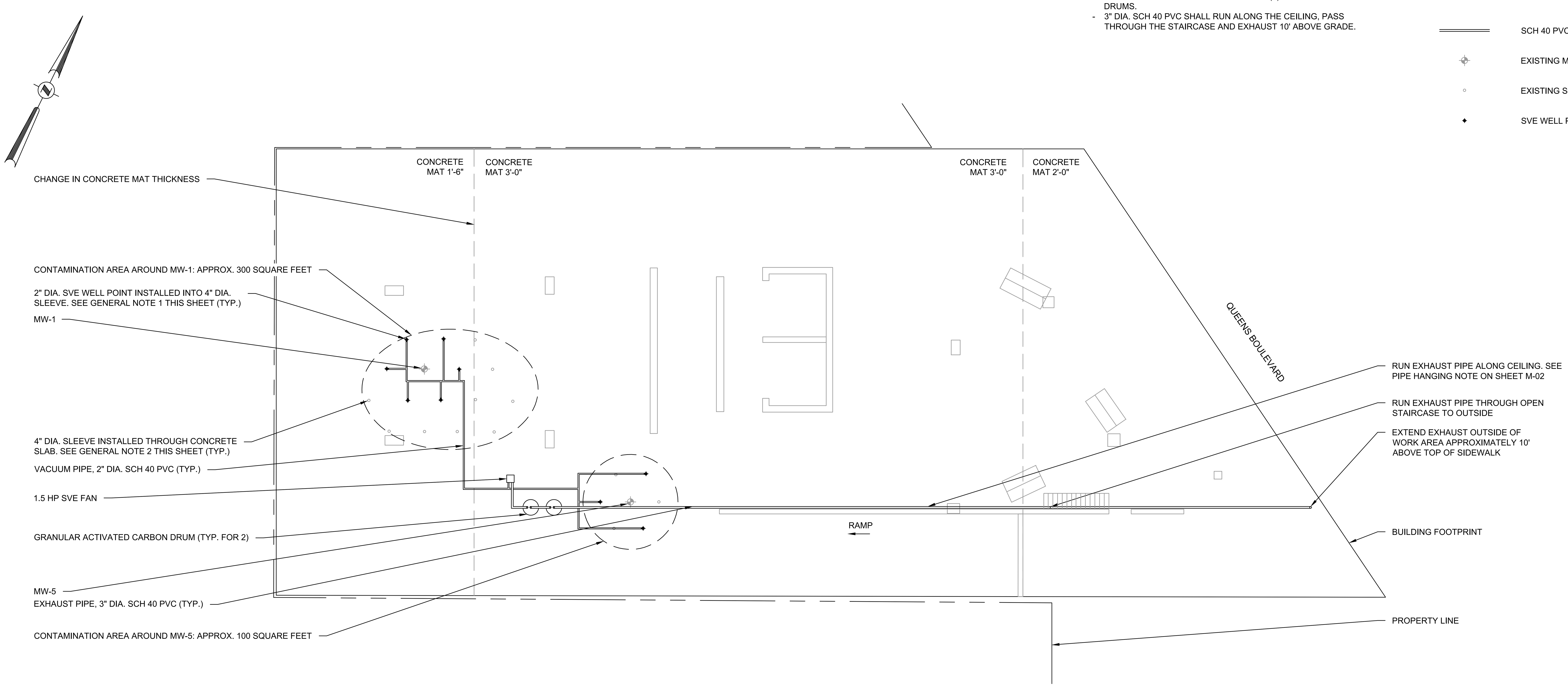
1. INSTALLATION OF SOIL VAPOR EXTRACTION (SVE) SYSTEM. THE SVE SYSTEM IS DIVIDED INTO TWO SECTIONS, ONE PART FOR THE AREA AROUND MW-1 AND THE OTHER PART FOR THE AREA AROUND MW-5 AS SHOWN ON THESE PLANS. EACH SECTION IS CONNECTED TO A SINGLE 1.5 HP FAN.
2. MW-1
   - SIX (6) 2" DIA. SVE WELL POINTS TO TEN (10) FEET BELOW THE CONCRETE SLAB. EACH WELL IS TO BE 5' OF SOLID SCH 40 PVC ON TOP AND 5' OF SLOTTED SCREEN SCH 40 PVC - SLOT SIZE 010.
   - EACH SVE WELL POINT IS TO MANIFOLD TOGETHER INTO A 2" DIA. SCH 40 PVC HEADER PIPE. THE HEADER PIPE SHALL CONNECT TO THE MW-5 HEADER PIPE AT THE SVE FAN.
3. MW-5
   - THREE (3) 2" DIA. SVE WELL POINTS TO TEN (10) FEET BELOW THE CONCRETE SLAB. EACH WELL IS TO BE 5' OF SOLID SCH 40 PVC ON TOP AND 5' OF SLOTTED SCREEN SCH 40 PVC - SLOT SIZE 010.
   - EACH SVE WELL POINT IS TO MANIFOLD TOGETHER INTO A 2" DIA. SCH 40 PVC HEADER PIPE. THE HEADER PIPE SHALL CONNECT TO THE MW-1 HEADER PIPE AT THE SVE FAN.
4. SVE SYSTEM
   - MW-1 AND MW-5 HEADER PIPES MANIFOLD AT SVE FAN INLET.
   - FAN EXHAUST PIPING TO BE 3" DIA. SCH 40 PVC.
   - EFFLUENT SHALL PASS THROUGH TWO (2) TREATMENT CARBON DRUMS.
   - 3" DIA. SCH 40 PVC SHALL RUN ALONG THE CEILING, PASS THROUGH THE STAIRCASE AND EXHAUST 10' ABOVE GRADE.

GENERAL NOTES

1. 9 OF 21 EXISTING 4" DIA. PVC SLEEVES SHALL BE UTILIZED FOR THE PROPOSED SVE SYSTEM. SVE WELL POINTS COMPRISED OF 2" DIA. SCH 40 PVC SHALL BE PUSH DRIVEN INTO THE EXISTING SLEEVES. THE VOID SPACE BETWEEN THE SLEEVE AND THE WELL POINT SHALL BE FILLED WITH GROUT. SEE DETAIL ON M-02.
2. THE REMAINING 12 EXISTING 4" DIA. PVC SLEEVES SHALL PLUGGED WITH SCH 40 PVC PLUG.
3. ALL LATERAL PIPING UPSTREAM OF THE SVE TO SLOPE DOWN TOWARDS WELL POINTS AT 1/8" PER FOOT (1% SLOPE).
4. ALL ELECTRICAL WORK IS TO BE PERFORMED BY A LICENSED ELECTRICIAN.
5. ALL MATERIALS TO BE REMOVED ARE TO BE LEGALLY DISPOSED OF.

LEGEND

SCH 40 PVC PIPE
EXISTING MONITORING WELL
EXISTING SLEEVE
SVE WELL POINT



REFERENCE DOCUMENTS:

S-101.01
TAN ARCHITECT P.C.
11/11/2016

SVE SITE PLAN
SCALE: 1/8" = 1'-0"

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CONSULTANTS

Number	Revision Description	Revision Date
7		
6		
5		
4		
3		
2		
1		

Designed By	GMG	Date Submitted	05/01/2020
Drawn By	GMG	Date Created	04/29/2020
Approved By	PKB	Scale	AS SHOWN

Client:
ADVANCED CLEANUP TECHNOLOGIES
110 MAIN STREET, STE 103
PORT WASHINGTON, NY 11050

Project:
SOIL VAPOR EXTRACTION SYSTEM

Project Address:
124-22 QUEENS BLVD
KEW GARDENS, NY 11415

County Tax Map Number:
Contract Number:
Regulatory Reference Number:

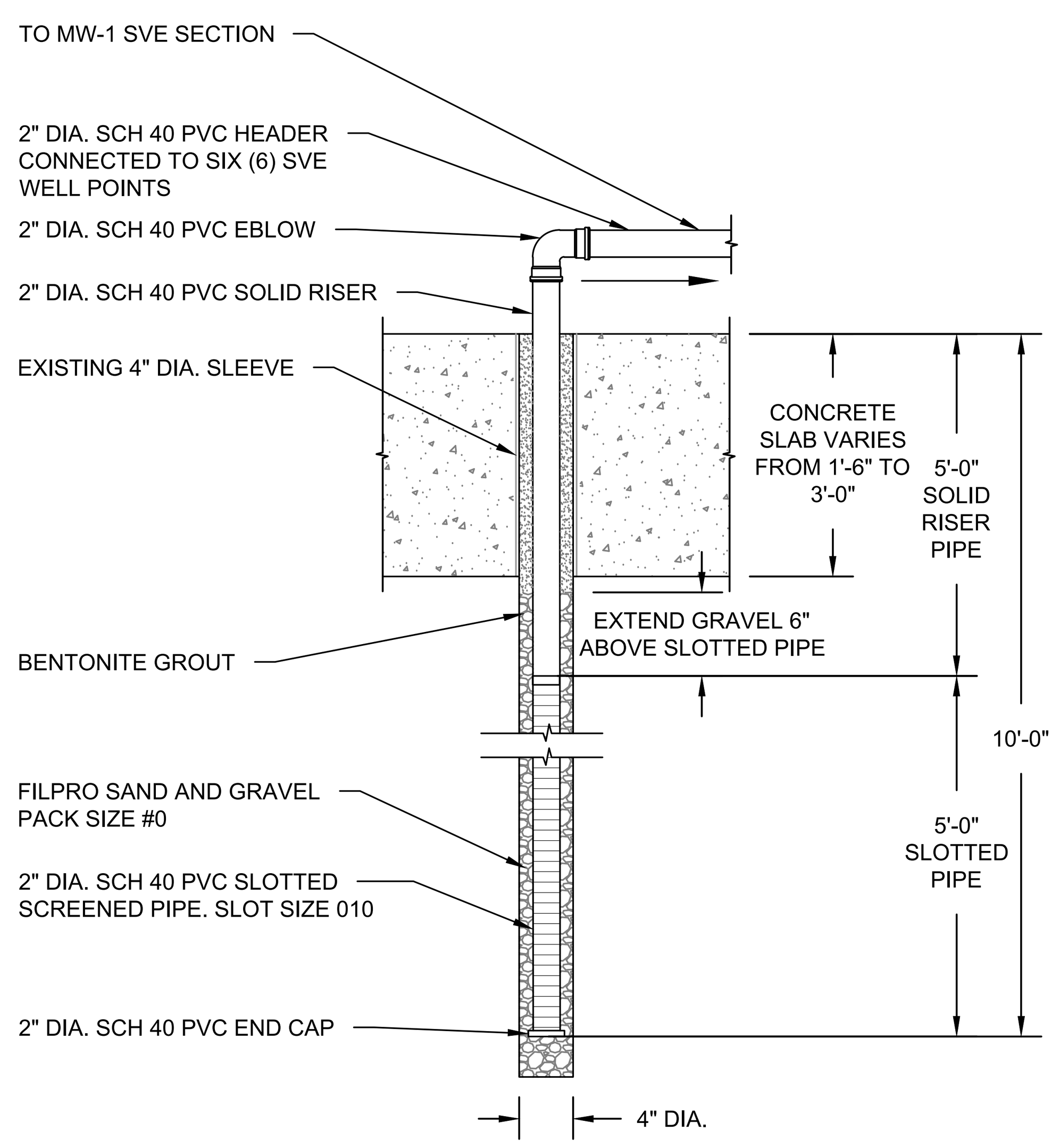
Title of Drawing:
SITE PLAN

Drawing Number:
M-01

Sheet 1 of 2

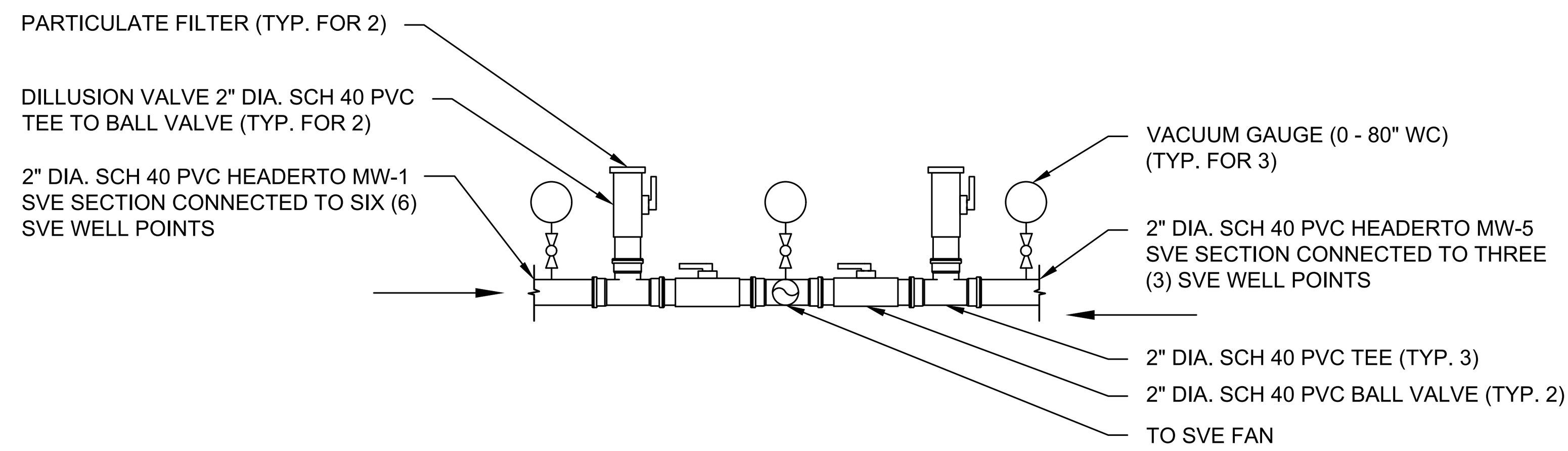
PWGC Project Number:
ACT1701

PWGC FILE NAME: G:\Shared drives\Projects\ACT1701\SVE and ISCO Design\ACT1701 - SVE - 001.dwg (M-01)
PLOT DATE/TIME: Apr 30, 2020-2:59pm By: ggobillot



SVE WELL POINT DETAIL (TYP. FOR 9)

SCALE: 1" = 1'-0"



SVE MANIFOLD DETAIL

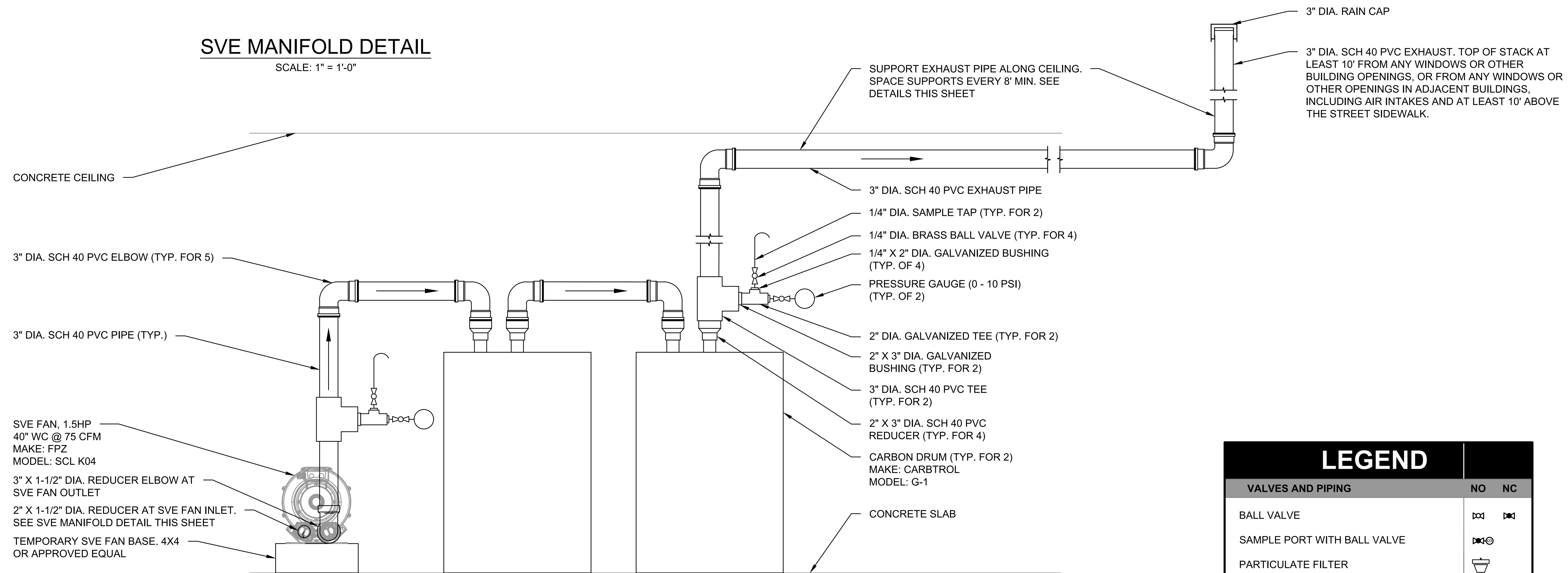
SCALE: 1" = 1'-0"

SVE FAN, 1.5HP
40" WC @ 75 CFM
MAKE: FPZ
MODEL: SCL K04

3" X 1-1/2" DIA. REDUCER EL SVE FAN OUTLET

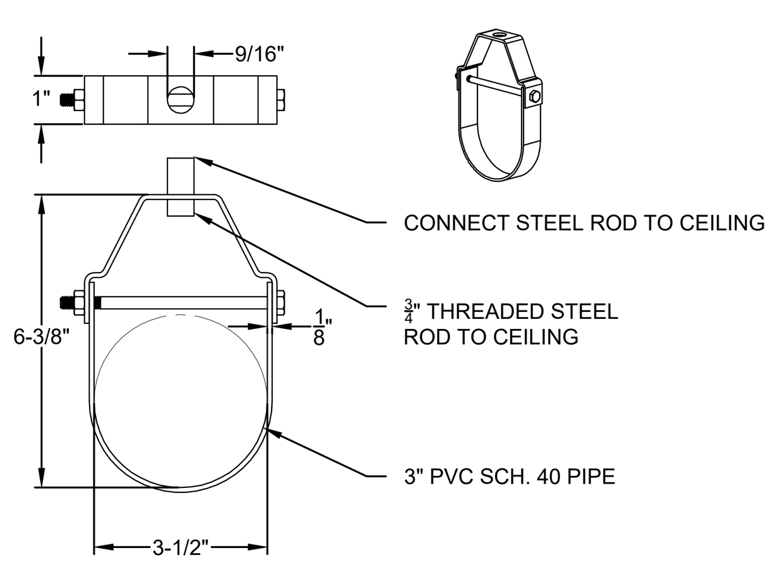
2" X 1-1/2" DIA. REDUCER AT SEE SVE MANIFOLD DETAIL

TEMPORARY SVE FAN BASE OR APPROVED EQUAL



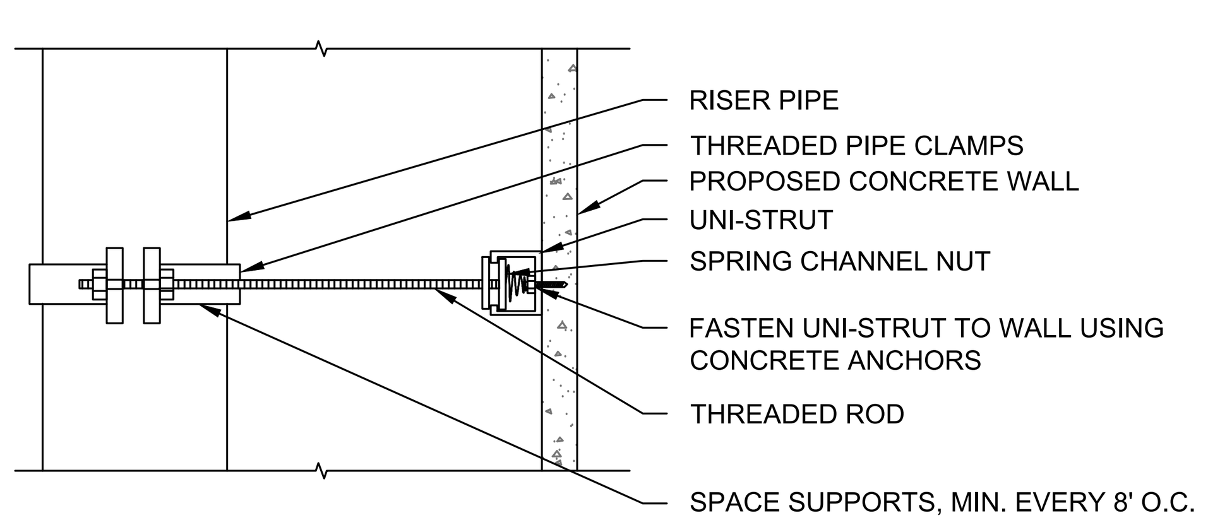
SVE SYSTEM DETAIL DETAIL

SCALE: 1" = 1'-0"



TYPICAL HORIZONTAL PIPE HANGING SUPPORT DETAIL

SCALE: NOT TO SCALE

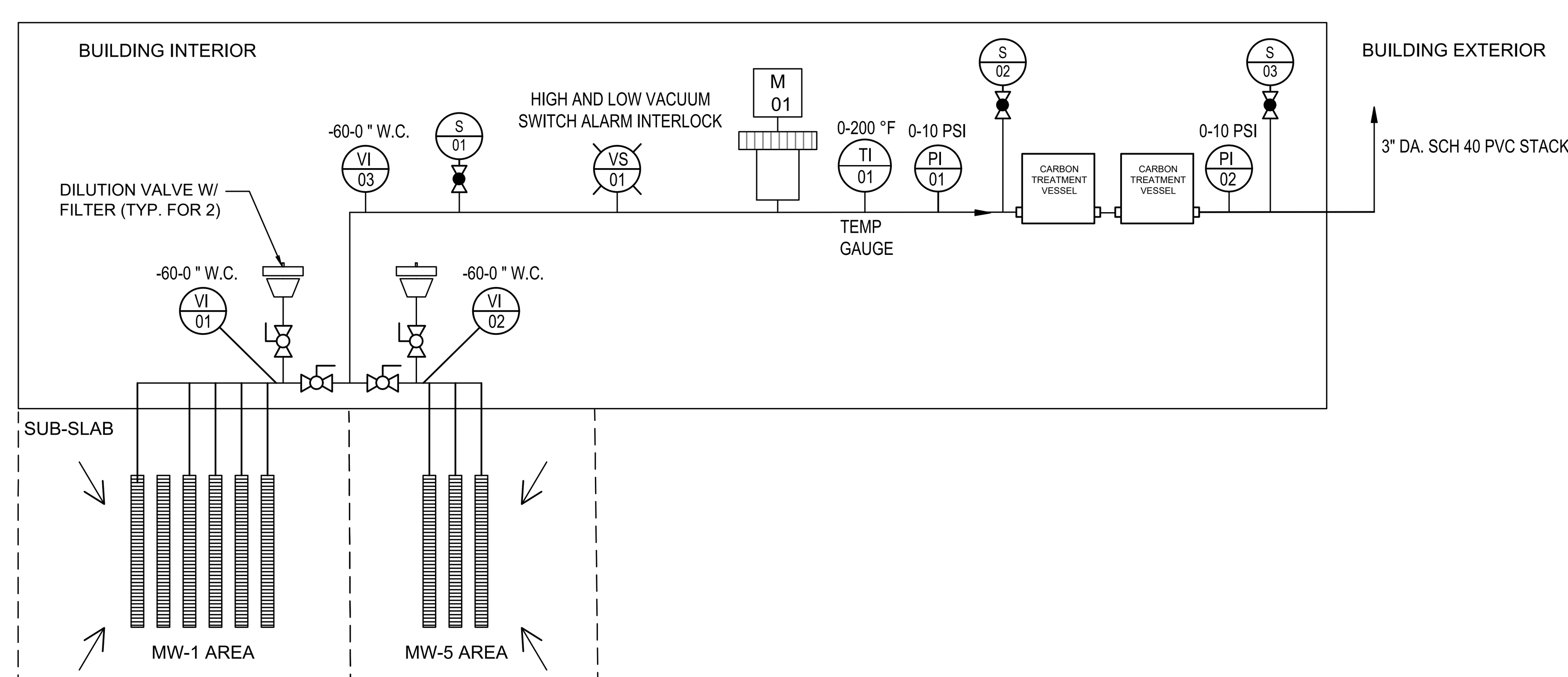


TYPICAL VERTICAL PIPE HANGING SUPPORT DETAIL

SCALE: NOT TO SCALE

ALARM INTERLOCK TABLE

ALARM INTERLOCK	ALARM DESCRIPTION	SYSTEM RESPONSE	NOTES
1	VACUUM HIGH	CRITICAL ALARM SYSTEM SHUT DOWN	VACUUM ABOVE 60" W.C.
2	VACUUM LOW	CRITICAL ALARM SYSTEM SHUT DOWN	VACUUM BELOW 10" W.C.



PROCESS & INSTRUMENTATION DIAGRAM

SCALE: NOT TO SCALE

LEGEND

VALVES AND PIPING	NO	NC
BALL VALVE		
SAMPLE PORT WITH BALL VALVE		
PARTICULATE FILTER		
CARBON VESSEL		
MOISTURE SEPARATOR (NOT USED)		
LIQUID LEVEL ALARM (NOT USED)		
VACUUM SWITCH		

INSTRUMENT IDENTIFICATION

INDICATING INSTRUMENT (LOCAL)

ALARM

EXAMPLE

- SETPOINT OF INSTRUMENT
- INSTRUMENT DESIGNATION (PRESSURE SWITCH)
- INSTRUMENT TYPE
- SYSTEM POSITION NUMBER

EQUIPMENT

CENTRIFUGAL, REGENERATIVE BLOWER

EQUIPMENT ABBREVIATIONS

- FI - FLOW INDICATOR
- M - MOTOR
- PI - PRESSURE INDICATOR
- TI - TEMPERATURE INDICATOR
- VA - VACUUM ALARM
- VI - VACUUM INDICATOR
- S - SAMPLE PORT

SYSTEM POSITION DESIGNATION

PROPOSED

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E-mail: INFO@PWGROSSER.COM

CONSULTANTS

GMG		05/01/2020
GMG		04/29/2020
PKB		AS SHOWN

ADVANCED CLEANUP TECHNOLOGIES
110 MAIN STREET, STE 103
PORT WASHINGTON, NY 11050

SOIL VAPOR EXTRACTION SYSTEM

124-22 QUEENS BLVD
KEW GARDENS, NY 11415

DETAILS AND P&ID

M-02

2 2

ACT1701

Advanced Cleanup Technologies, Inc.

ENVIRONMENTAL CONSULTANTS

OPERATIONS AND MAINTENANCE MANUAL

Tony's Cleaners
429 Merrick Road
Lynbrook, New York 11563

April 10, 2013

ACT File #: 7045-LBNY

Prepared for:

Mr. Howard Zuckerman
Nu-Life Realty
429 Merrick Road
Lynbrook, New York 11563

Prepared by:

Advanced Cleanup Technologies, Inc.
960 South Broadway, Suite #100
Hicksville, New York 11801

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FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION AND STATEMENT OF PURPOSES

1.1 Introduction

The property located at 429 Merrick Road, Lynbrook, New York (the Site) is currently occupied by Tony's Cleaners where dry cleaning operations take place. Past activities have resulted in the presence of volatile organic compounds (VOCs) to underlying soil and ground water. The most prevalent VOCs identified in the soil beneath the Site are Tetrachlorothene (PCE), Trichloroethene (TCE) and cis-1,2 Dichloroethene.

Advanced Cleanup Technologies, Inc. (ACT) was given the work assignment to install a Soil Vapor Extraction system (SVES) beneath the Site to protect occupants of the building and remediate contaminated soil and ground water beneath the ground. Operation of the SVES will also control the migration of contaminated ground water by depressing the water table beneath the Site.

1.2 Statement of Purposes

This document provides operational guidance to keep the SVES operating efficiently and insure timely site closure. The tasks include continually monitoring air flow, vacuum and temperature through a wireless telemetry system and performing annual inspections including changes to pre-filter media.

The objectives of the SVES are: 1) to maintain a negative pressure beneath the building foundation in order to prevent VOCs from entering the building's breathing zone; 2) to remove VOCs from subsurface soil and ground water and to restore the ground water to drinking water quality or to the best quality reasonably attainable using the best available technology, and 3) to prevent any further migration of ground water containing VOCs beyond the Site.

1.3 Previous Environmental Investigations

A previous environmental investigation was performed by Brockerhoff Environmental Services LLC in February 2012. During the investigation, seven soil borings were installed, screened and sampled from beneath the Site, four of them within the dry cleaning building. Additionally, three monitoring wells were installed, screened and sampled throughout the Site, and the four on-Site dry wells were surveyed and sampled.

No VOCs were identified above soil cleanup objectives in any of the soil borings except for PCE and Trichloroethene TCE at SS-2 next to the dry cleaning machine and PCE at SS-4 inside the northern portion of the building. Additionally, PCE was found in MW-1 and MW-2 and TCE in MW-2 above water quality standards. According to that investigation, PCE was also found in high concentrations in a sediment sample, DW-1. However, the location where that sample was collected could not be replicated during subsequent sampling events. The results of that investigation are included in Appendix D.

On July 13, 2012 ACT screened and sampled the three on-Site monitoring wells and installed, screened and sampled a fourth monitoring well in the southwest corner of the Site which is hydraulically downgradient of the dry cleaning establishment. The investigation confirmed that PCE and TCE was present above water quality standards in front of the building (MW-2) and PCE was found only slightly above water quality standards at the downgradient perimeter of the Site (MW-4).

On August 15, 2012 ACT installed and sampled three additional soil borings inside the dry cleaning building. Three temporary monitoring wells were also installed and sampled at the bore hole locations. Finally, three dry wells (DW-1, DW-3 and DW-4) were sampled in the northern and southern exterior portions of the Site. No VOCs were detected above regulatory criteria in any of the soil borings except for Methylene Chloride in the deep sample from SB-2. Methylene Chloride was also found in the laboratory's method blank and is probably a laboratory artifact.

PCE and TCE were identified significantly above water quality standards in the ground water samples from TW-1, TW-2 and TW-3. No VOCs were detected above regulatory criteria in any of the dry well sediment samples. Laboratory analytical results can be seen in Appendix E.

2.0 SOIL VAPOR EXTRACTION SYSTEM

2.1 Description of System

Figure 1 shows the piping layout for the SVES. The SVES consists of two vertical 2 inch diameter vapor extraction wells installed to within 1 foot of the water table and two horizontal 4 inch diameter depressurization wells. The vertical SVES wells are connected to a single 2 inch diameter manifold pipe which is leads into the boiler room and powered by a 3 Hp FPZ regenerative blower. The horizontal SVES wells are connected to 3 inch diameter riser pipes and dedicated roof-mounted Radonaway HS5000 vacuum blowers.

The regenerative blower and controls are located in the boiler room in the northwest corner of the building. After exiting the respective blowers, the air streams are discharged through exhaust pipes located above the roof. The 3 HP FPZ regenerative blower is equipped with a moisture separator, air filter, gauges and switches to control its operations. The suction lines are equipped with vacuum relief valves to avoid excessive vacuum loads on the blower. Figure 2 contains the Process and Instrumentation Diagram for the Remedial System.

2.2 Equipment and Controls

The regenerative blower is equipped with a vacuum relief valve, in-line filter and moisture separator with a high level liquid level switch. The suction side of the blower is equipped with a filter to remove particulates and a moisture separator to remove excessive moisture. The vacuum relief valve is used to adjust the vacuum placed upon the manifold to the SVES piping. Ball valves on each riser pipe adjust vacuum to each of the SVES wells.

The blower is equipped with control switches to shut down the blower in the event of an alarm condition. The moisture separator will shut the blower down when the liquid level within the moisture separator rises to a preset level, triggering an alarm condition. A high pressure switch will shut down the blower if the vacuum at the blower inlet rises past the alarm set point. An internal thermal overload switch will shut the blower down if there is an overload on the blower.

In the event of an alarm, a control panel on the wall inside the boiler room will indicate specific operating and alarm conditions by illumination of a light or position of a switch. A Netbiter wireless telemetry system programmed with a contact phone number and will send an email and text alert after the alarm has been detected.

2.3 Operation and Maintenance

2.3.1 Start-up Procedure

To start the SVES system, the following procedure should be used:

1. Open all valves on the individual extraction lines to be operated. Close all others.
2. Close all sample ports.
3. Close drain valve on moisture separator.
4. Turn the power control switch, located on the control panel, to the "ON" position.
5. Reset alarms by pressing the "Alarm Reset" button on the control panel.
6. Start the blower using the disconnect switch located on the control panel.
7. Fine tune the flow rates from the individual extraction pipes by adjusting the ball valves on the manifold. Fine tune the total flow by adjusting the pressure relief valve on the blower.
8. Check and record all the pressure gauge and the temperature gauge associated with each system and compare with normal operating ranges.

To stop operation of the SVES, turn the power off to the individual blower by using the disconnect switch on the control panel or the main switch outside the control panel.

2.3.2 Routine Operating Procedures

The SVES operates by placing a vacuum on the extraction pipes. As the air passes through the soil the contamination volatilizes and is drawn from the soil through the extraction piping and into the blowers. The amount of vacuum is controlled by the vacuum relief valve located on the blower package and the flow control valve associated with each extraction pipe on the manifold. The options for operation of each system are as follows:

1. Opening vacuum relief valve - decreases the vacuum on the entire system. Opening the vacuum relief valve increases the exhaust flow rate by adding atmospheric air, but will decrease the concentration of vapors in the exhaust. The flow rate from the individual extraction pipes will be decreased due to a decrease in vacuum.

2. Closing vacuum relief valve - increases the vacuum on the entire system. Closing the vacuum relief valve decreases the exhaust flow rate, but increases the concentration of vapors in the exhaust by placing a higher vacuum on the extraction pipes and it will also increase the extraction rate.

3. Opening the flow control valves on the extraction pipes - will increase the vacuum and flow rate from the individual point.

4. Closing the flow control valves on the extraction pipes - will decrease the vacuum and flow rate from the individual point.

2.3.3 Maintenance

2.3.3.1 Extraction Blowers

The extraction blowers require little or no maintenance to perform as designed. Maintenance activities should involve keeping the filter clean and the moisture separator empty. The blower is difficult to disassemble and reassemble; therefore, prior to any attempts to repair the blower, the manufacturer should be consulted.

2.3.3.2 Moisture Separator

The moisture separator should remain free of liquid at all times. Both extraction pipes are located within 1 foot of the water table. However, no liquid was observed in the moisture separator during startup and the water table is not expected to rise close enough to the bases of the well screens to permit water to enter the treatment system.

2.3.4 Troubleshooting

2.3.4.1 Regenerative Blower

Table 3 identifies possible problems, symptoms and potential solutions that may occur while operating the regenerative blower. Once the regenerative blower is either repaired or replaced, the system should be re-started and monitored in accordance with Section 2.3.1.

2.3.4.2 Moisture Separator

The moisture separator should stay dry during normal remedial system operations. In the event water enters the moisture separator, the high level switch will shut down the regenerative blower and send an alarm through the Netbiter. Liquid in the moisture separator will be transferred into a drum and stored onsite until offsite transport and disposal can be arranged through a licensed waste hauler.

3.0 SYSTEM MONITORING

The operation of the SVES will be monitored by instrumentation such as a flow meter, level sensor and pressure gauge. Signals from each instrument are transmitted from where they are installed in the process line to the control panel located on the inside wall of the treatment room.

Operational data, such as water levels, air pressure, and equipment failures will be continually recorded by wireless telemetry. Based on the results, system modifications may be made as frequently as once a month.

3.1 Inspections

The remediation systems will be inspected and sampled according to the schedule shown in Appendix C. Any failures, faults or unusual observations will be investigated fully. Any equipment that is found to be out of adjustment or in disrepair will be repaired or serviced. Manufacturer's information for the major pieces of equipment is provided in the manual included in Appendix A.

3.2 Observations

The inspection items that will be observed and recorded during screening, sampling and monitoring events are included on the Data Sheets located in Appendix D. A general list of observations is listed below.

- Weather Conditions

  The weather will be monitored for parameters including current weather conditions (sunny, raining, etc.), air temperature, wind direction, wind speed, relative humidity and barometric pressure.

- Equipment Operations and System Operating Parameters

  The operating configuration of the regenerative blower, moisture separator and carbon units will be recorded. Operations that will be recorded include the flow and pressure at each recording location.

  The air flow rate and vacuum downstream of the regenerative blower will also be recorded.

  The pressures at the regenerative blower outlets (pre-carbon) and between carbon locations will also be recorded.

  The temperature of the effluent air stream after each blower will be recorded.

  Photoionization detector (PID) readings will be made from air samples collected at the pre-, mid- and post-carbon sample ports.

- Vapor Monitoring Points

  The vacuum in each vapor monitoring point located in the basement will be recorded.

3.3 Air Quality

Ambient concentrations of VOCs will be measured inside the boiler room using a PID equipped with a 10.2 eV bulb.

3.4 Waste Disposal

Some waste material will be generated during the operation of the remedial systems. Liquid wastes from the moisture separator may also be generated. The removal and disposal of waste shall be completed following guidelines defined by OSHA, NYSDEC, New York State Department of Transportation (NYSDOT) and the USEPA. A disposal or regeneration facility and waste transporter shall be contacted and scheduled for the removal of the waste. The collection and generation of waste should be noted on the Data Sheets provided in Appendix D.

3.5 Reporting Documentation

All data collected during field activities shall be recorded into a spreadsheet program following each day's activities. Keeping data up to date will allow the operator to monitor system performance by comparing new data with past operating data. Data that will be continuously updated during O&M activities includes:

- summary of system operation;
- airflow data and calculations;
- summary of temperatures;
- laboratory data for all sample ports sampled;
- PID data for all sample ports sampled;
- summary of pressure and vacuum gauge readings;
- summary of O&M activities; and,
- summary of system alarms.

Any additional data that may provide insight into the operation of the remedial systems will also be compiled.

4.0 SITE MONITORING AND REPORTING

4.1 Monitoring

Annual system monitoring will be performed. Due to improvements in water quality in the ground water monitoring wells at the Site, a long-term water quality monitoring program will not be performed.

4.2 Reporting

ACT will prepare a status report on an annual basis. The report will include a summary of remedial system operations, maintenance and monitoring data accumulated from the site over the preceding year. Included as attachments to the report will be analytical laboratory reports, Field Sheets, Calculation Sheets (if necessary) and descriptions of the following:

- system downtime/reason;
- operational issues; and,
- maintenance log.

At a minimum, with respect to the preceding year, these progress reports shall:

1. describe the actions which have been taken during that quarter,
2. include all sampling reports, test results and all other data,
3. describe work planned for the next year with schedules relating such work to the overall project schedule for the completion of remedial activities,
4. describe problems encountered or anticipated, actual or anticipated delays, and solutions developed and implemented to address actual or anticipated problems or delays.

FIGURES

SCOPE OF WORK

INSTALLATION OF SOIL VAPOR EXTRACTION (SVE) SYSTEM AT 124-22 QUEENS BOULEVARD QUEENS, KEW GARDENS 11415 AS SHOWN ON THESE PLANS.

PROJECT BACKGROUND:

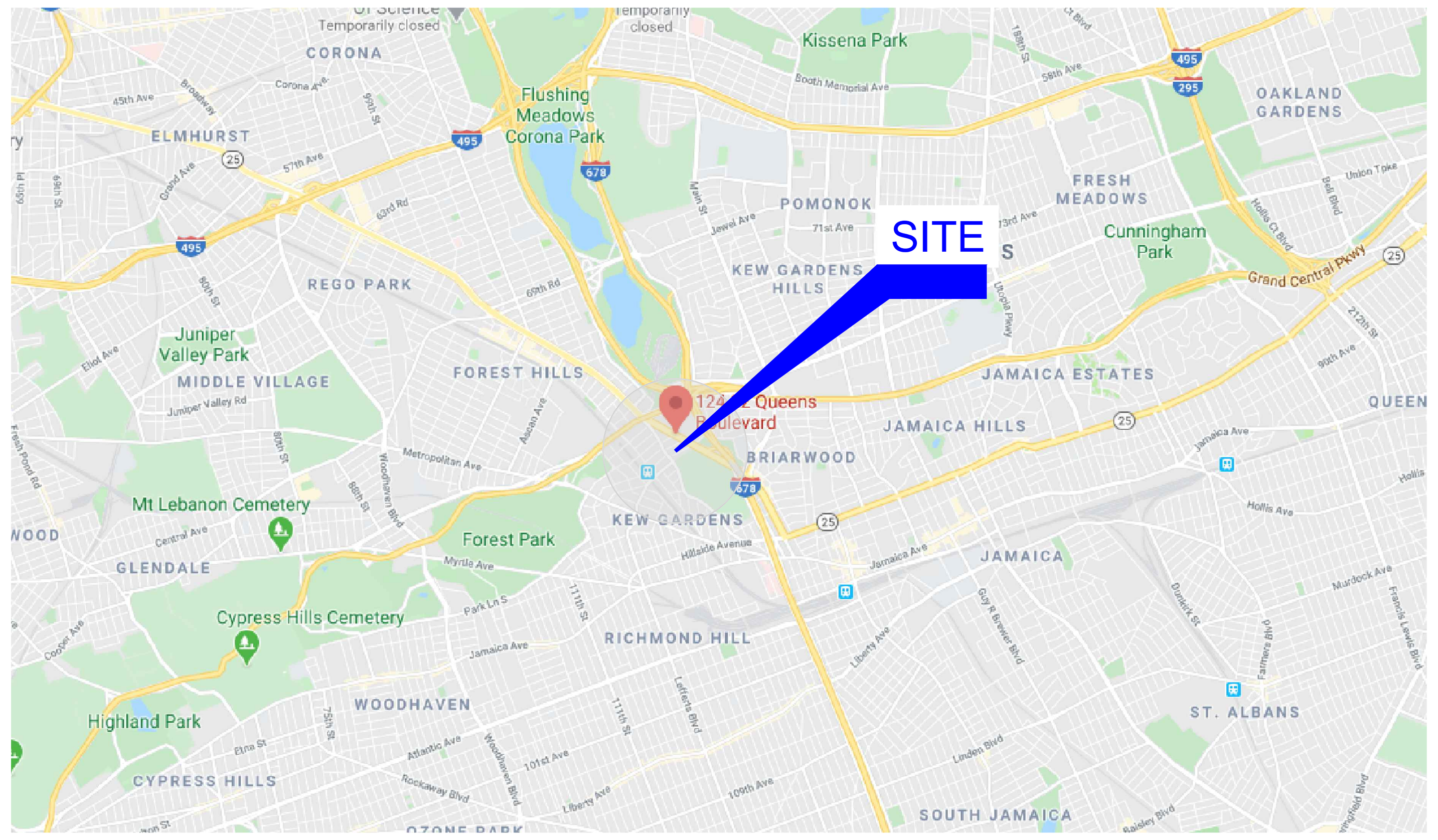
1. DURING CONSTRUCTION OF THE BUILDING FOOTPRINT 4" DIA. PVC SLEEVES WERE INSTALLED IN THE CONCRETE SLAB. THE SLEEVES WERE INSTALLED SO THAT FUTURE WORK RELATED TO THE INSTALLATION OF AN SVE SYSTEM OR IN-SITU CHEMICAL INJECTION SYSTEM COULD BE DONE WITHOUT NEEDING TO CORE-DRILL THE CONCRETE SLAB.
2. THIS PROJECT IS INSTALL AN SVE SYSTEM UTILIZING THESE PVC SLEEVES.
3. THERE ARE TWO AREAS TO NOTE. MW-1 WHICH IS SURROUNDED BY 15 PVC SLEEVES AND MW-5 WHICH IS SURROUND BY 6 PVC SLEEVES ALL WITH 5' SPACING.
4. THIS SVE SYSTEM IS TO BE CONSIDERED TEMPORARY AS PART OF A PILOT TEST PER THE REMEDIAL ACTION WORK PLAN (RAWP). IN THE EVENT THE SYSTEM PROVES EFFECTIVE THE SYSTEM WILL BE CHANGED TO A PERMANENT SVE SYSTEM.

THE WORK INCLUDES:

1. INSTALLATION OF SOIL VAPOR EXTRACTION (SVE) SYSTEM. THE SVE SYSTEM IS DIVIDED INTO TWO SECTIONS, ONE PART FOR THE AREA AROUND MW-1 AND THE OTHER PART FOR THE AREA AROUND MW-5 AS SHOWN ON THESE PLANS. EACH SECTION IS CONNECTED TO A SINGLE 1.5 HP FAN.
2. MW-1
   - SIX (6) 2" DIA. SVE WELL POINTS TO TEN (10) FEET BELOW THE CONCRETE SLAB. EACH WELL IS TO BE 5' OF SOLID SCH 40 PVC ON TOP AND 5' OF SLOTTED SCREEN SCH 40 PVC - SLOT SIZE 010.
   - EACH SVE WELL POINT IS TO MANIFOLD TOGETHER INTO A 2" DIA. SCH 40 PVC HEADER PIPE. THE HEADER PIPE SHALL CONNECT TO THE MW-5 HEADER PIPE AT THE SVE FAN.
3. MW-5
   - THREE (3) 2" DIA. SVE WELL POINTS TO TEN (10) FEET BELOW THE CONCRETE SLAB. EACH WELL IS TO BE 5' OF SOLID SCH 40 PVC ON TOP AND 5' OF SLOTTED SCREEN SCH 40 PVC - SLOT SIZE 010.
   - EACH SVE WELL POINT IS TO MANIFOLD TOGETHER INTO A 2" DIA. SCH 40 PVC HEADER PIPE. THE HEADER PIPE SHALL CONNECT TO THE MW-1 HEADER PIPE AT THE SVE FAN.
4. SVE SYSTEM
   - MW-1 AND MW-5 HEADER PIPES MANIFOLD AT SVE FAN INLET.
   - FAN EXHAUST PIPING TO BE 3" DIA. SCH 40 PVC.
   - EFFLUENT SHALL PASS THROUGH TWO (2) TREATMENT CARBON DRUMS.
   - 3" DIA. SCH 40 PVC SHALL RUN ALONG THE CEILING, PASS THROUGH THE STAIRCASE AND EXHAUST 10' ABOVE GRADE.

GENERAL NOTES

1. 9 OF 21 EXISTING 4" DIA. PVC SLEEVES SHALL BE UTILIZED FOR THE PROPOSED SVE SYSTEM. SVE WELL POINTS COMPRISED OF 2" DIA. SCH 40 PVC SHALL BE PUSH DRIVEN INTO THE EXISTING SLEEVES. THE VOID SPACE BETWEEN THE SLEEVE AND THE WELL POINT SHALL BE FILLED WITH GROUT. SEE DETAIL ON M-02.
2. THE REMAINING 12 EXISTING 4" DIA. PVC SLEEVES SHALL PLUGGED WITH SCH 40 PVC PLUG.
3. ALL LATERAL PIPING UPSTREAM OF THE SVE TO SLOPE DOWN TOWARDS WELL POINTS AT 1/8" PER FOOT (1% SLOPE).
4. ALL ELECTRICAL WORK IS TO BE PERFORMED BY A LICENSED ELECTRICIAN.
5. ALL MATERIALS TO BE REMOVED ARE TO BE LEGALLY DISPOSED OF.

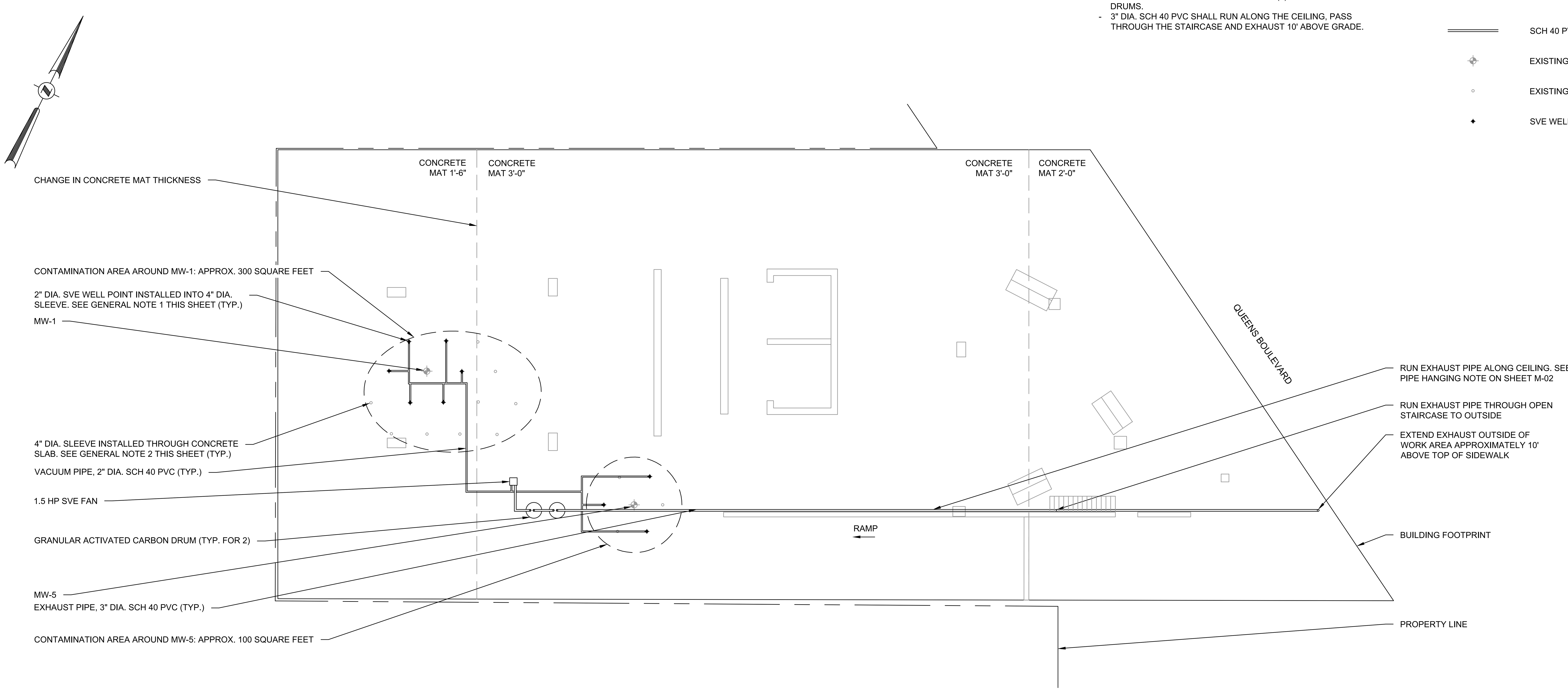


VICINITY MAP

SCALE: NOT TO SCALE

LEGEND

(double line)	SCH 40 PVC PIPE
(symbol)	EXISTING MONITORING WELL
(symbol)	EXISTING SLEEVE
(symbol)	SVE WELL POINT



REFERENCE DOCUMENTS:

S-101.01
TAN ARCHITECT P.C.
11/11/2016

SVE SITE PLAN

SCALE: 1/8" = 1'-0"

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GMG	04/29/2020
PKB	AS SHOWN

ADVANCED CLEANUP TECHNOLOGIES
110 MAIN STREET, STE 103
PORT WASHINGTON, NY 11050

SOIL VAPOR EXTRACTION SYSTEM

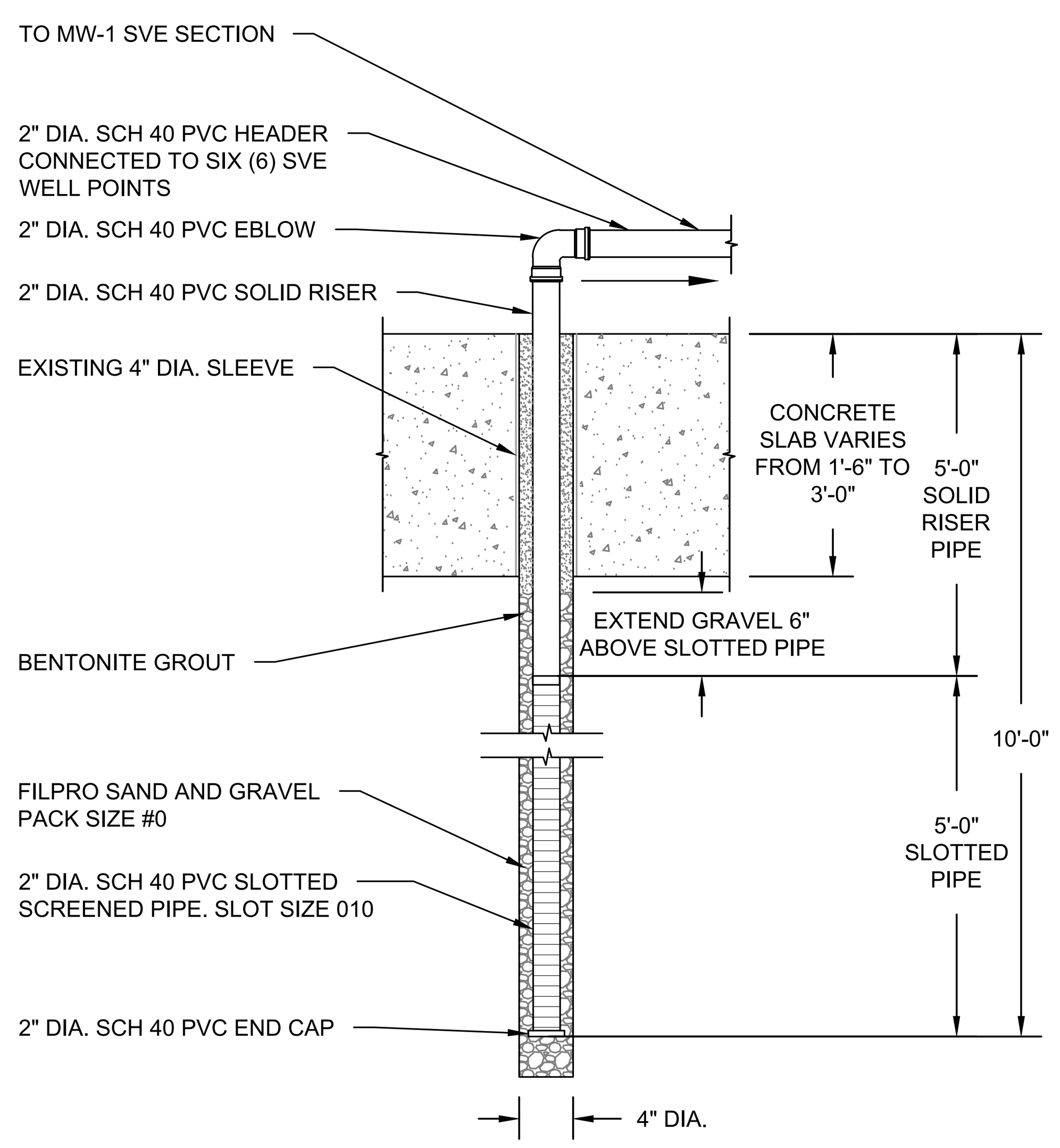
124-22 QUEENS BLVD
KEW GARDENS, NY 11415

SITE PLAN

M-01

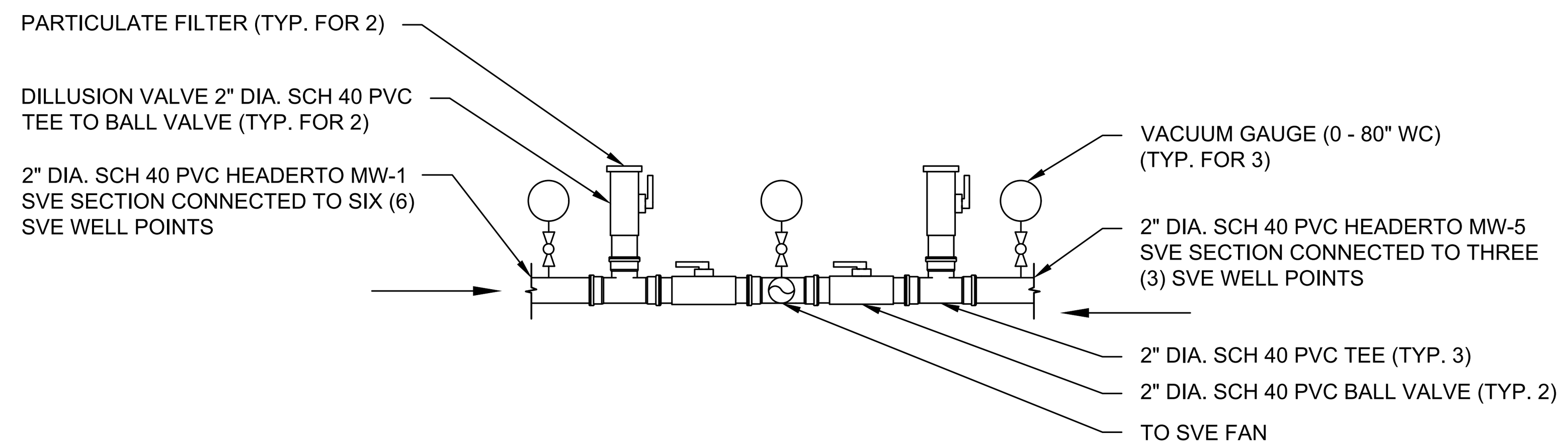
1 2

ACT1701



SVE WELL POINT DETAIL (TYP. FOR 9)

SCALE: 1" = 1'-0"



SVE MANIFOLD DETAIL

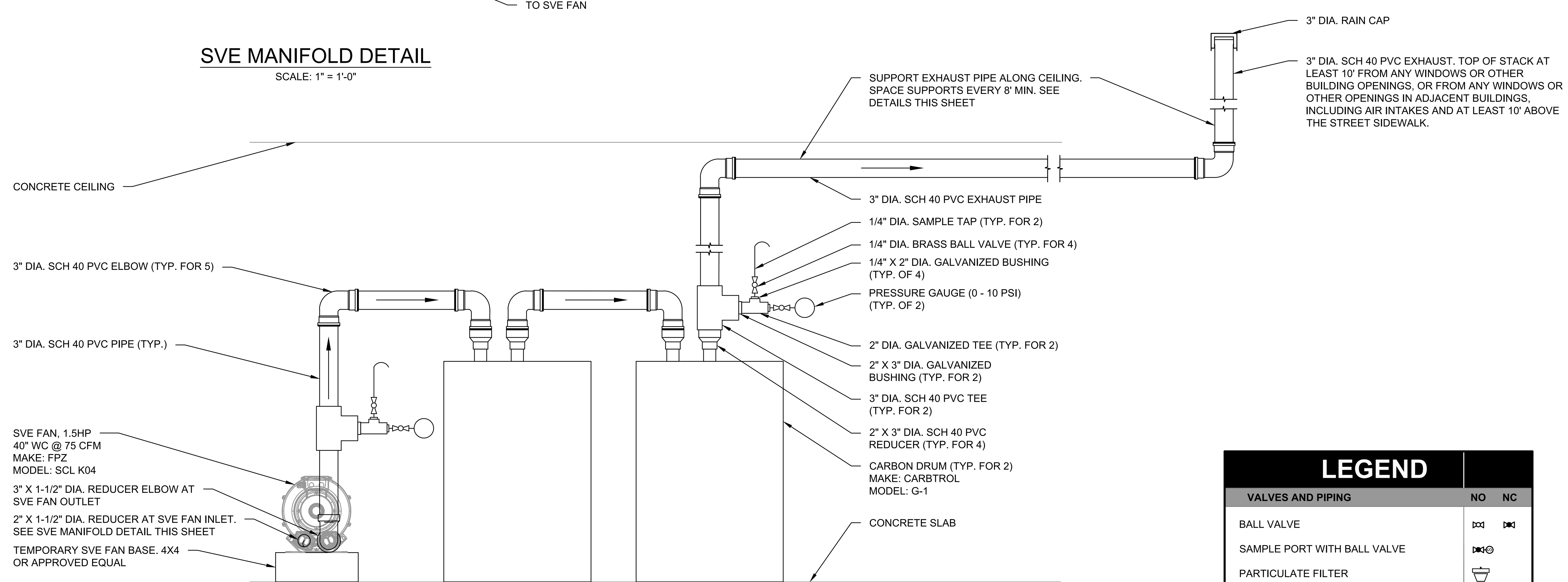
SCALE: 1" = 1'-0"

SVE FAN, 1.5HP
40" WC @ 75 CFM
MAKE: FPZ
MODEL: SCL K04

3" X 1-1/2" DIA. REDUCER EL SVE FAN OUTLET

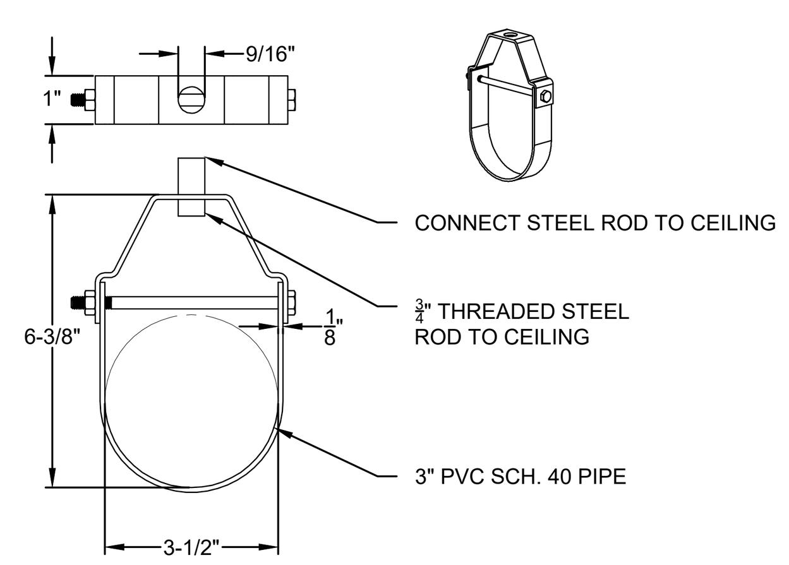
2" X 1-1/2" DIA. REDUCER AT SEE SVE MANIFOLD DETAIL

TEMPORARY SVE FAN BASE OR APPROVED EQUAL



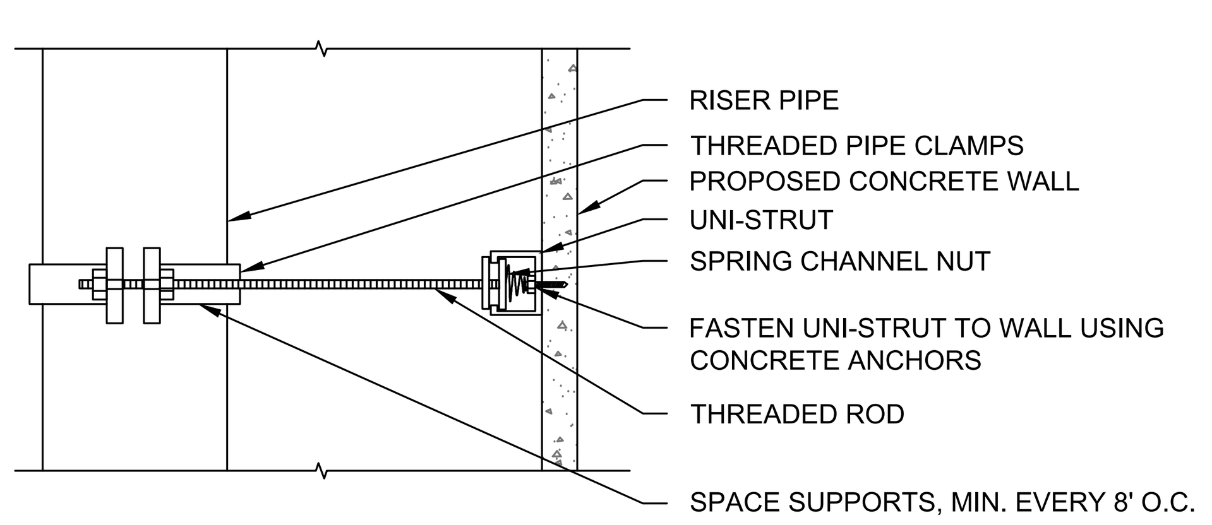
SVE SYSTEM DETAIL DETAIL

SCALE: 1" = 1'-0"



TYPICAL HORIZONTAL PIPE HANGING SUPPORT DETAIL

SCALE: NOT TO SCALE

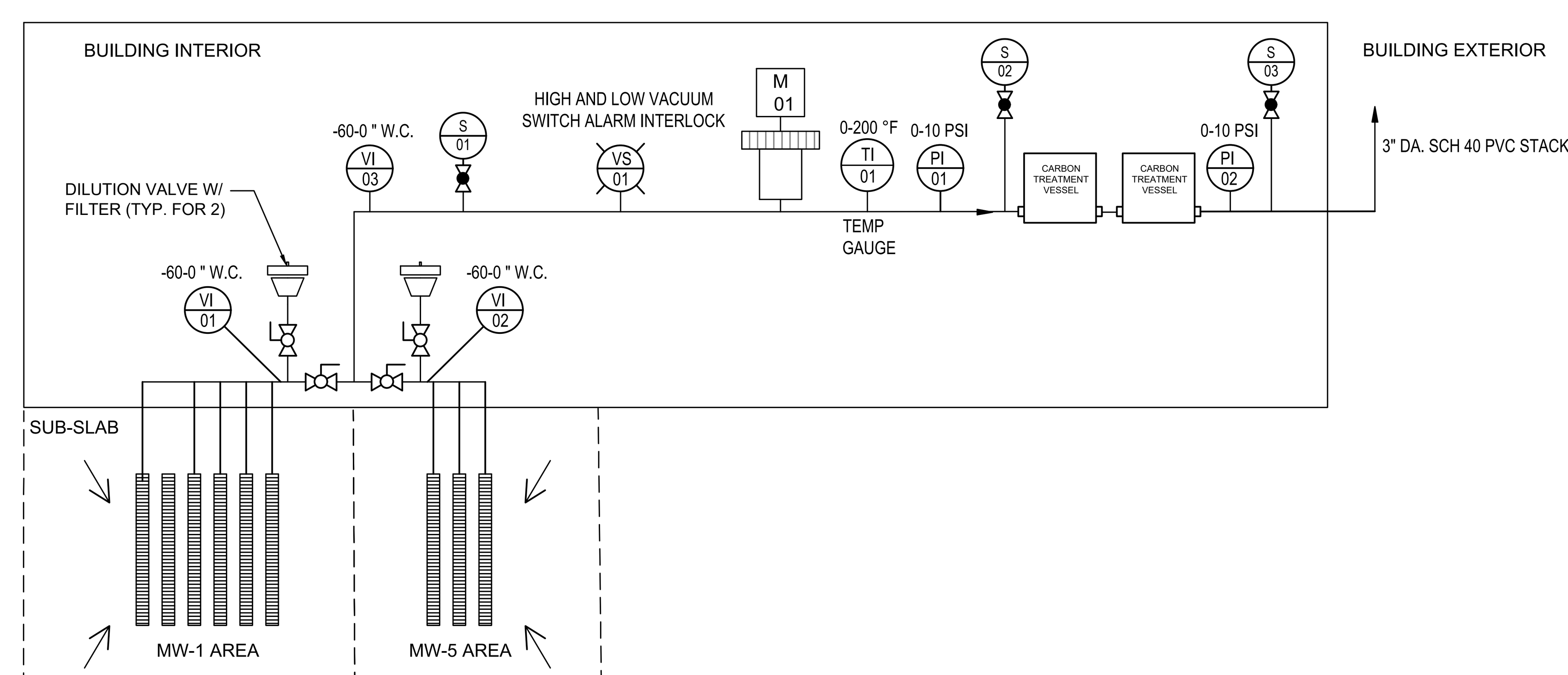


TYPICAL VERTICAL PIPE HANGING SUPPORT DETAIL

SCALE: NOT TO SCALE

ALARM INTERLOCK TABLE

ALARM INTERLOCK	ALARM DESCRIPTION	SYSTEM RESPONSE	NOTES
1	VACUUM HIGH	CRITICAL ALARM SYSTEM SHUT DOWN	VACUUM ABOVE 60" W.C.
2	VACUUM LOW	CRITICAL ALARM SYSTEM SHUT DOWN	VACUUM BELOW 10" W.C.



PROCESS & INSTRUMENTATION DIAGRAM

SCALE: NOT TO SCALE

LEGEND

VALVES AND PIPING — NO / NC

- BALL VALVE
- SAMPLE PORT WITH BALL VALVE
- PARTICULATE FILTER
- CARBON VESSEL
- MOISTURE SEPARATOR (NOT USED)
- LIQUID LEVEL ALARM (NOT USED)
- VACUUM SWITCH (VS 01)

INSTRUMENT IDENTIFICATION

- INDICATING INSTRUMENT (LOCAL)
- ALARM

EXAMPLE
- SETPOINT OF INSTRUMENT
- INSTRUMENT DESIGNATION (PRESSURE SWITCH)
- INSTRUMENT TYPE
- SYSTEM POSITION NUMBER

EQUIPMENT

- CENTRIFUGAL, REGENERATIVE BLOWER

EQUIPMENT ABBREVIATIONS

- FI - FLOW INDICATOR
- M - MOTOR
- PI - PRESSURE INDICATOR
- TI - TEMPERATURE INDICATOR
- VA - VACUUM ALARM
- VI - VACUUM INDICATOR
- S - SAMPLE PORT

SYSTEM POSITION DESIGNATION

PROPOSED

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GMG 04/29/2020
PKB AS SHOWN

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110 MAIN STREET, STE 103
PORT WASHINGTON, NY 11050

SOIL VAPOR EXTRACTION SYSTEM

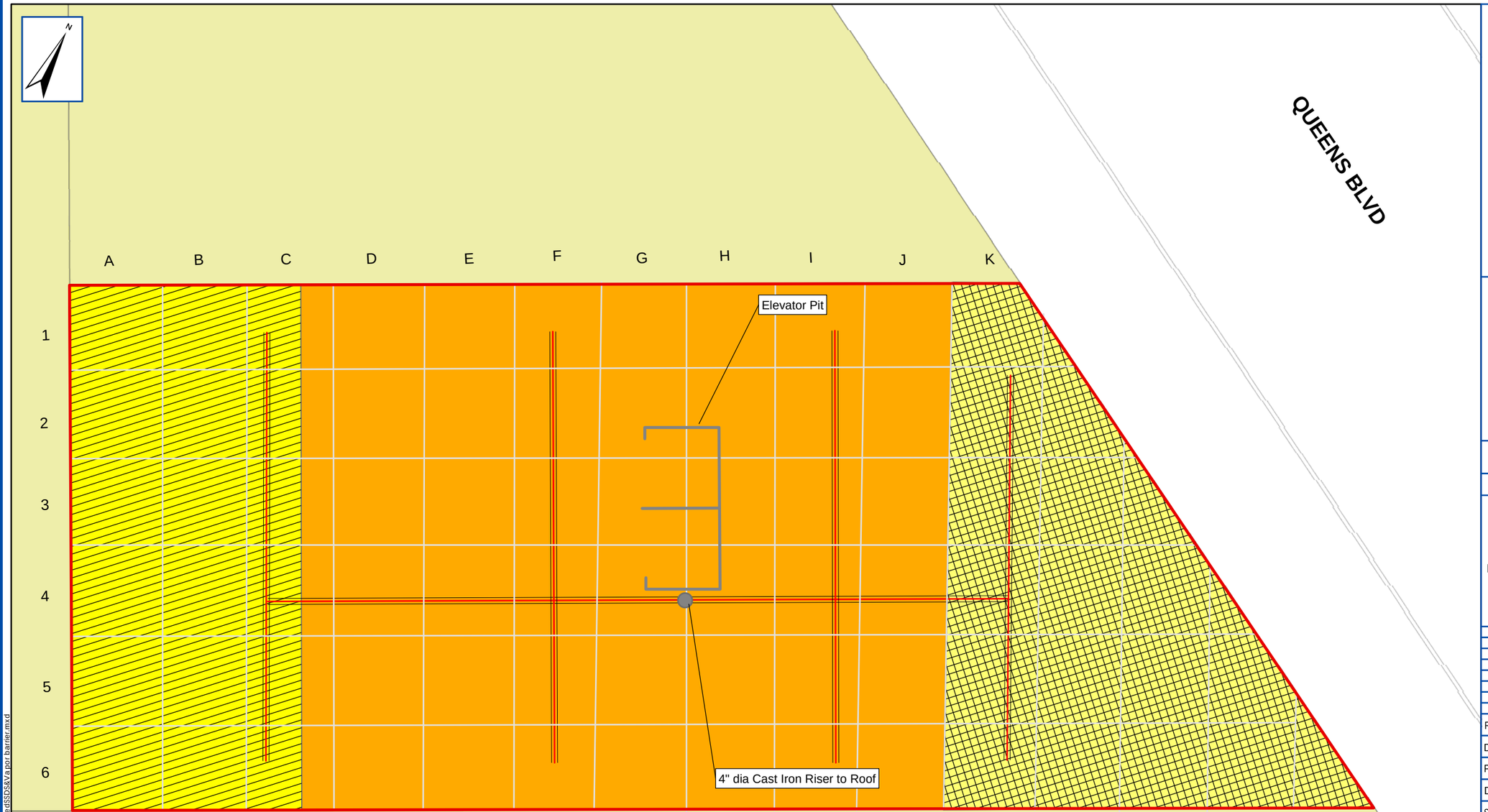
124-22 QUEENS BLVD
KEW GARDENS, NY 11415

DETAILS AND P&ID

M-02

2 2

ACT1701



Notes:
1) SVE - Soil Vapor Extraction
2) SSDS - Sub-Slab Depressurization System
3) SVE/SSDS blowers will be mounted on building rooftop.
4) Construction-level SVE/SSDS/vapor barrier design plans and details provided within RAWP Appendix.
5) Latest ammended development plans, top of concrete slab shown is at 9 ft bgs and located in building basement/parking area.

0 10 20 30 40 Feet

- Site Boundary/Extent of Proposed Vapor Barrier
- SVE/SSDS Trench Location
- 3.0' Thick Concrete Slab
- 2.0' Thick Concrete Slab
- 1.5' Thick Concrete Slab
- Adjacent Buildings
- Curbline

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DRAWING PREPARED FOR:

Luciano, LLC
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&
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	ACT1701	Designed by:	JP
Date:	3/29/2018	Drawn by:	TS
Scale:	AS SHOWN	Approved by:	JP

Proposed SVE/SSDS, Vapor Barrier, and Cover Type Plan

124-22 QUEENS BLVD
KEW GARDENS, NY

FIGURE NO:

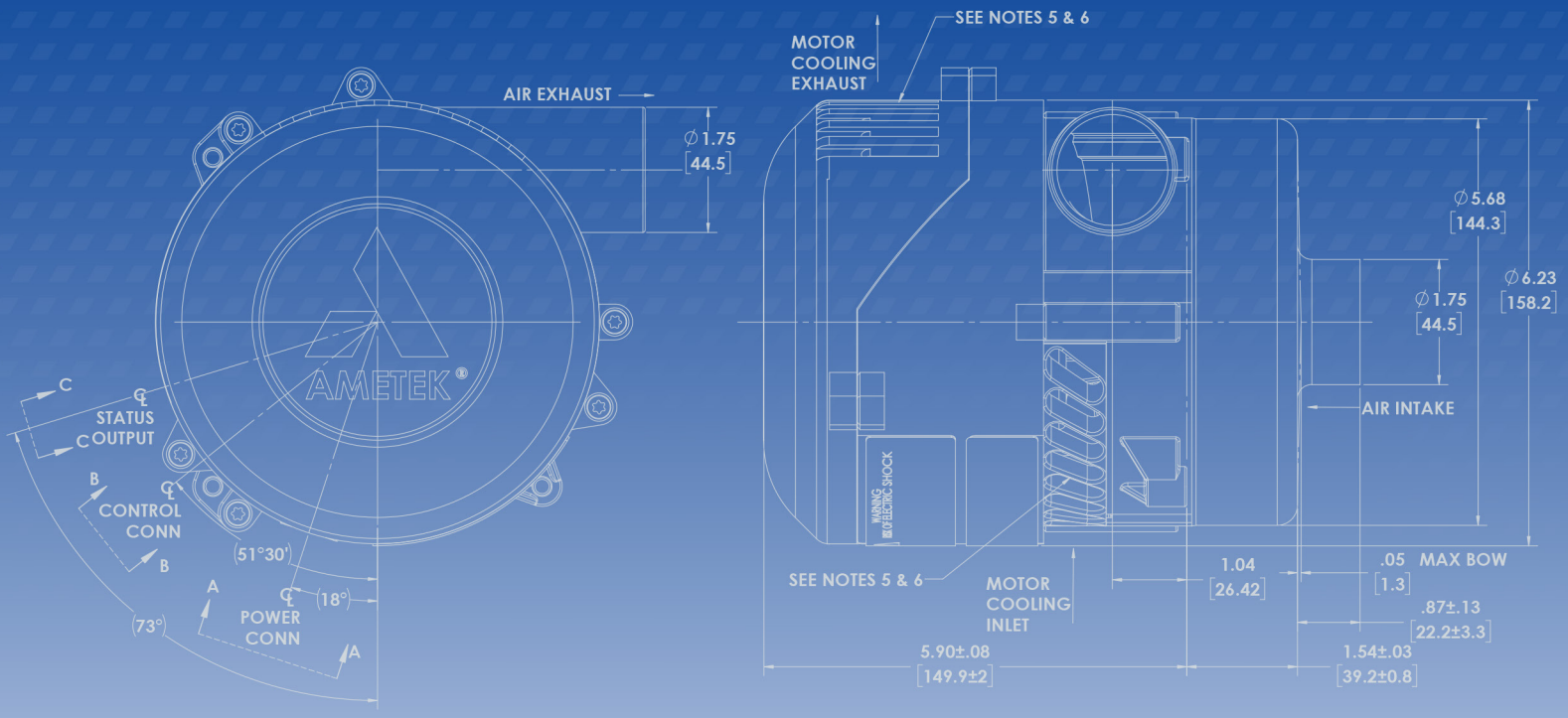
14

Document Path: W:\Projects\A-D\ACT1701\map files\RAWP\FIG14 ProposedSSDSSVapor barrier.mxd

APPENDIX A

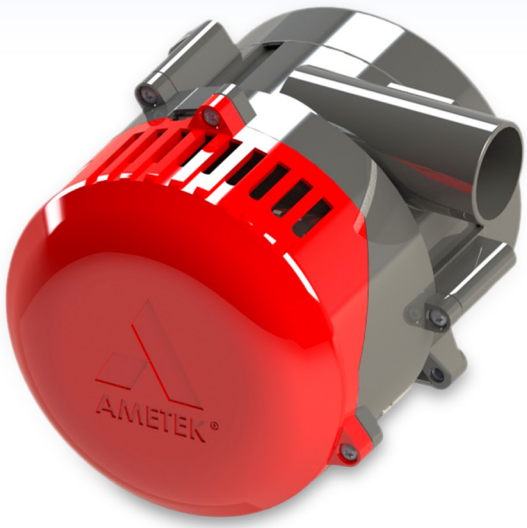
MANUFACTURER EQUIPMENT SPECIFICATIONS

AMETEK®
DYNAMIC FLUID SOLUTIONS



Windjammer® PRO

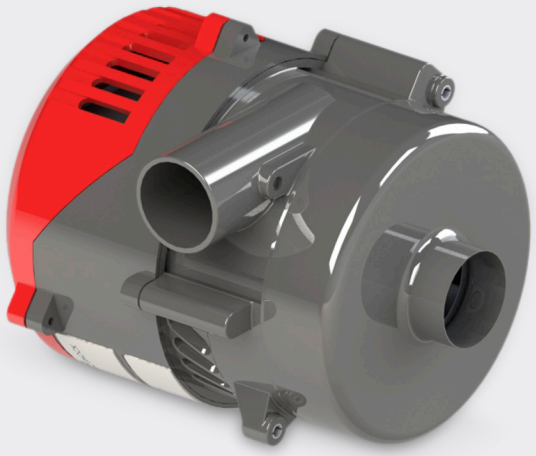
Selection Guide



- Greater efficiency and flow
- More robust design
- Common performance – 120 to 240 VAC
- Most configurable blower on the market
- Runs cooler, cleaner and longer
- Improved software flexibility

Windjammer® PRO

Key Features



- Higher performance design with “Common Performance” model provides 17% greater flow compared to other manufacturers
- “Common Performance” provides the same air performance between 120 VAC and 240 VAC
- New design reduces overall noise and improves sound quality
- Innovative cooling chamber provides lower operating temperature prolonging overall life
- Improved flexibility for speed control, data logging, and programmability

We Keep the World Moving . . .

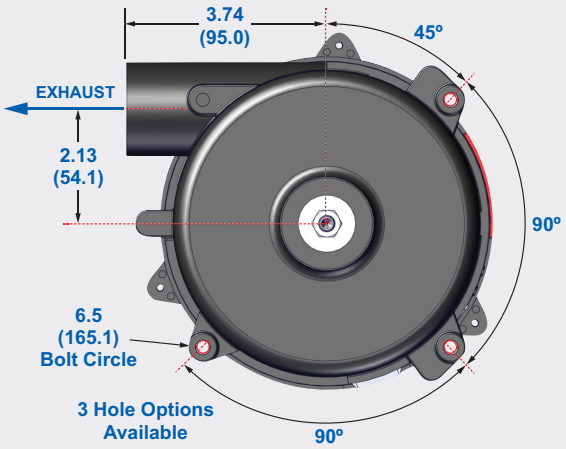
The innovative design and enhancements of the Windjammer® PRO provide **INCREASED PERFORMANCE** over competitive models. One key feature is the ability to apply multiple performance profiles depending on the application requirement. New to the feature list, “Common Performance” provides the ability to have the same air performance whether operating at 120 or 240 VAC. This is great for OEM products designed for the global market.

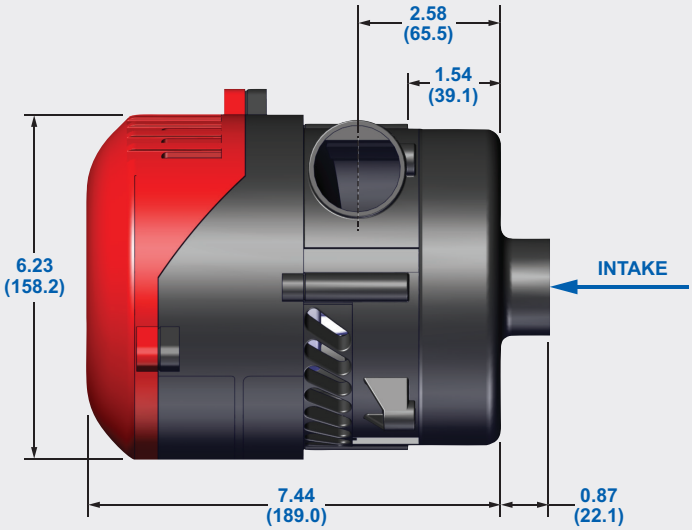
The Windjammer® PRO operates at a **LOWER TEMPERATURE** to extend the life of the brushless motor. Improved motor cooling along with shaft and bearing assembly redesigns extend the life of bearings and sensitive electronic modules.

The redesigned blower housing and optional motor cooling ducts makes this model perfect for **HUMID AND HARSH ENVIRONMENTS**. Improved sealing along with a reconfigured bearing prevents contamination from infiltrating into the bearings or motor controller assembly, prolonging the blowers’ life in these environments.

Principles of our Acustek® technology have been applied to **REDUCE NOISE** and substantially improve the sound quality produced by this blower. A redesigned motor enclosure with improved air and noise channeling makes the Windjammer® PRO one of AMETEK’s quietest high flow designs available.

Next generation controller software adds **IMPROVED FLEXIBILITY** over other designs. Custom speed and acceleration profiles, overcurrent safety limits, and error logging are just a few of the new software features available with the Windjammer® PRO.





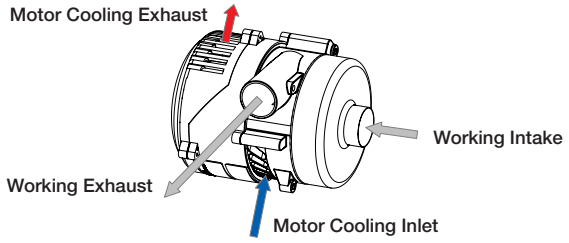
AMETEK®
DYNAMIC FLUID SOLUTIONS

Configuring Your Blower

Please examine and check off the following steps to help you determine your requirements at a glance. Contact your local AMETEK sales representative for a list of standard configurations. Other variations may require additional lead time.

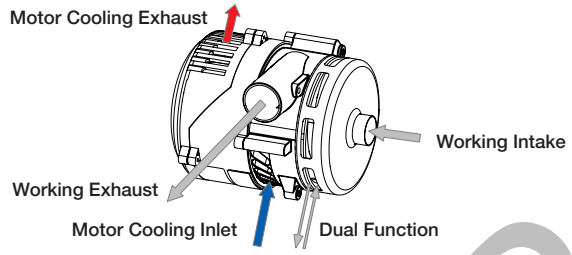
Step 1 Construction

☐ **Bypass**



Working air is separated from the motor cooling air. This is great for environments with contamination, high heat, moisture, etc.

☐ **Dual Function**



A dual function bypass blower has additional slotted holes that enable it to function in vacuum or pressure.

Condition 1: Block Working Intake → Vacuum Function

Condition 2: Block Working Exhaust → Pressure Function

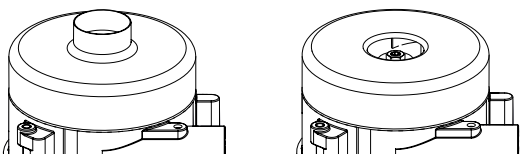
Condition 3: Block Working Intake/Exhaust → Pressure Function

Step 2 Input Voltage

☐ 120 AC	☐ 240 AC	☐ Dual Voltage
110-132 VAC 50/60 Hz	**208-264 VAC 50/60 Hz** 240V models are optimized and typically offer higher air performance than dual voltage models	**120-132 VAC 50/60 Hz I 18A** **208-264 VAC 50/60 Hz I 13A** Dual Voltage offers the same air performance when supplied 120 or 240 VAC

Step 3 Working Inlet Style

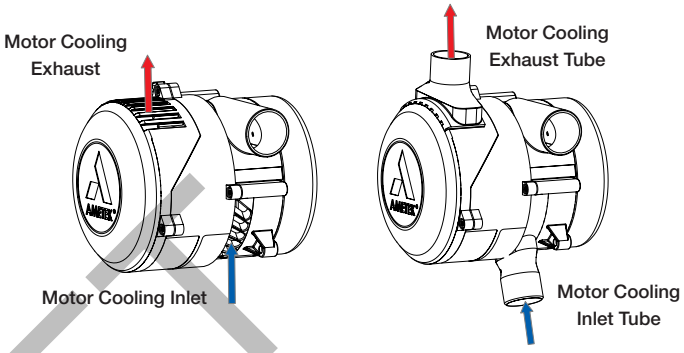
☐ **Intake Tube** ☐ **Bell Mouth**



If intake tube is not being used in system, a bell mouth configuration will provide more air flow performance.

Step 4 Motor Cooling Style

☐ **Dual Vents** ☐ **Dual Tubes**



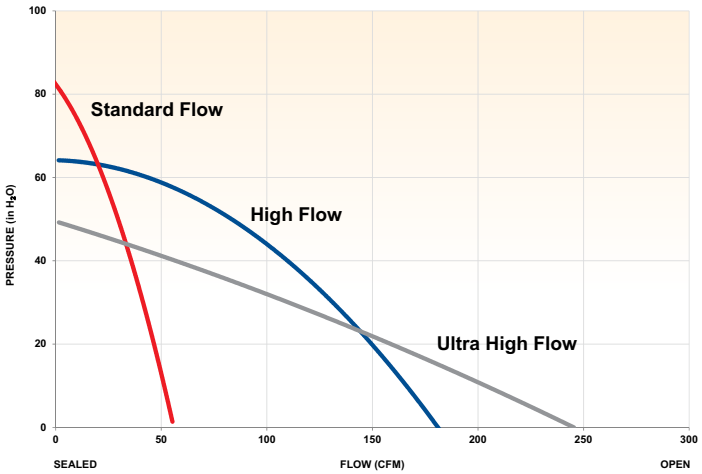
☐ **Intake Tube Only** ☐ **Discharge Tube Only**

These options allow for **warm** motor exhaust air to be ducted outside, or **clean/dry** motor cooling air to be ducted inside.

Step 5 Flow Performance

☐ Standard	☐ High	☐ Ultra High
1.25" (31.8) Intake	**1.75" (44.5) Intake**	**2.75" (69.9) Intake**
1.25" (31.8) Discharge	**1.75" (44.5) Discharge**	**2.50" (63.5) Discharge**

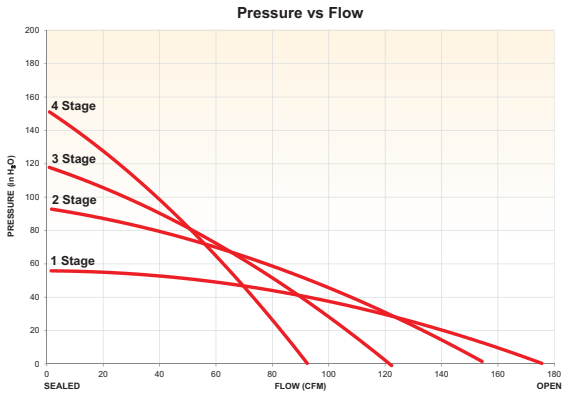
Generally, more flow on the "open" side of the curve reduces the maximum pressure on the "sealed" side of the curve. A lot of other factors (voltage, construction, stages, etc.) affect these curves so this chart should be used for reference only. Always refer to individual data sheet for actual performance data.



Step 6 Pressure Performance

- ☐ 1 Stage
- ☐ 2 Stage
- ☐ 3 Stage
- ☐ 4 Stage

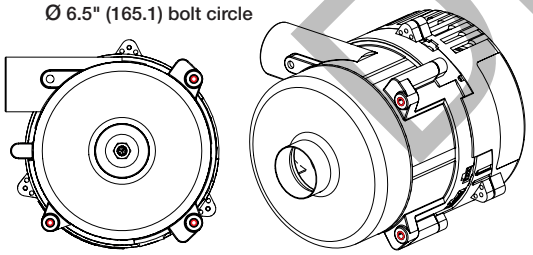
Generally, more pressure on the “sealed” side of the curve reduces the maximum flow on the “open” side of the curve. Always refer to individual datasheet for actual performance data. When operating on the left side of the chart (low flow) an increase in the number of stages can give you substantially more pressure.



Step 7 Mounting

- ☐ 5/16" Through Holes
- ☐ 1/4-20
- ☐ M6 x 1

3 holes spaced 90° apart on a
Ø 6.5" (165.1) bolt circle



Step 8 Protection

- ☐ Standard
- ☐ Silicone Coating

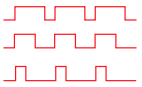
Silicone coated board protects the motor controller from environments with high amounts of debris.

- ☐ Silicone Coating + SST Hardware

Steel components (including shaft and bearings) are replaced with SST to provide additional corrosion resistance.

Step 9 Speed Command

PWM



15 – 45 vdc max amplitude 30 Hz – 20 kHz frequency range

Speed command options allow the blower speed to be controlled via a configurable input signal. If the 0-10 vdc option is selected an input signal of 5 vdc is sent to the blower it will result in a half speed command.

- ☐ 0-10 vdc
  Configurable from 0-15 vdc
- ☐ Mechanical
  Onboard Potentiometer
- ☐ Remote Potentiometer
  Provides a 5 vdc output which can be connected to a remote mounted (customer supplied) potentiometer.
- ☐ 4-20 mA
- ☐ PWM

Typically 4-20 mA and PWM commands offer better isolation from other system signals (noise).

ALSO SELECT: *(Only applicable for 0-10, 4-20 and PWM options)*

- ☐ Pull Up
  If speed command is lost, blower will operate at full speed.
- ☐ Pull Down
  If speed command is lost, blower speed will be reduced to zero.

Step 10 Speed Control

- ☐ Open Loop

Open loop control refers to the blower response when sent a speed command. An open loop blower speed is permitted to shift as the load (pressure/vacuum) that the blower is working against changes. Eg: if the pressure goes up the speed will go up.

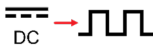
- ☐ Closed Loop

Closed loop control refers to the blower response when sent a speed command. A closed loop blower remains at constant speed as the load (pressure/vacuum) that the blower is working against changes. Eg: if the blower operating at 12,000 RPM is sent a 50% speed command, the blower will operate at half speed (6,000 RPM). When the pressure increases, the blower will again be regulated to 6,000 RPM.

Step 11 Wiring Harness *(Check all required)*

- ☐ No Harness *(Customer must supply connectors)*
  Power | AMP 350766-1 Connector, TE 640310-3 Sockets
  Speed | MOLEX 39-01-4051 Connector, 39-00-0208 Sockets
  Status | MOLEX 50-29-1662 Connector, 39-00-0214 Sockets
- ☐ Power Input Harness
  Provided with flying leads
- ☐ Speed Input/Output Harness
  Speed output can be configured to 1,2,3, or 6 pulses per revolution (standard 2 pules per revolution)
- ☐ Status Output Harness
  Status out “pulse codes” are outlined in the operation manual

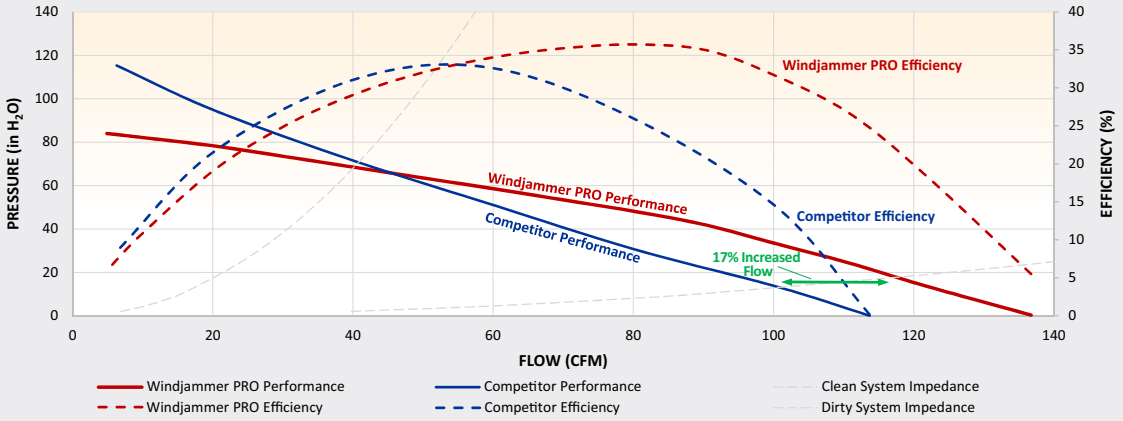
Both Speed and Status connectors supply a 15 vdc amplitude pulsed (digital) signal. It is also possible to supply an outside voltage (up to 15 vdc).



LEAD LENGTH: *(Not applicable for “No Harness” option)*

- ☐ 6.5" (165mm)
- ☐ 15" (380mm)
- ☐ 24" (610mm)

Performance and Efficiency Data



Notes: Data presented represents blower performance at STANDARD AIR DENSITY, .075 lb/ft³ (29.92" Hg, Sea Level, 68°F). Vacuum performance available upon request.

Technical Data

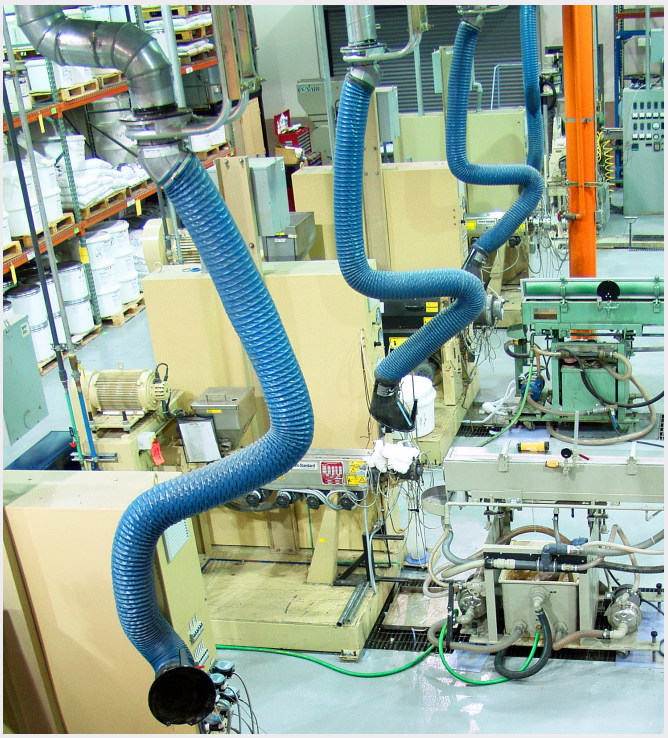
Sound Level @ Full Speed: 82dB (A) and 55 Sones

Operating Temperature (Working Air): -4°F to 122°F (-20°C to 50°C)

Approximate Weight: 6.5 Lbs (2.95 Kg)

Standard Options

The proven reliability of the AMETEK Windjammer® makes the PRO Series the perfect fit for an extraordinary number of applications around the world. AMETEK has learned numerous lessons from past engagements fueling the Windjammer® Pro's development, design, and value creation. The features and functions offered allow the Windjammer® PRO to fit more seamlessly into any application. See standard configurations.



Custom Options

AMETEK is committed to making your life easier. If you do not find the options you desire above, we also offer customized services. Contact your sales representative for more information.

Windjammer PRO Ordering Information

Size

057 = 5.7

Construction

B = Bypass T = Thru-flow P = Peripheral S = Slotted shell (dual purpose)

Inlet/Outlet Size

S = Standard Flow H = High flow U = Ultra high flow

Fan System

1 = Single stage 2 = 2 Stage 3 = 3 Stage 4 = 4 Stage X = Non standard

Voltage

0 = Dual voltage 120/240 1 = 110/120 2 = 230/240

Performance Level

F = Good N = Better (standard) H = Best

Mounting Holes

A = (3X) 5/16" thru (standard) B = (3x) 1/4-20 C = (3X) M6

Working Air Intake, Motor Cooling Intake – Discharge

A = Bell-mouth, intake slots – discharge slots
B = Inlet tube, intake slots – discharge slots
C = Bell-mouth, intake tube – discharge slots
D = Inlet tube, intake tube – discharge slots

Protection

0 = Conformal coated PCBA (standard)
1 = Add silicone coating on PCBA
2 = Add silicone coating on PCBA with stainless steel components

Feedback Loop

0 = Open loop 1 = Closed loop

Speed Control

0 = Mechanical
1 = Remote potentiometer
2 = 0-10V pull down
3 = 0-10V pull up
4 = 4-20mA pull down
5 = 4-20mA pull up
6 = PWM pull down
7 = PWM pull up

Wiring Harnesses (flying leads)

A = No harnesses
B = 6.5" power, speed and status out
C = 6.5" power only
D = 15" power, speed and status out
E = 15" power only
F = 24" power, speed and status out
G = 24" power only

Packaging

B = Bulk pack
S = Single pack

WP	057	B	H	2	-	0	N	TBD	A	-	TBD	/	A	A	0	1	3	-	A	S

Example: WP057BH2-0N##A-#### / AA013-AS

AMETEK®
DYNAMIC FLUID SOLUTIONS

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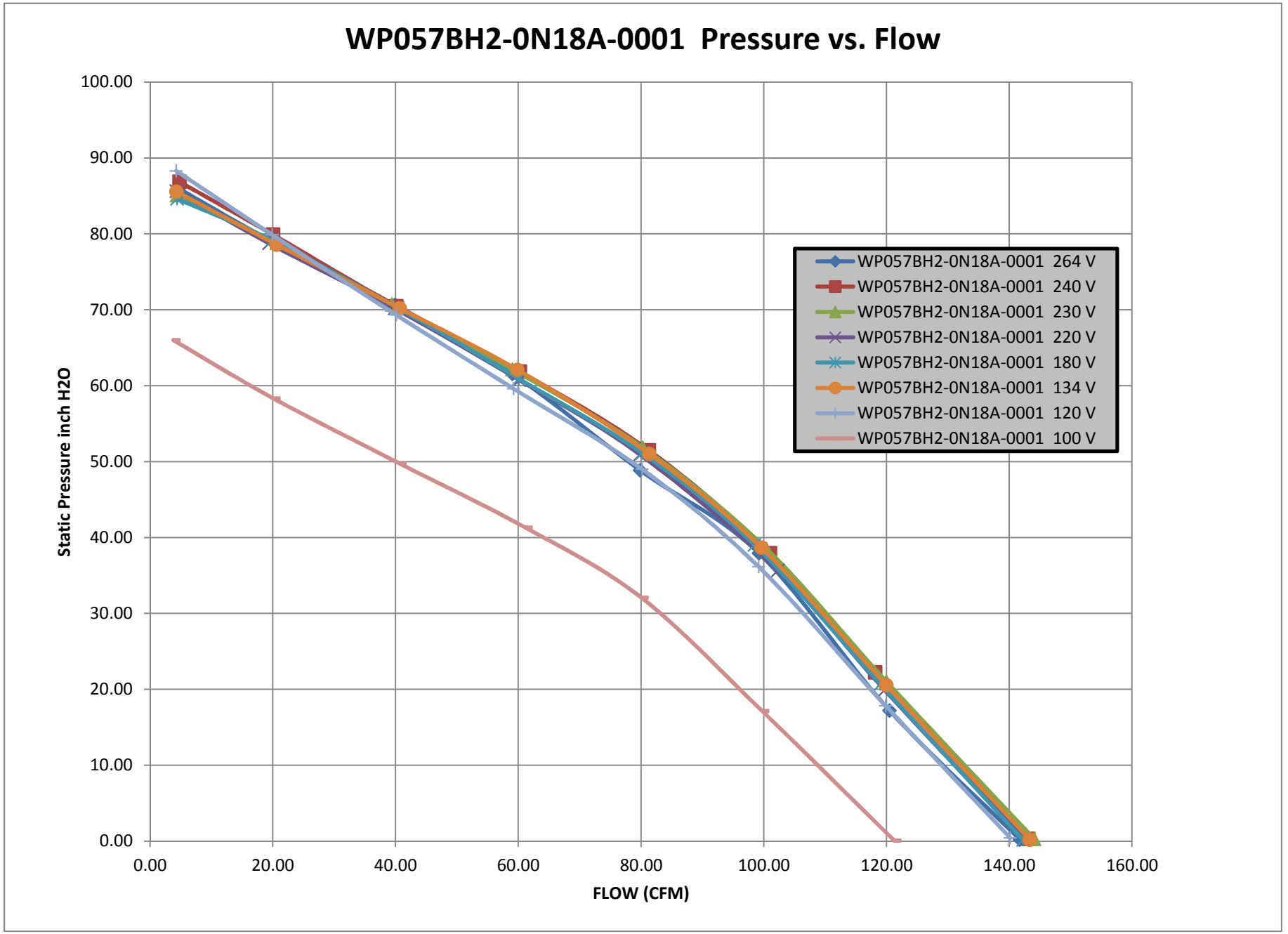

WP057BH2-0N18A-0001 Pressure vs. Flow
Static Pressure inch H2O
FLOW (CFM)
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
WP057BH2-0N18A-0001 264 V
WP057BH2-0N18A-0001 240 V
WP057BH2-0N18A-0001 230 V
WP057BH2-0N18A-0001 220 V
WP057BH2-0N18A-0001 180 V
WP057BH2-0N18A-0001 134 V
WP057BH2-0N18A-0001 120 V
WP057BH2-0N18A-0001 100 V

AMETEK, Dynamic Fluid Solutions

Blower Test Report

Test administered by: LOUGHNEY **REA** **Serial #**

Model under test: WP057BH2-0N18A-0001 **Lab Log #** **Date:** 2/20/2018

Time: 11:43:13

Ambient Temperature	25.0 °C	**Humidity Ratio**	0.0116
Barometric Pressure	28.96 inch Hg	**Air Density**	0.0711 lb/ft^3
Relative Humidity	56.3 %	**Correction Factor**	1.055
		Pipe ID	4.00 inch

Remarks:

Flow Rate *cfm*	Static Pressure *inch H2O*	Total Pressure *inch H2O*	Current *A*	Power Demand *W*	Voltage *V*	Flow Temperature *°C*	Rotational Speed *rpm*	Static Efficiency %	Total Efficiency %
141.72	0.22	0.38	11.65	1464.10	264.08	31.84	17880	0.26	0.45
120.50	17.22	17.34	11.63	1460.72	264.08	31.50	17580	17.15	17.27
99.21	37.93	38.02	11.06	1384.96	264.10	31.63	16980	27.96	28.03
79.87	48.86	48.91	11.58	1457.03	264.09	32.34	17550	32.39	32.42
59.06	61.55	61.58	11.33	1424.85	264.10	32.98	18360	30.90	30.92
39.94	70.64	70.65	10.37	1300.65	264.14	33.97	18960	26.34	26.34
20.02	78.93	78.93	9.16	1138.89	264.40	34.27	19620	16.86	16.87
4.68	85.98	85.98	8.07	990.52	264.24	33.08	20340	4.93	4.93
143.12	0.30	0.46	13.26	1501.24	240.06	31.18	18120	0.34	0.53
118.14	22.25	22.36	13.55	1529.74	240.05	31.35	17970	20.73	20.84
101.00	37.93	38.02	13.70	1544.61	240.04	31.68	17880	29.95	30.01
81.28	51.49	51.55	13.54	1528.47	240.06	32.18	17970	33.10	33.14
60.26	61.84	61.87	12.56	1434.45	240.08	32.86	18420	31.46	31.48
40.11	70.48	70.49	10.99	1280.92	240.13	34.01	18960	26.80	26.81
20.05	79.90	79.90	9.73	1127.60	240.19	34.56	19770	17.27	17.27
4.81	86.85	86.85	8.66	991.37	240.24	33.07	20520	5.11	5.11
144.07	0.27	0.44	13.92	1492.99	230.28	31.87	18120	0.32	0.52
119.99	21.02	21.14	14.12	1521.39	230.26	31.66	17970	20.02	20.13
100.43	38.52	38.60	14.39	1537.96	230.26	31.88	17880	30.39	30.45
80.28	51.85	51.90	14.12	1518.26	230.27	32.34	17970	33.16	33.19
59.07	62.14	62.17	13.60	1411.90	230.23	33.14	18450	31.50	31.52
39.44	70.71	70.72	12.14	1268.80	230.27	34.15	18990	26.70	26.71
20.64	78.80	78.81	10.24	1111.96	230.31	34.45	19680	17.79	17.79
4.38	85.07	85.07	8.87	952.14	230.37	32.78	20340	4.74	4.74
142.58	0.20	0.37	14.62	1448.26	220.21	30.91	17970	0.24	0.44

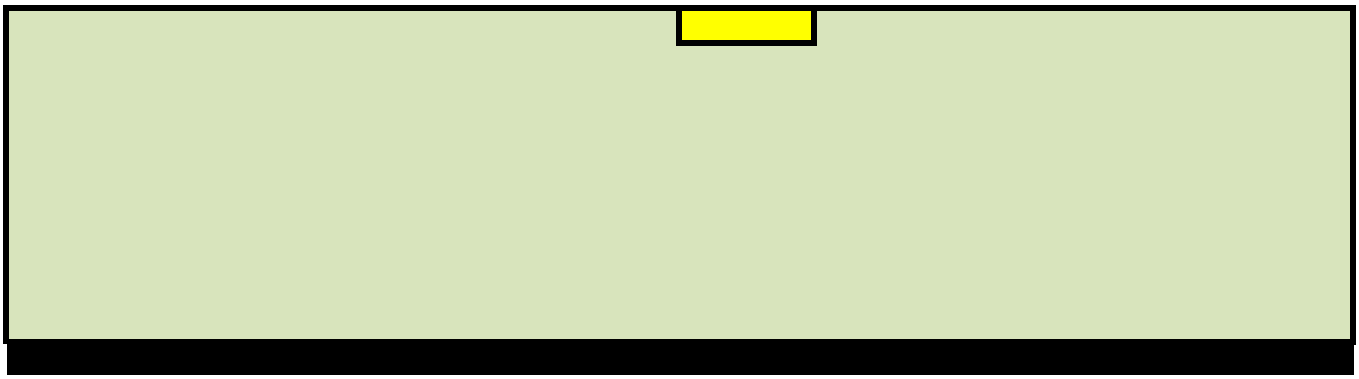
119.70	19.91	20.02	14.79	1473.23	220.20	30.92	17850	19.49	19.60
102.33	35.69	35.78	14.88	1487.20	220.19	31.19	17790	29.62	29.69
79.82	50.94	50.99	14.77	1470.34	220.19	31.81	17850	33.40	33.43
60.19	60.74	60.77	14.18	1389.96	220.22	32.51	18300	31.82	31.83
39.88	70.16	70.17	12.77	1257.09	220.26	33.54	18930	27.00	27.00
19.41	78.76	78.76	10.38	1086.64	220.31	34.03	19680	17.08	17.08
4.33	85.63	85.63	9.18	954.37	220.36	32.16	20460	4.69	4.69

142.25	0.17	0.34	15.94	1391.86	180.22	29.68	18000	0.21	0.41
119.00	20.68	20.80	16.04	1415.05	180.20	30.00	17880	20.91	21.03
98.49	39.03	39.11	16.13	1436.11	180.28	30.39	17790	32.22	32.28
80.20	51.11	51.17	16.04	1417.70	180.28	31.04	17880	34.86	34.89
60.13	60.91	60.94	15.66	1335.31	180.23	31.81	18330	33.12	33.14
40.33	70.26	70.28	15.16	1223.86	180.28	32.99	18960	28.05	28.05
19.92	79.14	79.14	14.03	1073.58	180.36	33.44	19710	17.81	17.81
4.43	84.60	84.60	10.45	905.47	180.40	32.09	20250	5.00	5.00

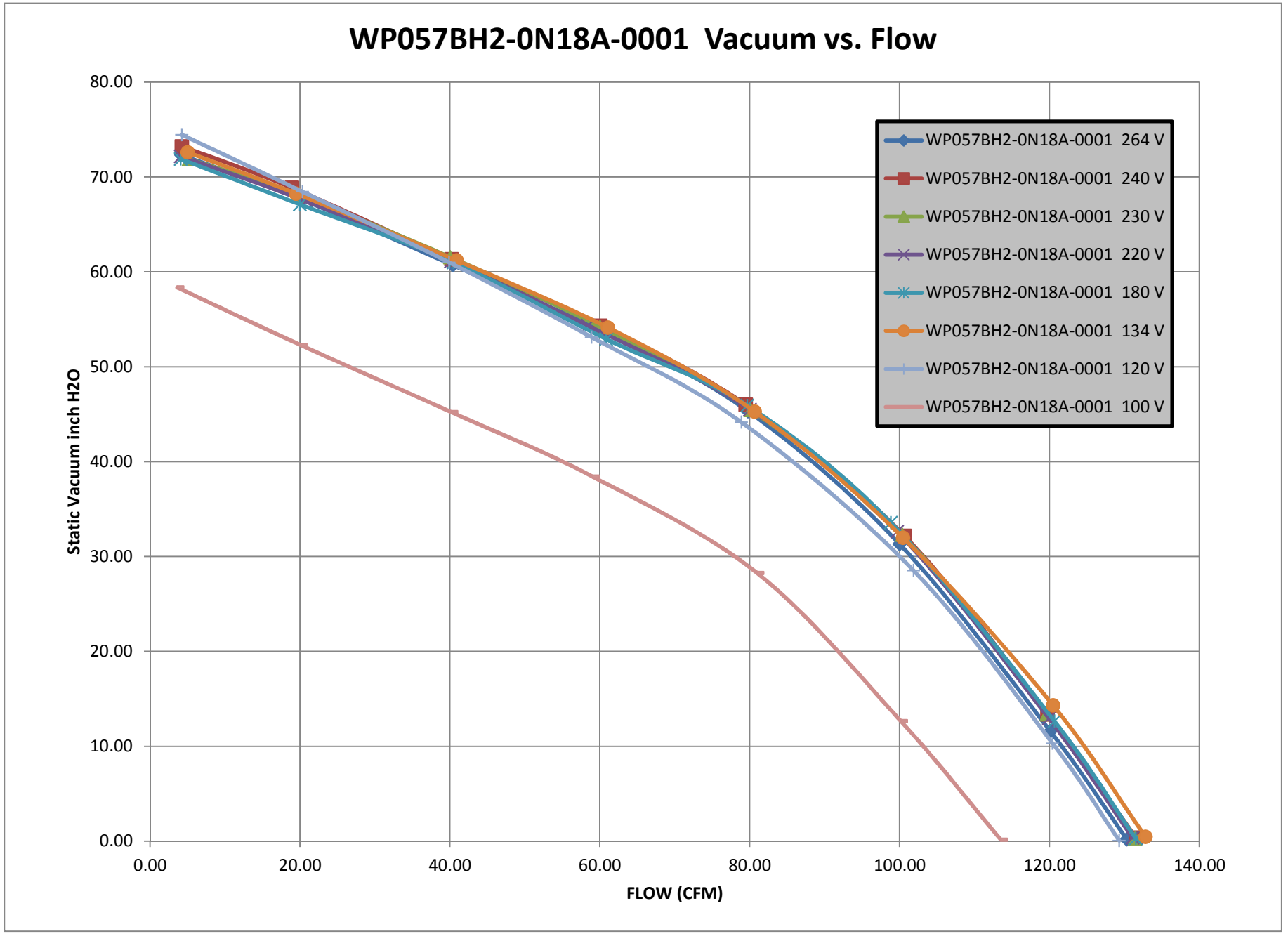
143.36	0.18	0.35	18.10	1431.35	133.85	29.25	18120	0.22	0.42
119.99	20.55	20.66	18.28	1455.07	133.80	29.57	17970	20.35	20.46
99.61	38.67	38.75	18.42	1470.31	133.79	30.02	17850	31.50	31.57
81.34	51.03	51.08	18.29	1455.40	133.80	30.63	17970	34.34	34.38
59.85	62.10	62.13	17.55	1369.61	133.85	31.41	18480	32.74	32.76
40.70	70.20	70.21	16.24	1216.07	133.94	32.51	18990	28.42	28.43
20.62	78.59	78.59	14.66	1040.51	134.04	32.94	19680	18.86	18.86
4.33	85.56	85.56	12.69	883.89	134.13	31.21	20400	5.05	5.05

140.16	0.43	0.59	18.20	1355.86	120.12	27.37	17760	0.53	0.73
119.87	17.83	17.95	18.45	1375.29	120.13	27.65	17640	18.57	18.69
99.18	36.15	36.23	18.61	1391.18	120.12	28.28	17550	30.85	30.92
80.18	48.99	49.04	18.48	1377.35	120.13	28.77	17610	34.18	34.21
59.23	59.61	59.64	17.73	1298.53	120.17	29.56	18150	32.65	32.67
40.15	69.31	69.32	16.68	1190.92	120.25	30.75	18840	28.14	28.15
19.90	79.89	79.90	15.29	1049.75	120.33	31.13	19800	18.26	18.26
4.29	88.29	88.29	13.93	919.88	120.41	29.44	20700	4.95	4.95

121.28	0.07	0.19	14.58	891.82	100.07	24.78	15540	0.11	0.30
99.74	17.14	17.22	14.88	909.78	100.07	25.27	15450	22.32	22.42
80.07	32.08	32.13	15.02	918.76	100.05	25.76	15390	33.24	33.30
61.18	41.31	41.34	14.48	880.96	100.07	26.48	15630	34.18	34.21
40.64	49.76	49.77	13.33	799.10	100.13	26.96	16200	30.19	30.20
20.10	58.32	58.33	12.06	695.29	100.21	27.52	17040	20.15	20.15
3.81	66.01	66.01	10.83	600.49	100.29	26.24	17850	4.99	4.99



PRESSURE SHEET			
Auto Populated don't change			
Voltages Tested To			
WP057BH2-0N18A-0001	264	V	
WP057BH2-0N18A-0001	240	V	
WP057BH2-0N18A-0001	230	V	
WP057BH2-0N18A-0001	220	V	
WP057BH2-0N18A-0001	180	V	
WP057BH2-0N18A-0001	134	V	
WP057BH2-0N18A-0001	120	V	
WP057BH2-0N18A-0001	100	V	
WP057BH2-0N18A-0001	0	V	
WP057BH2-0N18A-0001	Pressure	vs.	Flow


WP057BH2-0N18A-0001 Vacuum vs. Flow
Static Vacuum inch H2O
FLOW (CFM)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
WP057BH2-0N18A-0001 264 V
WP057BH2-0N18A-0001 240 V
WP057BH2-0N18A-0001 230 V
WP057BH2-0N18A-0001 220 V
WP057BH2-0N18A-0001 180 V
WP057BH2-0N18A-0001 134 V
WP057BH2-0N18A-0001 120 V
WP057BH2-0N18A-0001 100 V

AMETEK, Dynamic Fluid Solutions

Blower Test Report

Test administered by: LOUGHNEY **REA** **Serial #**

Model under test: WP057BH2-0N18A-0001 **Lab Log #** **Date:** 2/20/2018

Time: 11:43:13

Ambient Temperature	25.0 °C	**Humidity Ratio**	0.0116
Barometric Pressure	28.96 inch Hg	**Air Density**	0.0711 lb/ft^3
Relative Humidity	56.3 %	**Correction Factor**	1.055
		Pipe ID	4.00 inch

Remarks:

Flow Rate *cfm*	Static Vacuum *inch H2O*	Total Vacuum *inch H2O*	Current *A*	Power Demand *W*	Voltage *V*	Flow Temperature *°C*	Rotational Speed *rpm*	Static Efficiency *%*	Total Efficiency *%*
130.31	0.20	2.82	11.76	1483.54	264.20	21.74	17910	0.21	2.92
120.12	11.58	13.80	11.76	1486.92	264.34	21.64	17910	11.01	13.12
100.02	31.31	32.85	11.67	1465.63	263.99	21.61	17970	25.15	26.39
79.76	45.32	46.30	11.57	1457.30	264.14	21.61	18210	29.19	29.82
60.77	53.58	54.15	10.90	1370.26	264.09	21.57	18660	27.96	28.26
40.42	60.70	60.95	9.80	1221.04	264.14	21.55	19200	23.64	23.74
20.24	67.61	67.67	8.65	1064.66	264.13	21.51	19980	15.12	15.13
4.21	72.31	72.32	7.49	910.70	264.18	21.47	20580	3.93	3.93
131.52	0.37	3.03	13.20	1491.55	240.07	21.63	18090	0.38	3.14
119.73	13.37	15.58	13.18	1490.08	240.07	21.55	18090	12.64	14.73
100.66	32.17	33.73	13.12	1483.02	240.07	21.50	18120	25.68	26.93
79.47	46.01	46.98	12.74	1447.61	240.08	21.50	18300	29.71	30.33
60.08	54.32	54.88	11.75	1356.67	240.12	21.46	18750	28.29	28.58
40.23	61.31	61.56	10.42	1211.03	240.18	21.42	19290	23.95	24.05
18.93	68.86	68.92	9.13	1049.06	240.23	21.40	20130	14.61	14.63
4.25	73.22	73.22	8.10	919.34	240.28	21.38	20850	3.98	3.98
131.42	0.29	2.95	13.89	1480.19	230.20	21.48	18090	0.30	3.08
119.60	13.36	15.57	13.90	1489.21	230.35	21.43	18090	12.63	14.71
100.36	32.29	33.85	13.83	1470.77	230.21	21.38	18120	25.91	27.16
80.13	45.44	46.43	13.77	1436.62	230.22	21.36	18270	29.80	30.45
60.04	54.20	54.76	13.14	1348.07	230.25	21.34	18720	28.38	28.68
40.04	61.54	61.79	11.28	1207.03	230.29	21.31	19320	24.00	24.10
20.19	67.97	68.03	9.64	1041.73	230.35	21.30	20010	15.48	15.50
5.20	71.88	71.88	8.45	900.50	230.40	21.27	20580	4.88	4.88
131.09	0.37	3.02	14.79	1467.12	220.20	21.32	18060	0.39	3.17
119.92	12.94	15.15	14.77	1465.72	220.20	21.27	18060	12.44	14.57

99.67	32.62	34.15	14.73	1459.03	220.20	21.22	18090	26.19	27.42
80.06	45.49	46.47	14.53	1429.62	220.21	21.20	18270	29.94	30.59
58.41	54.33	54.85	13.54	1316.88	220.25	21.20	18690	28.32	28.59
40.13	61.09	61.34	11.75	1189.67	220.29	21.18	19230	24.22	24.32
20.85	67.44	67.51	9.91	1032.96	220.35	21.13	19920	15.99	16.01
4.11	72.18	72.18	8.53	876.60	220.41	21.08	20580	3.98	3.98

131.52	0.29	2.95	16.05	1411.52	180.21	21.14	18090	0.32	3.24
120.65	12.65	14.90	16.05	1411.82	180.29	21.10	18090	12.71	14.96
98.83	33.57	35.08	15.99	1400.00	180.20	21.09	18150	27.85	29.10
79.67	45.90	46.87	15.86	1368.84	180.22	21.05	18300	31.38	32.05
60.85	52.92	53.49	15.42	1267.59	180.36	21.05	18540	29.85	30.17
40.49	60.99	61.25	14.85	1154.72	180.32	21.01	19230	25.12	25.22
19.98	67.11	67.17	12.13	985.69	180.39	21.00	19860	15.98	16.00
4.09	71.89	71.90	9.72	839.63	180.45	20.95	20520	4.11	4.11

132.80	0.46	3.18	18.48	1480.51	133.78	20.96	18330	0.49	3.35
120.48	14.31	16.55	18.47	1477.35	133.77	20.91	18330	13.71	15.85
100.47	31.97	33.53	17.91	1410.11	133.80	20.85	18120	26.75	28.05
80.67	45.27	46.27	17.67	1382.22	133.82	20.85	18300	31.02	31.71
61.09	54.13	54.70	16.97	1301.02	133.88	20.85	18780	29.84	30.16
40.93	61.19	61.45	15.63	1146.13	133.97	20.82	19320	25.66	25.76
19.49	68.24	68.30	13.89	965.82	134.08	20.80	20070	16.17	16.18
5.03	72.60	72.60	11.89	832.06	134.14	20.75	20700	5.16	5.16

129.30	0.06	2.64	18.22	1350.64	120.02	20.81	17760	0.07	2.97
120.41	10.32	12.55	18.23	1349.98	120.02	20.74	17760	10.80	13.14
101.86	28.52	30.12	18.19	1344.35	120.02	20.72	17820	25.37	26.79
78.91	44.14	45.10	17.92	1314.75	120.04	20.68	18000	31.10	31.77
58.91	53.11	53.65	17.14	1235.22	120.08	20.66	18510	29.73	30.03
39.89	61.00	61.25	16.08	1125.17	120.16	20.64	19260	25.38	25.48
20.34	68.45	68.51	14.68	987.67	120.25	20.60	20190	16.54	16.56
4.24	74.45	74.45	13.19	858.16	120.33	20.57	21120	4.32	4.32

113.50	0.16	2.14	14.72	892.32	100.10	20.47	15540	0.24	3.20
100.16	12.66	14.21	14.77	894.30	100.11	20.44	15570	16.63	18.66
80.99	28.26	29.28	14.71	890.88	100.09	20.43	15570	30.14	31.22
59.01	38.43	38.97	14.02	842.79	100.13	20.43	15900	31.56	32.00
40.15	45.23	45.48	12.97	763.93	100.18	20.40	16440	27.88	28.04
20.05	52.31	52.37	11.74	663.55	100.26	20.36	17280	18.53	18.55
3.63	58.35	58.36	10.45	570.53	100.34	20.30	18150	4.35	4.36

VACUUM SHEET			
Auto Populated don't change			
Voltages Tested To			
WP057BH2-0N18A-0001	264	V	
WP057BH2-0N18A-0001	240	V	
WP057BH2-0N18A-0001	230	V	
WP057BH2-0N18A-0001	220	V	
WP057BH2-0N18A-0001	180	V	
WP057BH2-0N18A-0001	134	V	
WP057BH2-0N18A-0001	120	V	
WP057BH2-0N18A-0001	100	V	
WP057BH2-0N18A-0001	0	V	
WP057BH2-0N18A-0001	Vacuum	vs.	Flow

AMETEK, Inc.

Dynamic Fluid Solutions Division

100 E. Erie St.
Kent, Ohio 44240

User's Guide
4930721

INTEL2 PRODUCTS

Windjammer 5.7″	**120 Volt, 240 Volt, Universal 100V-240V**
Nautilair 7.6″	**120 Volt, 240 Volt, Universal 100V-240V**
Nautilair 8.9″	**120 Volt, 240 Volt, Universal 100V-240V**

Brushless Motor Drive Electronics

November 2018

Proprietary Notice

Introduction

The brushless drive electronics module is used to power a variety of brushless DC motors and blower systems in the AMETEK Windjammer 5.7" (145 mm) and Nautilair 7.6" (193mm), 8.9" (226mm) families. The input power designation refers to a nominal mid-range operating point; actual power input will depend upon the application.

The Printed Circuit Board (PCB) electronics provides: Conversion of the AC input to a DC bus voltage, a small signal power source for the analog and digital components, commutation and power electronics, input command, and velocity sensing and feedback.

When used in blower products, the PCB also supports the motor stator and Hall Effect Rotor Position Sensors, providing a compact and reliable package.

The electronics module implements uni-directional, single quadrant speed control. Motor speed is monitored by converting the frequency of the signals from the Rotor Position Sensors to an analog DC voltage. This voltage is compared to the User's Input Command. The compensated error between actual speed and commanded speed is used to control the voltage applied to the motor windings in a manner to minimize the speed error. The Command Input is optically isolated from the AC source and all internal power circuits. A variety of speed control options are available.

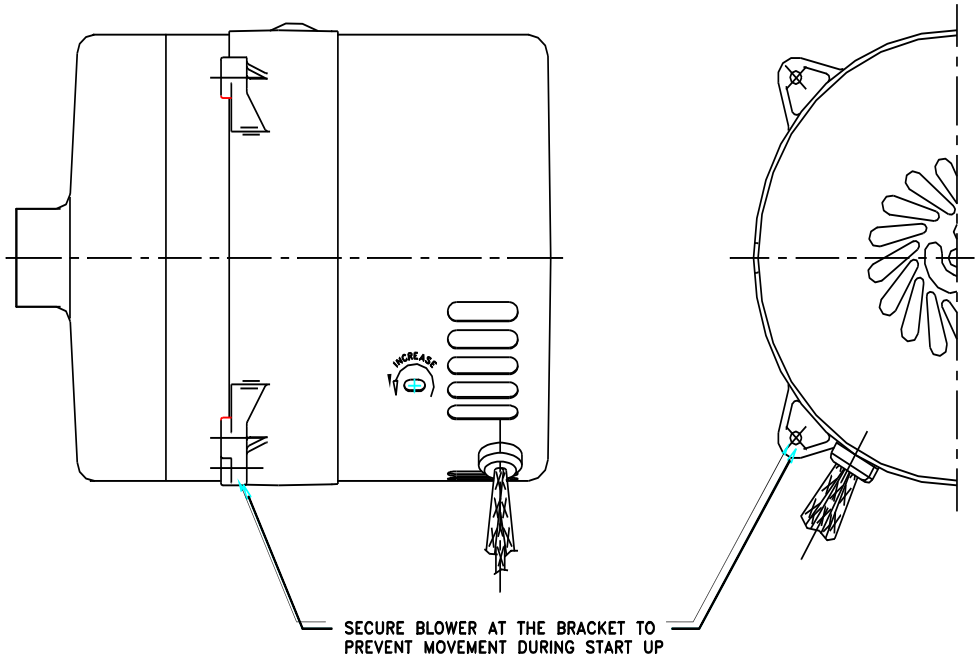
Protection features include over temperature and over current sensing and shutdown. A fuse, in-rush current limiter, and MOV voltage transient protector are connected to the AC source.

This User's Guide will provide information on the use and operation of the electronics module and its interfaces. Actual blower performance will depend upon the blower characteristics and the User's application.

Precautions for Use

WARNING: THIS PRODUCT OPERATES FROM AND USES VOLTAGES THAT ARE POTENTIALLY DANGEROUS! FAILURE TO OBSERVE APPROPRIATE SAFETY PRECAUTIONS COULD RESULT IN SERIOUS BODILY INJURY, INCLUDING DEATH IN EXTREME CASES. We recommend that adequate instructions and warnings by the Original Equipment Manufacturer (OEM) include labels clearly stating the precautions necessary for this type of equipment in the application.

WARNING: Secure blower prior to initial start to prevent sudden movement and possible damage.



Blower Safety Precaution

In the application of Ametek, Inc. blowers are considered as a component in your product, you must exercise the following minimum precautions:

THE FAILURE TO OBSERVE THE FOLLOWING SAFETY PRECAUTIONS COULD RESULT IN SERIOUS BODILY INJURY, INCLUDING DEATH IN EXTREME CASES. *We recommend that adequate instructions and warnings by the original equipment manufacturers (OEM) include labels setting forth the precautions listed below to the end user.*

The blowers must be connected to a proper and effective ground or mounted in a manner that will guarantee electrical isolation and insulate the user and others from electric shock. End product design should not rely solely on the primary insulation of the motor.

Standard blowers are not designed to handle volatile or flammable materials through the fan system unless specifically designed. Passing combustible gases or other flammable materials through the fan system could result in leakage which could cause a fire or explosion.

These products must not be used in an area contaminated by volatile or flammable materials since sparking is predictable in the normal operation of the motor and may ignite the volatile causing a dangerous explosion.

Other Division**s** of AMETEK, Inc. can supply specifically designed motors and blowers for use in handling combustible gases or for use in hazardous duty locations. These specially designed units should only be used in conjunction with combustible gases, which they were specifically designed to handle. The type of gases must be so noted on the product label and in the instructions.

The rotation of the blower is a potential source of injury and must be taken into account in the design of your end product. You must provide the necessary guarding or housing as required by the finished product. Do not remove guard as severe bodily injury may occur to fingers or appendages.

Products incorporating vacuum blowers must be designed so as to prevent the vacuum or air pressure from being concentrated in a manner that can expose the user to injury by coming into contact with any body area, such as eyes, ears, mouth, etc.

The blowers must not be exposed to moisture or liquid or used outdoors, except in equipment which is specifically designed for outdoor use and meets the appropriate regulatory agency requirements for outdoor use. Moisture or liquid can damage the blower and defeat the electrical insulation resulting in a severe electrical shock to the user.

Ametek blowers must not be operated above the design voltage. Over voltage conditions can cause excessive speed of the motor and can result in severe electrical shock and/or other traumatic injury to the operator.

Precautions must be exercised to ensure blower leads are properly routed and connected in your equipment. Lead wires must be routed and retained to ensure that they do not become pinched or come in contact with rotating parts during

assembly or subsequent operations. Connections must be designed so that proper electrical contact is established and the connections must be properly insulated.

Disassembly or repairs of AMETEK products should not be attempted. If accomplished incorrectly, repairs can create an electrical shock and/or operational hazard. It is recommended that repairs be made only by AMETEK and not by others.

In the event that the motor or blower ceases to operate, power must be disconnected before examination and/or removal from the system.

Contact AMETEK, Inc. to discuss any questionable application before selecting a blower. In setting forth the above listed recommendations with regards to precautionary steps that must be considered, we in no way intend to imply that if these steps are taken a product will meet the applicable safety standards. We, at AMETEK, are not sufficiently conversant with the specific safety hazards which may be associated with particular products. We can only advise precautions to be employed generally for the safe use of AMETEK products as components. For testing specifically related to the safety of the product, we recommend that you contact the appropriate regulatory agency as indicated by the type of product being manufactured.

Installation

Interface:
Please refer to the Block Diagram. All electrical connections are made through J1. Safety ground connections should be made to J1 pin 3.

Warning! Use care when making initial power connections. Application of main power to the User Speed Command Input pins will result in destruction of the velocity control circuit. Check all connections before applying power!

Power Input:
The 50/60 Hz AC power source is connected to J1, pins 5 and 4.

Speed Command Input (when applicable):
The Speed Command is connected to J1, pin 2 (positive) and pin 1 (negative).

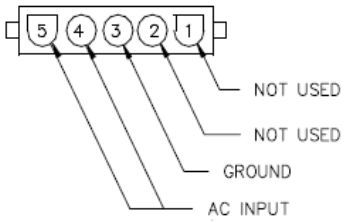
Note: Application of opposite polarity voltages to input pins 1 & 2 will not destroy the unit unless the input voltage exceeds 45VDC.

Connector:

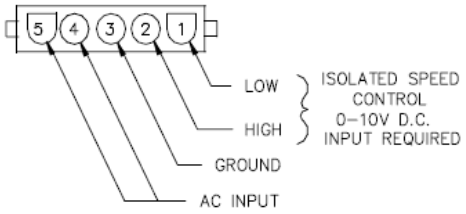
Refer to the outline drawing of the specific blower model for the required connector type.

Windjammer 5.7" and 7.6"

INTERNAL Mechanical Speed Control



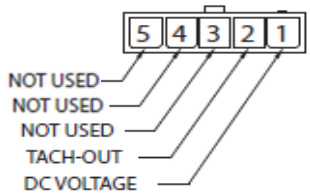
EXTERNAL Speed Control



POST HEADER ASSEMBLY

Windjammer 5.7

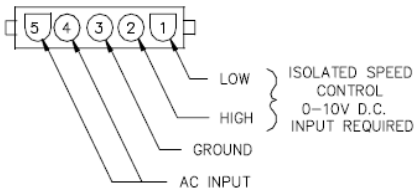
Option- Status or Tach-Out

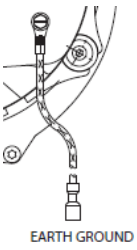


POST HEADER ASSEMBLY

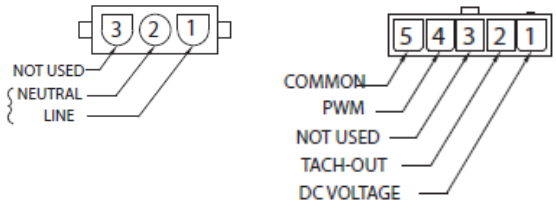
Nautilair 7.6" and 8.9"

0-10V speed control





PWM speed control and/or Tach out



POST HEADER ASSEMBLY

Ambient Temperature:

Operational: **-20°C** to +50°C
Storage: -40°C to +85°C

High Voltage Testing:

AC input and ground:
3000 VAC RMS (50/60Hz) applied for one minute, 2 mA leakage maximum.

AC input and Isolated Speed Control Input:
3000 VAC RMS (50/60 Hz) applied for one minute between AC input and Isolated Speed Control Input, 1 mA leakage maximum.

AC input and Isolated Status or Tach Output:
3000 VAC RMS (50/60 Hz) applied for one minute between AC input and Isolated Speed Control Input, 1 mA leakage maximum.

Electrical Performance Characteristics

AC Input:

240VAC Models:
180 to 264 VAC RMS, 50/60Hz, single phase

120VAC Models:
90 to 132 VAC RMS, 50/60Hz, single phase

Universal Models:
90 to 264 VAC RMS, 50/60Hz, single phase

Note: Although the unit contains a lock-out feature that detects low voltage conditions, the electronics should not be operated continuously with the AC Input lower than 180V FOR 240V models OR 90V for 120v / Universal models. Also, the blower performance changes with applied line voltage.

AC-Inrush Current:

With the blower connected to AC Power Line, there will be a high Inrush Current for approx. 50ms until the internal capacitors are charged. The inrush current is limited by a NTC-Thermistor.

Stand By Power Consumption:

240VAC 50/60 Hz version	50mA typical
120VAC 50/60 Hz version	65mA typical
100-264VAC 50/60 Hz version	65mA typical (120VAC)

Isolated Speed Control Input:

0..10V Analog Signal Input

Voltage Range: 0 to +10 VDC nominal,
Absolute maximum of 45 VDC

PWM Digital Pulse Input:

PWM Frequency Input range: 400 Hz to 10 KHz
Duty Cycle 0..100%
0 to +10 Volt pulse nominal,
0 to +45 Volt absolute maximum

(It is possible to provide a 10VDC, 12mA source to pin 2 and pulse the ground (sink) at pin 1.)

0..20mA Speed Control Current Input:

Current Range: 0 to 20mA
Absolute maximum 44mA (22V, 500Ω)

Speed Control Drift with Temperature:

Analog Mode: Typ. ±4% from nominal speed at +23°C

PWM or
Mechanical Mode: Typ. ±4% from nominal speed at +23°C

Operation

Prior to initial application of power, check all connections and grounds.

Speed Control:

Various speed control modes are available. The control electronics has a built in 25 turn potentiometer that may be used to directly control speed or to adjust motor speed in response to the signals on the Speed Command Input.

Mechanical Direct Speed Control:

In this mode, no input is required at the Speed Command Input; J1 pins 1 and 2 must be left open. The internal potentiometer is connected to the drive electronics and may be used to directly control motor speed over the design range.

Potentiometer Fully Clockwise: Motor RPM Maximum
Potentiometer Fully Counter-Clockwise: Motor RPM Minimum

Analog Speed Control:

In this mode, an analog signal between 0 to 10 VDC is used to control motor

speed. The internal potentiometer is wired to provide scaling of the input voltage. The analog voltage is applied between J1 pin 2(+) and pin 1(-). The analog input is used both for powering the velocity error amplifier and providing the speed command, therefore , a minimum voltage must be present at J1 pin 2 (+) and pin 1 (-) for proper operation. This minimum voltage threshold ensures that the controller will be "OFF" for voltages under 1.0 volts. The command scaling potentiometer is wired such that fully clockwise provides maximum command gain. With the potentiometer fully clockwise:

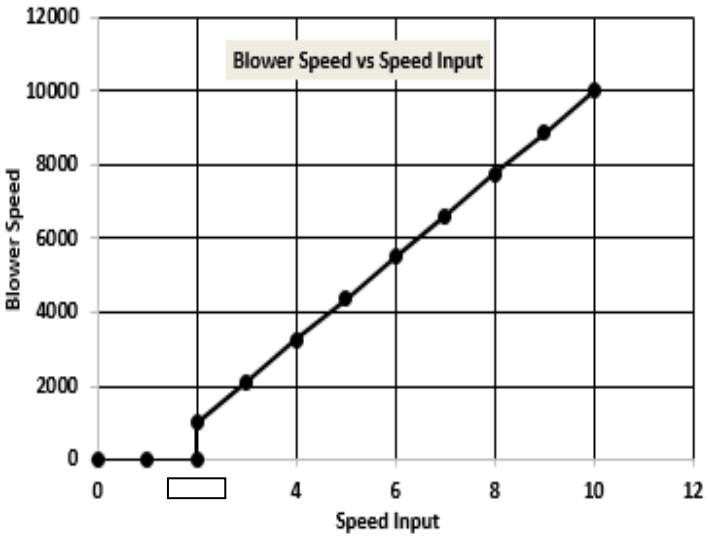
J1-1,2 10 Volts:	Maximum RPM
J1-1,2 <1 Volt:	Motor Off

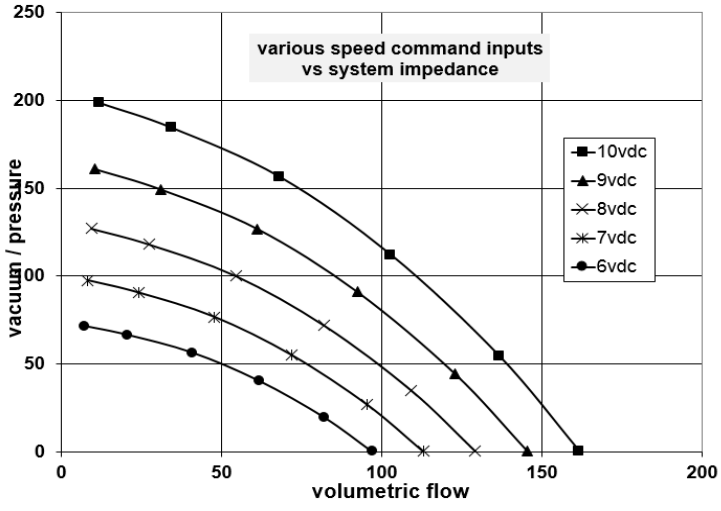
Digital PWM Speed Control:

In this mode, the internal potentiometer must be set fully clockwise. The User then supplies a Pulse Width Modulated (PWM) signal switching between 15 and 45 volts to the Speed Command Input, J1 pin 2(+) and pin 1(-). The PWM signal must have a base frequency between 400 Hz to 10 KHz. The motor may rotate slowly at any duty cycle greater than 10%. The Velocity Error amplifier and Filter and Compensation circuits (see the Block Diagram) will convert the pulse width duty cycle to a DC voltage for use by the Commutation and Control circuits.

J1-1,2 100% Duty Cycle:	Maximum RPM
J1-1,2 <10% Duty Cycle:	Motor Off

Speed Input Functions





In the Analog and Digital Modes the motor will not begin to rotate until a threshold voltage or threshold duty cycle is reached. In the Analog mode, this threshold voltage will also depend upon the setting of the potentiometer. This

feature allows the Speed Command Input to also be used as a logical "ON/OFF" signal.

AMETEK may pre-set the internal gain potentiometer for specific user applications during final factory test.

With the Speed Command Input voltage or duty cycle set to minimum, or, in Direct Mode, with the internal potentiometer set fully clockwise, apply AC appropriate to the unit. Increase the Speed Command Input voltage or duty cycle until rotation begins. In the Direct Mode, the motor will begin to rotate slowly; adjust the potentiometer to obtain the desired speed, pressure, or flow.

NOTE: For initial testing, or in order to check performance, the AC voltage may be brought up slowly using an adjustable AC voltage source or variable transformer with the Speed Command set to Maximum RPM. Prolonged operation at low line voltages under load is not recommended. The motor must never be allowed to stall when running under low line conditions! Use care when starting the motor with low line conditions!

Detailed Operation

Refer again to the Block Diagram. Input AC power is rectified and filtered to provide an internal DC bus voltage. In-rush current is limited using a Negative Temperature Coefficient (NTC) device in series with the Bridge Rectifier. A pre-regulated low voltage power source supplies the analog and digital circuits.

The User Speed Command Input may be used in the three Modes described above. In Analog Mode, through the internal command scaling potentiometer, is compared to the velocity feedback, amplified, and translated into a velocity error voltage that controls the commutation circuits.

In the Direct Mode (Mechanical), the internal potentiometer directly controls the velocity command.

The electronics module implements six-step commutation of the brushless DC motor using Hall Effect devices to detect motor rotor position. The Hall Effect information is used to select which transistors in the Power Output Stage are turned ON to enable rotation in the desired direction. The Hall Effect signals are also used to provide motor velocity feedback. Velocity scaling is determined by the factory based on the motor winding and blower maximum speed.

The Analog, Digital, or Direct Mode velocity command voltage is amplified, and translated across the isolation interface using an analog opto-coupler. The velocity error is used as a current command that is compared to the Current Feedback. The output of this amplifier controls the duty cycle of an internal PWM Modulator. This PWM frequency is selected to ensure good bandwidth and minimum current ripple in the stator. A single sensing resistor in the lower bus supply line is used to measure current. The output of this resistor is used to set the Current Limit. In Current Limit, the duty cycle of the PWM Modulator is shortened in proportion to the over current condition.

A Negative Temperature Coefficient (NTC) resistor is mounted on the Power Output Stage heat sink. This device will shut down the Commutation and Control logic if the internal temperature exceeds approximately +83°C ±5°C). Over temperature is a latched fault condition; power must be removed in order to restart the unit. If the Over temperature condition still exists, the unit will not return to normal operation until the heat sink temperature is less than +83°C (5°C Hysteresis).

NOTE: Constant cycling of the blower, by switching the main power, may cause damage to the blower if the blower will be restarted within less than 1 minute after being stopped. If the application requires constant ON/OFF the Speed Input should be used to start and stop the blower. If the Speed Input is used to start and stop the blower unlimited cycles are possible.
We recommend to disconnect the blower from the line voltage only if the machine will be switched off in general.

Blower Operation

As mentioned, the actual performance of the blower in the User's system will depend upon the application. The ability to control motor speed provides many benefits:

1) Adjusting speed varies the blower output, allowing the User to "tune" the blower to a particular application;

2) The blower may be part of an external control loop. For example, the User may adjust motor speed to maintain constant pressure or temperature.

Note: If the blower is part of an external control loop we recommend using the blower as an open loop version. Open loop means the internal speed control loop is not used and the speed is set to any value commanded by the speed input. If the blower is operated in a closed loop version and an external control loop is wired also, this may cause blower rpm oscillation.

Inlet Filter

Inlet Filter should be used whenever the working air or cooling air is polluted with dust or other air borne particles and contaminants larger than 2 microns. The filter system should be designed for minimal pressure drop and high efficiency. Contaminated air results in reduced operating life of the blower.

Error States

Following reasons will latch off the blower:

- locked rotor
- over current
- over temperature

The main power has to be switched off to restart the blower.

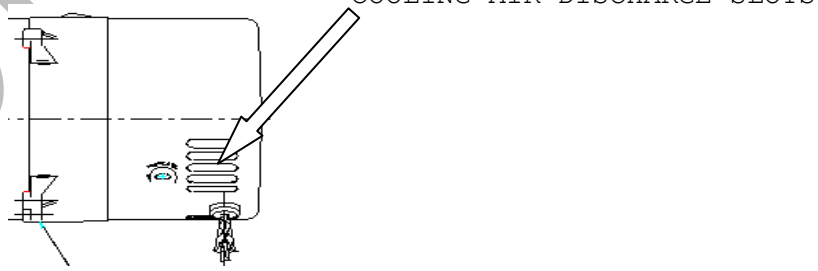
Following reasons will stop the blower:

- under voltage (for 240V it's 133**V** ; for 120V & Universal it's 83**V**)
- over voltage (for 240V & Universal it's **267V** ; (for 120V it's **150V**)

The motor will automatically restart when the voltage is again within design limits. Take precautions to insure nothing obstructs blower rotation.

Blower status and faults:

The Intelligen electronics provides external light indication of blower as long as main power is not switched off. The status LED is situated on the main control board and can be observed through the cooling air discharge slots of the blower.



Status and fault Table:

Blower status	Light status	Action	Resume operation
Powered in standby condition	OFF	N/A	N/A
Running	ON	N/A	N/A
Under voltage	1 blink slowly	Start with correct voltage	N/A
Over current	2 blinks and pause	Latched Shutdown	Power cycle
Stall motor	3 blinks and pause	Latched Shutdown	Power cycle
Over temperature	4 blinks and pause	Latched Shutdown	Power cycle
Over voltage	5 blinks and pause	Restart with correct voltage	N/A

..... Note: The latched error signal will stay until the main power is disconnected.

Option:

No input signal	7 blinks and pause	N/A	N/A

Option: The Failure/Fault output signal can be made available via a Solid State Relay contact. This feature is called Status Output.

Possible Stall Motor failure causes: Defect power stage, defective halls, defect driver circuit, improper stator phases, improper winding, locked bearing,

Possible Over Current failure causes: defect bearings, blower overload,

Possible Over Temperature failure causes: Ambient Temperature not within limits, cooling air and working air not kept separate, not enough exchange on cooling air, air contamination too high,

Hardware electronics protection features: Hardware Fuse – fast acting
(not accessible or replaceable)

Troubleshooting

1) Unit Will Not Start

a) AC Power not applied;

b) Connector wired incorrect;

c) Polarity of Speed Control Input is reversed;

e) In Digital Mode, Speed Control Input duty cycle is too low or base frequency is too low (<150 Hz);

f) Motor is stalled, blower impeller is blocked, over current condition exists;

g) Controller internal temperature still exceeds +83°C due to operating point, ambient temperature, or both.

h) Fuse has blown.

2) Unit Runs, but Will Not Reach Required Speed

a) Blower output capability is undersized for the application;

b) Line Voltage is outside normal range;

c) Internal pot is improperly adjusted;

d) Blower impeller or motor shaft is blocked;

e) Insufficient voltage at Speed Command Input.

3) Unit Starts, Runs Briefly and then Stops

Controller internal temperature still exceeds +83°C due to operating point, ambient temperature, or both.

4) Blower oscillates

a) Unstable speed input command;

b) If external control loop is used and the blower was supplied in closed loop configuration, the control loops may interfere with each other;

Maintenance & Service

Maintenance:

The blower d**oes** not require maintenance.
In the event of a fault, please do not open the blower.

Taking out of service:

The safety instructions must be read and observed prior to taking the unit out of service.

Disposal:

Take the blower out of service. Dismantle the drive ready for disposal and break it up into its individual components. Sort the individual parts according to material and forward to disposal. Adherence to the requirements of legislation governing disposal and environmental guidelines in the country of use must be ensured when disposing of electronic components.

Service & Support:

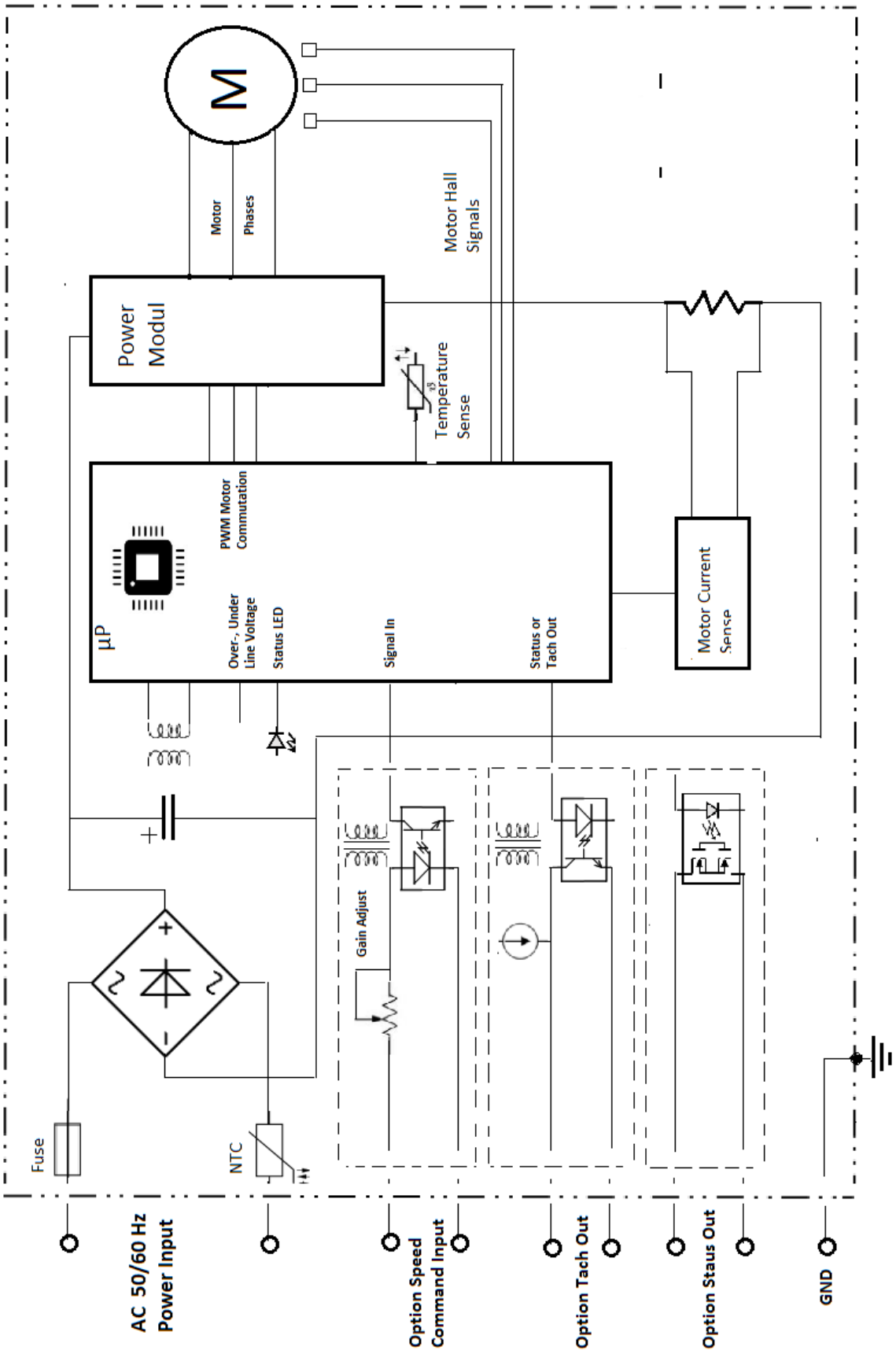
Should you have any questions or problems, please contact:

- Your local DFS sales outlet
- Your local DFS account manager
- Your local service center
- Our online YouTube channel

You can also visit our online web page for more information.

http://www.ametekpmc.com

Block Diagram



 Edition 11/2018

Electromagnetic Compatibility:

This Ametek family of blower products complies with requirements as defined by:

EN61000-4-2 (2009)
EN61000-4-3 (2006)+A1(2008)+A2(2010)
EN61000-4-4 (2004)+A1(2010)
EN61000-4-5 (2006)
EN61000-4-11 (2004)

These AMETEK products are capable of causing conducted electromagnetic interference on the power mains. In applications where this is a concern, a suitable line filter should be used in the AC mains as near as possible to the blower AC power input.

In all cases, when performing associated leakage tests, the measurement circuit must be faithfully reproduced as specified in the applicable agency document.

For compliance with **IEC61000-3-2** and **IEC61000-3-3** line perturbation and flicker requirements consult the factory for assistance. Solutions are available depending on the application.

AMETEK Products also have the following ratings:
- Pollution Degree 3
- Software Class B
- Overvoltage Category III

Regulatory Agency Certification:

TÜV Rheinland Bauart Certification, qualified per EN60950.

Underwriters Laboratories Inc., qualified per UL507 , UL1004-1 , UL1004-3 , UL1004-7 , UL2111 , UL1998 , UL60730-1

Canadian Standards Association, qualified per C22.2 #113 , C22.2 #100 , C22.2 #77

The Isolated Speed Control Input is a "Safety Extra-Low Voltage Circuit" per EN60950.

Locked Rotor test per UL507, condition 8.

REV	A	B	C				
ECN	106626	106638	106651				

ISSUED BY: Guenter Morlok
APPROVED BY: Gene Bennington MARCH 2014

DATE:_____

MONITORING FIELD SHEET
General Site Conditions

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS

429 Merrick Road
Lynbrook, New York
ACT Project No.: 7045-LBNY

GENERAL WEATHER: _____

_____

TEMPERATURE (°F): _____

RELATIVE HUMIDITY (%): _____

DEW POINT (°F): _____

BAR0METRIC PRESSURE (in. Hg): _____

ACT personel on site: _____

Air Sample Location	Wind	Wind Speed	PID Concentration (ppm)
Calibration	N/A	N/A	
Background	N/A	N/A	
Upwind			
Treatment room			
Downwind			

Notes

DATE:_____

MONITORING FIELD SHEET
General Site Conditions

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS

429 Merrick Road
Lynbrook, New York
ACT Project No.: 7045-LBNY

Sample Location	Pressure (+/-) ("H_2O)	Flow (ft^3/min)	Temp. (°F)	PID (ppm)	Sample Collected (yes/no)
VW-1			N/A		
VW-2			N/A		
VW-3			N/A		
VW-4			N/A		
VP-1		N/A	N/A		
VP-2		N/A	N/A		
VP-3 (Pizzeria)		N/A	N/A		
VP-4 (Beauty Salon)		N/A	N/A		
SVE BLOWER					
Temperature	N/A	N/A	N/A	N/A	N/A
Flow Rate	N/A		N/A	N/A	N/A
Pre-filter		N/A	N/A	N/A	N/A
Post-filter		N/A	N/A	N/A	N/A
Carbon influent		N/A	N/A		
Carbon mid		N/A	N/A		
Carbon effluent		N/A	N/A		

Notes

ADVANCED CLEANUP TECHNOLOGIES, INC.
DAILY FIELD ACTIVITY REPORT

Report Number:_____ Project Number:_____ Date:_____

Project/Address:_____

Weather: (AM)_____ Temperature: (AM)_____ Wind Direction: (AM)_____
(PM)_____ (PM)_____ (PM)_____

Site Condition:_____

Subcontractor Work: Crew:_____
Equipment:_____

_____

_____

On Site:_____ Off Site:_____

Work Accomplished:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Comments:_____

_____

_____

Site Supervisor_____ _____
Name Initial

SAMPLE INFORMATION RECORD

SITE _____ SAMPLE CREW _____

SAMPLE LOCATION/WELLNO. _____

FIELD SAMPLE I.D. NUMBER _____ DATE _____

TIME _____ WEATHER _____ TEMPERATURE _____

SAMPLE TYPE:

GROUNDWATER _____ SEDIMENT _____

SURFACE WATER _____ AIR _____

SOIL _____ OTHER (Describe, e.g., septage,leachate)

_____

WELL INFORMATION (fill out for groundwater samples):

DEPTH TO WATER _____ MEASUREMENT METHOD _____

DEPTH OF WELL _____ MEASUREMENT METHOD _____

VOLUME REMOVED _____ REMOVAL METHOD _____

FIELD TEST RESULTS:

COLOR _____ pH _____ ODOR _____

TEMPERATURE (°F) _____ SPECIFIC CONDUCTANCE (umhos/cm) _____

TURBIDITY _____

PID/FID READING _____ VISUAL DESCRIPTION _____

_____

CONSTITUENTS TO BE ANALYZED:

_____ _____ _____ _____

_____ _____ _____ _____

REMARKS: _____

_____

_____

_____

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.10	2-1/2" = 0.24	3-1/2" = 0.50	6" = 1.46

IIR-0794.PM4

Receipt for Samples

Project Name: _____ Field Log Book Reference Number: _____

Project Address: _____ Sampled By: _____

Project Number: _____ Split With: _____

SAMPLE NUMBERS	DATE	TIME	C O M P	G R A B	SPLIT SAMPLES	LOG BOOK PAGE NO.	TAG NUMBERS	SAMPLE LOCATION	NO. OF CONTAINERS	REMARKS

Transferred by (Signature)		Received by (Signature)		Telephone
Date	Time	Title	Date	Time

RFS

DAILY EQUIPMENT CALIBRATION LOG

Project Name: ______________________________

Project Number: ______________ Calibrated By: ______________

Date	Instrument Name and Model Number	Calibration Method	Time	Readings and Observations

APPENDIX I

WIRELESS TELEMETRY SPECIFICATIONS

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Electron datasheet	datasheet.hbs	two	4

Electron Datasheet (v002)

Functional description

Overview

The Electron is a tiny development kit for creating cellular-connected electronics projects and products. It comes with a SIM card (Nano 4FF) and an affordable data plan for low-bandwidth things. Plus it's available for more than 100 countries worldwide!

It also comes with Particle's development tools and cloud platform for managing and interacting with your new connected hardware.

Features

- U-blox SARA-U260/U270 (3G) and G350 (2G) cellular module
- STM32F205 120MHz ARM Cortex M3 microcontroller
- 1MB flash, 128KB RAM
- BQ24195 power management unit and battery charger
- MAX17043 fuel gauge
- RGB status LED
- 30 mixed-signal GPIO and advanced peripherals
- Open source design
- Real-time operation system (RTOS)
- FCC, CE and IC certified

Interfaces

Block diagram

Power

The Electron can be powered via the VIN (3.9V-12VDC) pin, the USB Micro B connector or a LiPo battery.

USB

Most USB ports can supply only a maximum of 500mA, but the u-Blox GSM module on the Electron alone can consume a peak of 800mA to 1800mA of current during transmission. In order to compensate of this deficit, one must connect the LiPo battery at all times when powering from a traditional USB port. The Electron will intelligently source power from the USB most of the time and keep the battery charged. During peak current requirements, the additional power will be sourced from the battery. This reduces the charge-discharge cycle load on the battery, thus improving its longevity.

VIN

The input voltage range on VIN pin is 3.9VDC to 12VDC. When powering from the VIN pin alone, make sure that the power supply is rated at 10W (for example 5VDC at 2Amp). If the power source is unable to meet this requirement, you'll need connect the LiPo battery as well.

LiPo Battery

When powered from a LiPo battery alone, the power management IC switches off the internal regulator and supplies power to the system directly from the battery. This reduces the conduction losses and maximizes battery run time. The battery provided with the Electron is a Lithium-Ion Polymer battery rated at 3.7VDC 2000mAh. You can substitute this battery with another 3.7V LiPo with higher current rating. Remember to never exceed this voltage rating and alway pay attention to the polarity of the connector.

Typical current consumption is around 180mA and upto 1.8A transients at 5VDC. In deep sleep mode, the quiescent current is 130uA (powered from the battery alone).

Li+

This pin is internally tied to the positive terminal of the LiPo battery connector. It is intentionally left unpopulated. Please note that an incorrect usage of this pin can render the Electron unusable.

Li+ pin serves two purposes. You can use this pin to connect a LiPo battery directly without having to use a JST connector or it can be used to connect an external DC power source (and this is where one needs to take extra precautions). When powering it from an external regulated DC source, the recommended input voltage range on this pin is between 3.6V to 4.4VDC. Make sure that the supply can handle currents of at least 3Amp.

This is the most efficient way of powering the Electron since the PMIC by-passes the regulator and supplies power to the Electron via an internal FET leading to lower quiescent current.

VUSB

This pin is internally connected to USB supply rail and will output 5V when the Electron is plugged into an USB port. It is intentionally left unpopulated. This pin will *NOT* output any voltage when the Electron is powered via VIN and/or the LiPo battery.

3V3 Pin

This pin is the output of the on-board 3.3V switching regulator that powers the microcontroller and the peripherals. This pin can be used as a 3.3V power source with a max load of 800mA. Unlike the Photon or the Core, this pin *CANNOT* be used as an input to power the Electron.

FCC approved antennas

Antenna Type	Manufacturer	MFG. Part #	Gain
PCB antenna	Taoglas	PC104.07.0165C	1dBi ~ 2.39dBi

Peripherals and GPIO

Peripheral Type	Qty	Input(I) / Output(O)	FT[1] / 3V3[2]
Digital	30	I/O	FT/3V3
Analog (ADC)	12	I	3V3
Analog (DAC)	2	O	3V3
UART	3	I/O	3V3
SPI	2	I/O	3V3
I2S	1	I/O	3V3
I2C	1	I/O	FT
CAN	2	I/O	FT
USB	1	I/O	3V3
PWM	13[3]	O	3V3

Notes: [1] FT = 5.0V tolerant pins. All pins except A3 and DAC are 5V tolerant (when not in analog mode). If used as a 5V input the pull-up/pull-down resistor must be disabled.

[2] 3V3 = 3.3V max pins.

[3] PWM is available on D0, D1, D2, D3, B0, B1, B2, B3, A4, A5, WKP, RX, TX with a caveat: PWM timer peripheral is duplicated on two pins (A5/D2) and (A4/D3) for 11 total independent PWM outputs. For example: PWM may be used on A5 while D2 is used as a GPIO, or D2 as a PWM while A5 is used as an analog input. However A5 and D2 cannot be used as independently controlled PWM outputs at the same time.

JTAG AND SWD

Pin D3 through D7 are JTAG interface pins. These can be used to reprogram your Electron bootloader or user firmware image with standard JTAG tools such as the ST-Link v2, J-Link, R-Link, OLIMEX ARM-USB-TINI-H, and also the FTDI-based Particle JTAG Programmer. If you are short on available pins, you may also use SWD mode which requires less connections.

| Electron Pin | JTAG | SWD | STM32 Pin | Default Internal[1] | | :-:|:-:|:-:|:-:|:-:| | D7 | JTAG_TMS | SWD/SWDIO| PA13 | ~40k pull-up | | D6 | JTAG_TCK | CLK/SWCLK| PA14 | ~40k pull-down | | D5 | JTAG_TDI | |PA15 | ~40k pull-up | | D4 | JTAG_TDO | |PB3 | Floating | | D3 | JTAG_TRST | |PB4 | ~40k pull-up | | 3V3 | Power | || | | GND | Ground| || | | RST | Reset | || ||

Notes: [1] Default state after reset for a short period of time before these pins are restored to GPIO (if JTAG debugging is not required, i.e. `USE_SWD_JTAG=y` is not specified on the command line.)

Memory Map

STM32F205RGY6 Flash Layout Overview

- Bootloader (16 KB)
- DCD1 (16 KB), stores keys, mfg info, system flags, etc..
- DCD2 (16 KB), swap area for DCD1
- EEPROM emulation bank 1 (16 KB)
- EEPROM emulation bank 2 (64 KB) [only 16k used]
- System firmware (512 KB) [256 KB comms + 256 KB hal/platform/services]
- Factory backup, OTA backup and user application (384 KB) [3 x 128 KB]

DCD Layout

The DCD area of flash memory has been mapped to a separate DFU media device so that we can incrementally update the application data. This allows one item (say, server public key) to be updated without erasing the other items.

DCD layout as of v0.4.9 found here in firmware

Region	Offset	Size
system flags	0	32
version	32	2
device private key	34	1216
device public key	1250	384
ip config	1634	128
claim code	1762	63
claimed	1825	1
device id	1852	6
version string	1858	32
dns resolve	1890	128
reserved1	2018	64
server public key	2082	768
padding	2850	2
flash modules	2852	100
product store	2952	24
cloud transport	2977	1
alt device public key	2978	128
alt device private key	3106	192
alt server public key	3298	192
alt server address	3490	128
reserved2	3618	1280

Note: Writing 0xFF to offset 3106 (DEFAULT key used on Electron) will cause the device to re-generate a new private UDP/ECC key on the next boot. TCP keys are currently unsupported on the Electron but would be located at offset 34. You should not need to use this feature unless your keys are corrupted.

```
// Regenerate Alternate Keys (Default)
echo -e "\xFF" > fillbyte && dfu-util -d 2b04:d00a -a 1 -s 3106 -D fillbyte
// Regenerate TCP Keys (Unsupported)
echo -e "\xFF" > fillbyte && dfu-util -d 2b04:d00a -a 1 -s 34 -D fillbyte
```

Memory Map (Common)

Region	Start Address	End Address	Size
Bootloader	0x8000000	0x8004000	16 KB

DCD1	0x8004000	0x8008000	16 KB
DCD2	0x8008000	0x800C000	16 KB
EEPROM1	0x800C000	0x8010000	16 KB
EEPROM2	0x8010000	0x8020000	64 KB

Memory Map (Modular Firmware - default)

Region	Start Address	End Address	Size
System Part 1	0x8020000	0x8040000	128 KB
System Part 2	0x8040000	0x8060000	128 KB
Application	0x8080000	0x80A0000	128 KB
Factory Reset/Extended Application	0x80A0000	0x80C0000	128 KB
OTA Backup	0x80C0000	0x80E0000	128 KB
Decompress region	0x80E0000	0x8100000	128 KB

Memory Map (Monolithic Firmware - optional)

Region	Start Address	End Address	Size
Firmware	0x8020000	0x8080000	384 KB
Factory Reset	0x8080000	0x80E0000	384 KB
Unused (factory reset modular)	0x80E0000	0x8100000	128 KB

Pin and button definition

Pin markings:

Pin description

Pin	Description
VIN	This pin can be used as an input or output. As an input, supply 5VDC to 12VDC to power the Electron. When the Electron is powered via the USB port, this pin will output a voltage of approximately 4.8VDC due to a reverse polarity protection series schottky diode between VUSB and VIN. When used as an output, the max load on VIN is 1Amp.
RST	Active-low reset input. On-board circuitry contains a 10k ohm pull-up resistor between RST and 3V3, and 0.1uF capacitor between RST and GND.
VBAT	Supply to the internal RTC, backup registers and SRAM when 3V3 is not present (1.65 to 3.6VDC). The Pin is internally connected to 3V3 supply via a 0 ohm resistor. If you wish to power is via an external supply, you'll need to remove this resistor. Instructions to remove this resistor can be found here
3V3	This pin is the output of the on-board regulator. When powering the Electron via VIN or the USB port, this pin will output a voltage of 3.3VDC. The max load on 3V3 is 800mA. It should not be used as an input to power the Electron.

WKP	Active-high wakeup pin, wakes the module from sleep/standby modes. When not used as a WAKEUP, this pin can also be used as a digital GPIO, ADC input or PWM.
DAC	12-bit Digital-to-Analog (D/A) output (0-4095), and also a digital GPIO. DAC is used as DAC or DAC1 in software, and A3 is a second DAC output used as DAC2 in software.
RX	Primarily used as UART RX, but can also be used as a digital GPIO or PWM.
TX	Primarily used as UART TX, but can also be used as a digital GPIO or PWM.
D0-D1	Digital only GPIO
A0-A1	12-bit Analog-to-Digital (A/D) inputs (0-4095), and also digital GPIOs. A6 and A7 are code convenience mappings, which means pins are not actually labeled as such but you may use code like `analogRead(A7)`. A6 maps to the DAC pin and A7 maps to the WKP pin.
B0-B5	B0 and B1 are digital only while B2, B3, B4, B5 are 12-bit A/D inputs as well as digital GPIOs
C0-C5	Digital only GPIO
VUSB	This pin is internally connected to USB supply and will output 5V when the Electron is plugged into an USB port. It is intentionally left unpopulated.
Li+	This pin is internally connected to the positive terminal of the LiPo battery. It is intentionally left unpopulated.

LED Status

Charge status LED

State	Description
ON	Charging in progress
OFF	Charging complete
Blink at 1Hz	Fault condition[1]
Rapid blinking	Battery disconnected[2]

Notes:

[1] A fault condition can occur due to several reasons, for example, battery over/under voltage, temperature fault or safety timer fault. You can find the root cause by reading the fault register of the power management IC in firmware.

[2] You can stop this behavior by either plugging in the LiPo battery or by disabling the charging using the appropriate firmware command.

System RGB LED

For a detailed explanation of different color codes of the RGB system LED, please take a look here.

Pinout diagram

You can download a high resolution pinout diagram in a PDF version here.

Technical Specifications

Absolute maximum ratings [1]

Parameter	Symbol	Min	Typ	Max	Unit
Supply Input Voltage	V_{IN-MAX}			+17	V
Supply Output Current	$I_{IN-MAX-L}$			1	A
Battery Input Voltage	V_{LiPO}			+6	V
Supply Output Current	$I_{3V3-MAX-L}$			800	mA
Storage Temperature	T_{stg}	-30		+75	°C
ESD Susceptibility HBM (Human Body Mode)	V_{ESD}			2	kV

[1] Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Recommended operating conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply Input Voltage	V_{IN}	+3.88[1]		+12	V
Supply Output Voltage	V_{IN}		+4.8		V
Supply Output Voltage	V_{3V3}		+3.3		V
LiPo Battery Voltage	V_{LiPo}	+3.6		+4.4	V
Supply Input Voltage	V_{VBAT}	+1.65		+3.6	V
Supply Input Current (VBAT)	I_{VBAT}			19	uA
Operating Current (Cellular ON)	$I_{IN\ avg}$		180	250	mA
Peak Current (Cellular ON)	$I_{IN\ pk}$	800[2]		1800[3]	mA
Operating Current (Cellular OFF)	$I_{IN\ avg}$		2	15	mA
Sleep Current (4.2V LiPo)	I_{Qs}		0.8	2	mA
Deep Sleep Current (4.2V LiPo)	I_{Qds}		110	130	uA
Operating Temperature	T_{op}	-20		+60	°C
Humidity Range Non condensing, relative humidity				95	%

Notes:

[1] The minimum input voltage is software defined with a user selectable range of 3.88V to 5.08V in 80mV increments. Out of the box, the minimum input voltage is set to 4.36V in order for the LiPo battery to be able to properly charge.

[2] 3G operation

[3] 2G operation

Radio specifications

The Electron is available in three different versions: A 2G version based on u-blox G350 cellular module, and two 3G versions based on U260 and U270 modules. The difference between the 3G versions is their operating frequency band which differs based on the country. All of these cellular modules are GSM only and do not support CDMA networks.

title	template	columns	order
P1 datasheet	datasheet.hbs	two	5

P1 Datasheet (v006)

```
void setup() {
    Particle.publish("my-event","The internet just got smarter!");
}
```

Functional description

Overview

The P1 is Particle's tiny Wi-Fi module that contains both the Broadcom Wi-Fi chip and a reprogrammable STM32F205RGY6 32-bit ARM Cortex-M3 microcontroller. The P1 comes preloaded with Particle firmware libraries, just like our dev kits, and it's designed to simplify your transition from prototype to production. The P1 is the PØ's big brother; it's a bit bigger and a tad more expensive, but it includes some extra flash and an antenna and u.FL connector on board. Every P1 includes free cloud service.

Features

- Particle P1 Wi-Fi module
  - Broadcom BCM43362 Wi-Fi chip
  - 802.11b/g/n Wi-Fi
  - STM32F205RGY6 120Mhz ARM Cortex M3
  - 1MB flash, 128KB RAM
  - 1MB external SPI flash
  - Integrated PCB antenna
  - Integrated u.FL connector for external antenna
  - Integrated RF switch
- 25 Mixed-signal GPIO and advanced peripherals
- Open source design
- Real-time operating system (FreeRTOS)
- Soft AP setup

- FCC, CE and IC certified

Interfaces

Block Diagram

Power

Power to the P1 is supplied via 3 different inputs: VBAT_WL (pin 2 & 3), VDDIO_3V3_WL (pin 5), VDD_3V3 (pin 26 & 27). Optionally +3.3V may be supplied to VBAT_MICRO (pin 38) for data retention in low power sleep modes. Each of these inputs also requires a 0.1uF and 10uF ceramic decoupling capacitor, located as close as possible to the pin (see Fig 1). The voltage should be regulated between 3.0VDC and 3.6VDC.

Typical average current consumption is 80mA with 5V @ input of the recommended SMPS power supply with Wi-Fi on. Deep sleep quiescent current is typically 80uA (Please refer to Recommended Operating Conditions for more info). When powering the P1 make sure the power supply can handle 600mA continuous. If a lesser power supply is provided, peak currents drawn from the P1 when transmitting and receiving will result in voltage sag at the input which may cause a system brown out or intermittent operation. Likewise, the power source should be sufficient enough to source 1A of current to be on the safe side.

Fig. 1 Recommended power connections with decoupling capacitors.

RF The RF section of the P1 includes an on-board PCB trace antenna and a u.FL connector which allows the user to connect an external antenna. These two antenna outputs are selectable via a user API, made possible by an integrated RF switch. The default selected antenna will be the PCB antenna. The area surrounding the PCB antenna on the carrier PCB should be free of ground planes and signal traces for maximum Wi-Fi performance. --- ### FCC Approved Antennas | Antenna Type | Manufacturer | MFG. Part # | Gain | |-|-|-|-| | Dipole antenna | LumenRadio | 104-1001 | 2.15dBi | | PCB Antenna | Included | - | - | --- ### Peripherals and GPIO The P1 module has ton of capability in a super small footprint, with analog, digital and communication interfaces. **Note:** P1 pin names will be preserved as they are named in the USI datasheet, however for the scope of this datasheet we will also refer to them as their Photon and code equivalents, i.e. D7 instead of MICRO_JTAG_TMS and A2 instead of MICRO_GPIO_13. This will help to simplify descriptions, while providing a quick reference for code that can be written for the P1 such as `int value = analogRead(A2);` | Peripheral Type | Qty | Input(I) / Output(O) | FT[1] / 3V3[2] | | :-:|:-:|:-:|:-: | | Digital | 24 | I/O | FT/3V3 | | Analog (ADC) | 13 | I | 3V3 | | Analog (DAC) | 2 | O | 3V3 | | SPI | 2 | I/O | 3V3 | | I2S | 1 | I/O | 3V3 | | I2C | 1 | I/O | FT | | CAN | 1 | I/O | FT | | USB | 1 | I/O | 3V3 | | PWM | 11[3] | O | 3V3 | **Notes:** [1] FT = 5.0V tolerant pins. All pins except A3 and DAC are 5V tolerant (when not in analog mode). If used as a 5V input the pull-up/pull-down resistor must be disabled. [2] 3V3 = 3.3V max pins. [3] PWM is available on D0, D1, D2, D3, A4, A5, WKP, RX, TX, P1S0, P1S1 with a caveat: PWM timer peripheral is duplicated on two pins (A5/D2) and (A4/D3) for 7 total independent PWM outputs. For example: PWM may be used on A5 while D2 is used as a GPIO, or D2 as a PWM while A5 is used as an analog input. However A5 and D2 cannot be used as independently controlled PWM outputs at the same time. ### RGB LED, SETUP and RESET button When using the P1 module, it is very important to remember that your device must have an RGB LED to show the user the connectivity status. Also required is a SETUP and RESET button to enter various [Device Modes](/guide/getting-started/modes). By default the RGB LED outputs are configured for a Common Anode type of LED. These components should be wired according to the [P1 Reference Design - User I/O](#schematic-user-i-o). RGB pins may be accessed in code as: RGBR, RGBG and RGBB. ### JTAG and SWD Pin D3 through D7 are JTAG interface pins. These can be used to reprogram your P1 bootloader or user firmware image with standard JTAG tools such as the ST-Link v2, J-Link, R-Link, OLIMEX ARM-USB-TINI-H, and also the FTDI-based Particle JTAG Programmer. If you are short on available pins, you may also use SWD mode which requires less connections. | Photon Pin | JTAG | SWD | STM32F205RGY6 Pin | P1 Pin # | P1 Pin Name | Default Internal[1] | | :-:|:-:|:-:|:-:|:-:|:-:|:-:|:-:|:- | | D7 | JTAG_TMS | SWD/SWDIO | PA13 | 54 | MICRO_JTAG_TMS | ~40k pull-up | | D6 | JTAG_TCK | CLK/SWCLK | PA14 | 55 | MICRO_JTAG_TCK | ~40k pull-down | | D5 | JTAG_TDI | | PA15 | 53 | MICRO_JTAG_TDI | ~40k pull-up | | D4 | JTAG_TDO | | PB3 | 54 | MICRO_JTAG_TDO | Floating | | D3 | JTAG_TRST | | PB4 | 51 | MICRO_JTAG_TRSTN | ~40k pull-up | | 3V3 | Power | Power | | | | | GND | Ground | Ground | | | | | RST | Reset |

title	template	columns	order
Particle shields and kits	datasheet.hbs	two	2

Shields and accessories

Shield Shield

Sometimes life can be a little difficult in the land of electronics when two systems talk a different voltage language. How do you make them talk to each other without making one of them *burn out*? The Shield Shield is the answer. This shield performs all the necessary voltage translation and provides an Arduino-compatible footprint to make it easier for you to plug in your existing Arduino shields or talk to other 5V hardware.

Shield Shield - Operation

We use Texas Instruments TXB0108PWR to do the voltage translation in between the Particle's device's 3.3V to a 5V logic. Unlike other IO pins, the analog pins are rated at only a max of 3.3V and **NOT** 5.0V. Please remember NOT to exceed this voltage at anytime. The shield has an on-board voltage regulator and can be powered from 7V to 15V DC source. You could also power it via the USB plug on the Particle device alone but the current would be limited to 500mA.

Shield Shield Schematic - TXB0108PWR

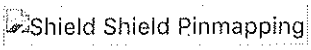
The new version of the Shield Shield (v3.x.x) uses dedicated mosfet based voltage translation on the I2C lines. We also decided to add a prototyping area in empty space in the middle of the shield.

Shield Shield Schematic - MOSFET I2C

Note: One drawback of using the TXB0108PWR as a voltage translator is that it is only capable of driving loads at short distances. Long length wires will introduce excessive capacitive loading and cause the auto direction detection

to fail. To overcome this drawback, the shield shield also has an optional on-board 74ABT125 buffer that is capable of driving heavier loads in *one* direction. A user can jumper wire to whichever IO pin they would like to be translated to 5V.

Shield Shield - Pin Mapping



Shield	Photon	Peripherals
0	RX	Serial1 RX,PWM
1	TX	Serial1 TX,PWM
2	A2	SPI1_SS
3	WKP	PWM,ADC
4	D6	
5	D0	SDA,PWM
6	D1	SCL,PWM,CAN_TX
7	D7	
8	A5	SPI1_MOSI,PWM
9	A4	SPI1_MISO,PWM
10	D5	SPI3_SS
11	D2	SPI3_MOSI,PWM,CAN_RX
12	D3	SPI3_MISO,PWM
13	D4	SPI3_SCK
A0	A0	ADC**
A1	A1	ADC**
A2	DAC1	DAC,ADC**
A3	DAC2	SPI1_SCL,DAC,ADC**
A4	D0	SDA,PWM*
A5	D1	SCL,PWM*,CAN_TX

* Note: These pins can also function as 3.3V PWM outputs or 3.3V Servo outputs.
** Note: ADC inputs are 3.3V max.

IMPORTANT: The Shield Shield does not map the Particle device's pins to like-numbered pins on the Arduino. In other words, D0 on the Particle device is not the same as D0 on the Arduino. Please review the pin mapping table to the right and plan accordingly.

Shield Shield - Specifications (v3.x.x)

- Operating voltage: 7 to 15V DC
- Current consumption: standalone 7mA at 9V DC
- Voltage translator with auto direction detect: TXB0108PWR
- Dedicated MOSFET based voltage translator on I2C lines
- Separate unidirectional quad buffer for driving heavy loads: 74ACT125
- Diode protection on ADC pins

- Dimensions: 3.4" x 2.1"
- Weight: 28 gms

Drill Template >

Relay Shield

The Relay Shield allows you to take over the world, one electric appliance at a time. Want to control a lamp, fan, coffee machine, aquarium pumps or garden sprinklers? Then this is a solution for you!

The shield comes with four relays that are rated at a max of 220V @10Amp allowing you to control any electric appliance rated at under 2000 Watts. You are not just limited to an appliance though; any gadget that requires high voltage and/or a lot of current can be controlled with this shield.

We have even provided a small prototyping area around the shield for you to add more components or connectors. A temperature sensor to go along with your brewer, maybe?

IMPORTANT: This shield provides regulated power (5V) to the seated Particle device and relays. However, it does not support power to the devices controlled by the relays.

Relay Shield - Library

If you're already logged into Build.particle.io then you can jump directly to the library to get going quickly and easily with the RelayShield library, which wraps all the features in easy-to-use functions.

Examples include: 1. **Blink a Relay** - How to turn a relay on and off 2. **Blink all the Relays** - An extension on the simplest case 3. **Internet Relays** - Creating Particle.function()s so that you can turn relays on and off over the Internet

Relay Shield - Operation

The schematic for the relay shield is simple and self explanatory. The shield has four relays that are controlled by pins D3, D4, D5 and D6 on the Particle device. Each relay is triggered via a NPN transistor that takes a control signal from the Particle device and switches the relay coil ON and OFF, which in turn makes or breaks the electrical contact on the output. There is also a fly-back diode connected across the coil to help protect the transistor from high voltage transients caused during switching.

NOTE: On the under side of the relay shield (top center), you will see 4 solder pads that are by default bridged via traces. You can scratch off the trace to disconnect the control pin from the preassigned ones (D3 to D6) and wire up based on your project requirement.

Relay Shield Schematic - Control

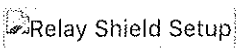
The relays are SPDT (Single Pole Double Throw) type, which means they have three terminals at the output: COMMON (COMM), Normally Open (NO) and Normally Closed (NC). We can either connect the load in between the COMM and NO or COMM and NC terminals. When connected in between COMM and NO, the output remains open/disconnected when the relay is turned OFF and closes/connects when the relay is turned ON. In the later case, the output remains closed/connected when the relay is OFF and opens/disconnects when the relay is ON.

Relay Shield Schematic - Power Supply

The Relay Shield uses a high efficiency RT8259 switch mode voltage regulator that provides a constant 5V to the Particle device and the relays. The regulator is rated at 1.2A max output current which is ample enough to power the Particle device, the four relays and still have left over for other things you may decided to connect later. You can power the shield via the 5.5mm barrel jack or through the screw terminal. There is a reverse polarity protection diode in place so that you don't fry the electronics by plugging in the wires in reverse!

Here is an example setup to control a light bulb. The relay acts like a switch which is normally open and when pin D3 on the Particle device is turned HIGH, it activates Relay 1 thereby closing the circuit on the light bulb and turning it ON. Ta dah!

Relay Shield - Sample Setup



Relay Shield - Sample Code

```
int RELAY1 = D3;
int RELAY2 = D4;
int RELAY3 = D5;
int RELAY4 = D6;

void setup()
{
   //Initilize the relay control pins as output
   pinMode(RELAY1, OUTPUT);
   pinMode(RELAY2, OUTPUT);
   pinMode(RELAY3, OUTPUT);
   pinMode(RELAY4, OUTPUT);
   // Initialize all relays to an OFF state
   digitalWrite(RELAY1, LOW);
   digitalWrite(RELAY2, LOW);
   digitalWrite(RELAY3, LOW);
   digitalWrite(RELAY4, LOW);

   //register the Particle function
   Particle.function("relay", relayControl);
}

void loop()
{
   // This loops for ever
}

// command format r1,HIGH
int relayControl(String command)
{
  int relayState = 0;
  // parse the relay number
  int relayNumber = command.charAt(1) - '0';
  // do a sanity check
  if (relayNumber < 1 || relayNumber > 4) return -1;

  // find out the state of the relay
  if (command.substring(3,7) == "HIGH") relayState = 1;
  else if (command.substring(3,6) == "LOW") relayState = 0;
  else return -1;

  // write to the appropriate relay
  digitalWrite(relayNumber+2, relayState);
  return 1;
}
```

An example API request to this function would look something like this:

```
POST /v1/devices/{DEVICE_ID}/relay

# EXAMPLE REQUEST
curl https://api.particle.io/v1/devices/0123456789abcdef/relay \
  -d access_token=123412341234 -d params=r1,HIGH
```

Relay Shield - Specifications (v3.x.x)

- Operating voltage: 7 to 20V DC
- Current consumption: 150mA min to 290mA max (at 9V DC)
- Relay Max Voltage: 220V AC
- Relay Max Current: 10Amp at 125V AC
- Relay Part Number: JS1-5V-F Data Sheet
- Dimensions: 6.0" x 1.7"
- Weight: 80 gms

Drill Template >

Programmer Shield

Do you want to gain complete control over your Particle device right down to its every bit of memory space? or watch as your code gets executed and debug it? Then this shield should be able to pacify that control freak inside of you.

This is a FT2232H based JTAG programmer shield that is compatible with OpenOCD and Broadcom's WICED IDE. The FT2232 chip is setup to provide an USB-JTAG and USB-UART interface simultaneously. The FT2232 can be also reconfigured by the user by reprogramming the on-board config EEPROM. The unused pins are clearly marked and broken out into easy to access header holes.

The USB-UART interface is connected to the TX and RX of a Particle device and communicates via Serial1

For more instructions on setting up OpenOCD and using the Programmer Shield, please read through the README at the landing page of the Programmer Shield repository on GitHub, linked below:

https://github.com/spark/shields/tree/master/photon-shields/programmer-shield

Programmer Shield - Specifications

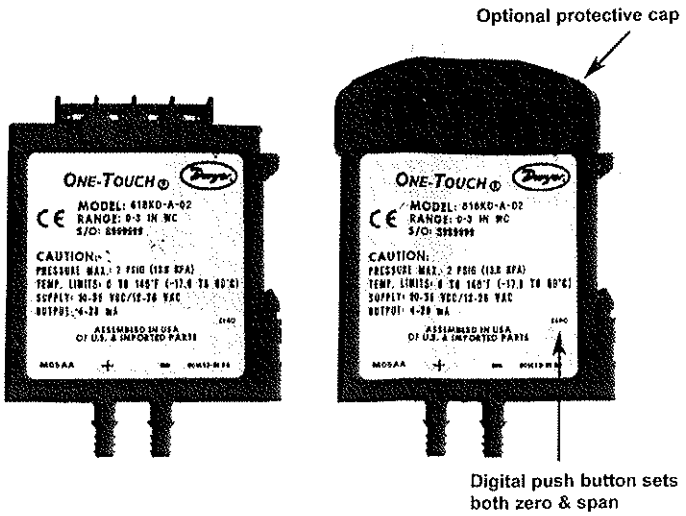
- Operating supply: USB
- Current consumption:
- Dimensions: 1.55" x 3.3"
- Weight: 18 gms
- Compatibility: OpenOCD and WICED IDE

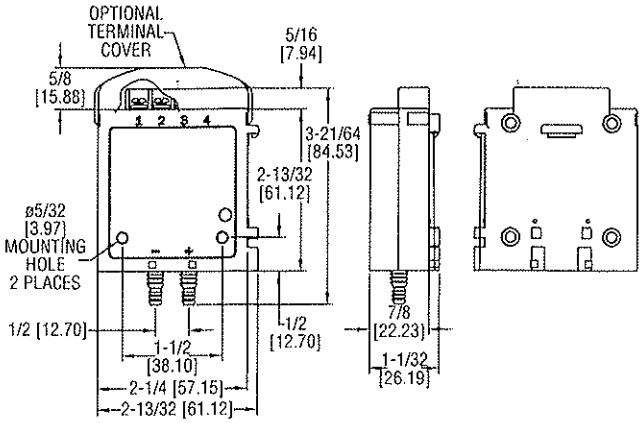
Drill Template >

Power Shield

Series 616KD One-Touch® Differential Pressure Transmitter

Specifications – Installation and Operating Instructions





The Series 616KD One-Touch® Differential Pressure Transmitter senses the pressure of air and compatible gases and sends a standard 4 to 20 mA or optional voltage output signal. A wide range of models are available factory calibrated to specific ranges. A single push button properly adjusts both zero and span. New enclosure enables the 616KD-A/B to be mounted on a 35 mm DIN rail either via its side or back DIN rail clips.

INSTALLATION

1. Location
Select a clean, dry mounting location free from excess vibration where the temperature will remain between 20 and 122°F (-6.7 and 50°C). The tubing supplying pressure to the instrument can be practically any length required, but long lengths will increase response time slightly.

2. Position
A vertical position, with pressure connections pointing down, is recommended. That is the position in which all standard models are calibrated at the factory. Consult factory for other position orientations.

3. Pressure Connections
Two integral barbed tubing connections are provided. They are dual-sized to fit both 1/8 and 3/16" (3.12 and 4.76 mm) I.D. tubing. Be sure the pressure rating of the tubing exceeds that of the operating ranges.

4. Electrical Connections:

⚠ CAUTION Do not exceed specified supply voltage ratings. Permanent damage not covered by warranty will result. This unit is not designed for 120 or 240 volts AC line operation.

Electrical connections are made to the terminal block located on the top of the transmitter. Terminals are marked 1, 2, 3 and 4 as shown below. Determine which of the following circuit drawings applies to your application and wire accordingly. Shielded cable is recommended. Ground the shield at the power supply end only.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases.
Wetted Materials: Consult factory.
Accuracy: 616KD-A: ±0.25% FS; 616KD-B: ±1% FS; 616KD-C: ±2% FS.
Stability: ±1% FS/year.
Temperature Limits: 0 to 140°F (-17.8 to 60°C).
Compensated Temperature Range: 20 to 122°F (-6.67 to 50°C).
Pressure Limits: 2 psig (ranges 5 in w.c. or lower); 5 psig (ranges 10 to 40 in w.c.).
Thermal Effect: 616KD-A: ±0.02% FS/°F; 616KD-B: ±0.04% FS/°F; 616KD-C: ±0.06 FS/°F, includes zero and span.
Power Requirements: 4 to 20 mA output: 10 to 35 VDC (2 wire) or 12 to 26 VAC (4 wire); 5V output: 10 to 35 VDC (3 wire) or 12 to 26 VAC (4 wire); 10V output: 13 to 35 VDC (3 wire) or 12 to 26 VAC (4 wire).
Output Signal: 4 to 20 mA or option with field selectable 0 to 10, 0 to 5, 2 to 10, 1 to 5 volts.
Zero and Span Adjustments: Push button.
Loop Resistance: 4 to 20 mA output (DC): 0 to 1250 Ω max. Rmax = 50(VpsDC - 10) Ω; 4 to 20 mA output (AC): 0 to 1200 Ω max. Rmax = 50(1.4 VpsAC -12) Ω; Voltage output: 5K Ω minimum.
Current Consumption: 24 mA max.
Warm Up Time: 20 minutes.
Electrical Connections: Screw-type terminal block.
Process Connections: Barbed, dual size to fit 1/8" & 3/16" (3 mm & 5 mm) ID rubber or vinyl tubing.
Enclosure Rating: NEMA1 (IP20).
Mounting Orientation: Vertical with pressure connections pointing down.
Weight: 1.8 oz (51 g).
Agency Approvals: CE.

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4.1: 4 to 20 mA OUTPUT CONNECTIONS

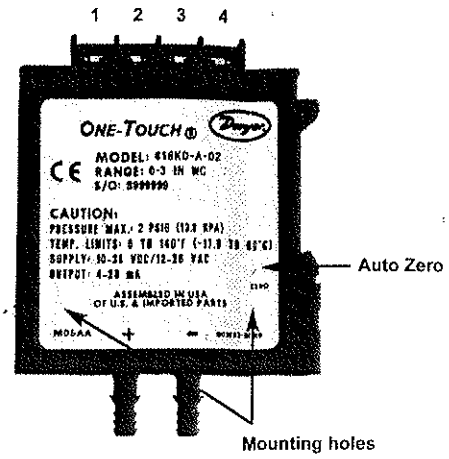


Figure 1

4.2: VOLTAGE OUTPUT CONNECTIONS

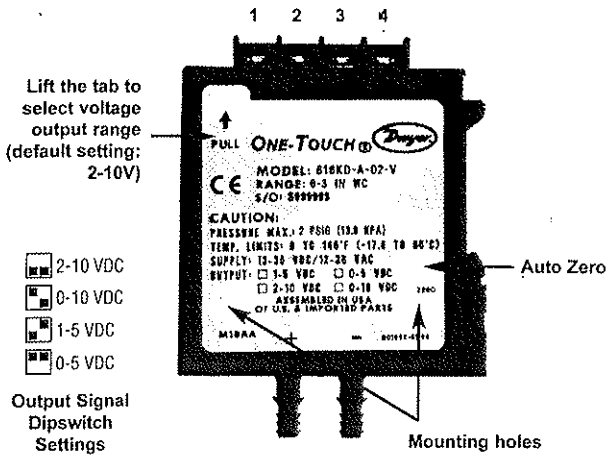
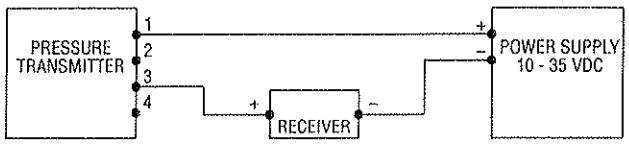
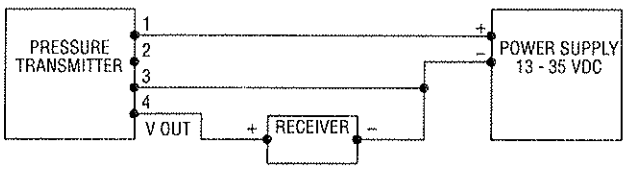


Figure 3

2-WIRE CONNECTIONS (4 to 20 mA)



3-WIRE CONNECTIONS (VOLTAGE OUTPUT)



4-WIRE CONNECTIONS (4 to 20 mA)

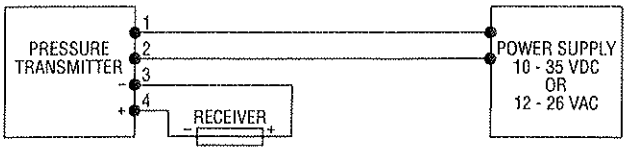


Figure 2

4-WIRE CONNECTIONS (VOLTAGE OUTPUT)

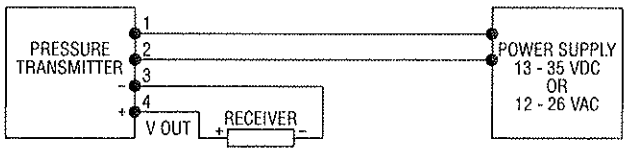


Figure 4

ZERO ADJUSTMENT
A single push button is provided to zero the transmitter. Allow transmitter to warm up for 20 minutes. The zero calibration can be set by applying zero pressure to both the pressure ports and pressing the zero button for 2 seconds. Span is factory calibrated to the range specified on the label. There is no user span adjustment necessary.

CHANGING OUTPUT SIGNAL
To change output signal see dipswitch settings in Figure 3 -- OUTPUT SIGNAL DIPSWITCH SETTINGS.

MAINTENANCE/REPAIR
Upon final installation of the Series 616KD no routine maintenance is required. The Series 616KD is not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN
Refer to "Terms and Conditions of Sales" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

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APPENDIX J

FIELD ACTIVITIES FORM

FIELD AUDIT FORM

Site: _____ Date: _____

Persons On-site: _____ QA/QC Officer Conducting Audit: _____

_____ Project: _____

_____

1. Is safety equipment in use (hardhats, respirators, gloves etc.): YES NO

2. Is a decontamination station, equipment and supplies on site and in working order:

Methanol	YES	NO
Alconox	YES	NO
D.I. Water	YES	NO
Scrub Brushes	YES	NO
Steam Cleaner	YES	NO

Comments: _____

_____

_____

3. Is the decontamination pad set up so water is contained: YES NO

Comments: _____

_____

_____

4. Is the site/investigation areas secured (fence, markers, etc.) or otherwise in accordance with project requirements: YES NO

Comments: _____

_____

_____

FIELD AUDIT FORM
(continued)

5. Is contaminated material properly stored and in a secure area or otherwise in accordance with project requirements: YES NO
   Are the drums of waste (water, soil, ppe) labeled properly: YES NO

   Comments: _____

   _____

   _____

6. Are field forms filled out properly, legibly and timely:

Field Log Book	YES	NO
Chain of Custody	YES	NO
Equipment Calibration Log	YES	NO
Daily Field Activity Report	YES	NO
Location Sketch	YES	NO
Sample Information Record	YES	NO
Equipment Usage Form	YES	NO
Boring Logs	YES	NO

   Comments: _____

   _____

   _____

7. Is the proper sampling and field measurement equipment, including calibration supplies on site: YES NO

   Comments: _____

   _____

   _____

FIELD AUDIT FORM
(continued)

8. Are there adequate sample containers, including deionized water for QA/QC:

Field Blanks	YES	NO
Trip Blanks	YES	NO

Comments: _____

_____

_____

9. Is the equipment decontaminated in accordance with project requirements:

Sampling equipment	YES	NO
Construction equipment	YES	NO

Comments: _____

_____

_____

10. Is field measurement equipment calibrated:

Daily	YES	NO
Properly	YES	NO

Comments: _____

_____

_____

11. Are samples collected and labeled properly: YES NO

Comments: _____

_____

_____

FIELD AUDIT FORM
(continued)

12. Are samples stored at 4°C: YES NO

Comments: _____

_____

_____

13. Are coolers properly sealed and packed for shipment including Chain of Custody taped to underside of lid: YES NO

Comments: _____

_____

_____

14. Is a copy of the Field Investigation Work Plan available on site: YES NO

Comments: _____

_____

_____

15. Is a copy of each equipment manual on-site: YES NO

Comments: _____

_____

_____

16. Is a copy of the QA/QC Plan available on site: YES NO

Comments: _____

_____

_____

FIELD AUDIT FORM
(continued)

17. Are investigation personnel familiar with the Work Plan and QA/QC Plan: YES NO

Comments: _____

_____

_____

18. Are quality control samples taken:

Trip Blanks	YES	NO
Field Blanks	YES	NO

Comments: _____

_____

_____

19. Are samples shipped in a timely and appropriate manner: YES NO

Comments: _____

_____

_____

20. Has the laboratory been contacted regarding planned shipment of samples: YES NO

Comments: _____

_____

_____

21. Certification - Based upon my audit at the above project, I hereby certify/do not certify compliance with QA/QC requirements for the project:

_____ _____

Dated Signed

FIELD AUDIT FORM
(continued)

General Comments: _____

_____

_____

_____

APPENDIX K

REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

APPENDIX K

RSO TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION FOR [Site Name]

TABLE OF CONTENTS