147-25 94TH AVENUE

QUEENS, NEW YORK

Remedial Action Work Plan

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Prepared for:
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CERTIFICATIONS

I, Michelle Lapin, P.E., certify that I am currently a NYS registered Professional Engineer and that this Remedial Action Work 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).

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

STATE OF NEW YORK · MICHELLE LAPIN · No. 073934-1 · LICENSED PROFESSIONAL ENGINEER

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NYS Professional Engineer #	Date	Signature

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LIST OF ACRONYMS

Acronym	Definition
AGV	Air Guidance Value
AKRF	AKRF, Inc.
AOC	Area of Concern
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BOA	Brownfield Opportunity Area
BTEX	VOCs associated with petroleum (benzene, toluene, ethylbenzene, and xylenes)
C&D	Construction and Demolition
CAMP	Construction Air Monitoring Plan
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CPP	Citizen Participation Plan
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECL	Environmental Conservation Law
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	NYS Environmental Laboratory Approval Program
EM	Electromagnetic
ESA	Environmental Site Assessment
FER	Final Engineering Report
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
LBP	Lead-Based Paint
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCDEP	New York City Department of Environmental Protection
NYCRR	New York Codes Rules and Regulations
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation

Acronym	Definition
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Housing
OSHA	United States Occupational Health and Safety Administration
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PE	Professional Engineer
PID	Photo Ionization Detector
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RE	Remedial Engineer
RI	Remedial Investigation
RIR	Remedial Investigation Report
RMZ	Residual Management Zone
RRSCOs	Restricted Residential Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SCOs	Soil Cleanup Objectives
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SRI	Supplemental Remedial Investigation
SRIR	Supplemental Remedial Investigation Report
SSDS	Sub-Slab Depressurization System
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
SWPP	Storm Water Pollution Prevention
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
UUSCOs	Unrestricted Use Soil Cleanup Objectives
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

Site Description/Physical Setting/Site History

This draft Remedial Action Work Plan (RAWP) has been prepared by AKRF, Inc. (AKRF) on behalf of J2 147-07 94th Avenue LLC (the "Applicant") for the 147-25 94th Avenue site, hereafter referred to as the "Site". The Site is an approximately 35,000-square foot parcel located in the Jamaica neighborhood of Queens, New York. The Site is identified on the New York City Tax Map as Tax Block 9998, Lot 25.

The Site includes three vacant, interconnected warehouse buildings, a concrete-paved loading dock, and asphalt-paved parking areas. The buildings vary in height from one to three stories and only the westernmost building includes a basement. The Site was most recently occupied by cold food storage and a frozen food supplier and became vacant in September 2017. The Site is abutted to the north by Long Island Rail Road (LIRR) tracks; to the east by a scaffolding sales and installation facility; to the south by 94th Avenue, followed by a vacant lot and an active construction site; and to the west by commercial uses. The surrounding area is primarily commercial and industrial, with residential uses to the north and south. The Site location is shown on Figure 1 and a Site plan is provided as Figure 2.

The Applicant is applying to remediate the Site under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). A Remedial Investigation (RI) was completed by AKRF in October 2017 and the results and findings were documented in an RI Report (RIR), which was submitted to NYSDEC in December 2017. The data compiled from the RI were used to prepare this RAWP.

Summary of Past Uses

Historical records indicated that the Site was developed with small, low-rise dwellings/residences by 1901. By 1925, the Site was identified as Armour & Co. Beef and Provisions and also included a storage yard for the NY Telephone Co. until approximately 1942. Between 1951 and 2006, the Site contained a produce warehouse and meat storage facilities. A refrigeration sales and service facility was identified in the eastern portion of the Site between approximately 1967 and 2006.

Summary of the Remedial Investigation

Soil, sediment, groundwater, and soil vapor were investigated as part of AKRF's October 2017 RI, which was documented in a draft RIR dated December 2017. Soil/fill sample analytical results were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted Residential Soil Cleanup Objectives (RRSCOs), groundwater samples were compared to NYSDEC Ambient Water Quality Standards (AWQSs), and soil vapor samples were compared to New York State Department of Health (NYSDOH) indoor Air Guideline Values (AGVs), September 2013 NYSDOH Fact Sheet update for tetrachloroethene (PCE), the August 2015 Fact Sheet update for trichloroethene (TCE), and the May 2017 update to the Soil/Indoor Air Decision Matrix Values.

The analytical results for soil, groundwater, and soil vapor data collected during the October 2017 RI are presented in Tables 7 through 11, 12 through 16, and 17, respectively. Concentration maps showing compounds detected above standards/guidelines for soil and groundwater are shown on Figures 4 and 5, respectively. A concentration map showing detected compounds compared to guidelines for soil vapor is provided as Figure 6. Tables 1 through 3 summarize soil, groundwater, and soil vapor concentrations, respectively, above standards/guidelines. The following is a summary of the findings of the RI:

Soil and Sediment

Twelve of the 32 VOCs analyzed for were detected in at least one of the soil or sediment samples. Acetone was detected above its Unrestricted Use Soil Cleanup Objective (UUSCO) of 0.05 milligrams per kilogram (mg/kg) but below its Restricted Residential Use Soil Cleanup Objective

(RRSCO) of 100 mg/kg in 10 samples with a maximum concentration of 0.283 mg/kg at RI-SB-13(0-2) 20171012. Toluene was detected in two sediment samples with a maximum concentration of 2.63 mg/kg, above the UUSCO of 0.7 mg/kg but below the RRSCO of 100 mg/kg.

Nineteen of the 22 SVOCs analyzed for were detected in at least one of the soil or sediment samples. Benzo(a)anthracene was detected above its UUSCO and RRSCO of 1 mg/kg in 3 samples with a maximum concentration of 1.53 mg/kg at RI-SB-1(13-15) 20171012. Benzo(a)pyrene was detected above its UUSCO and RRSCO of 1 mg/kg in 3 soil samples with a maximum concentration of 1.47 mg/kg at RI-SB-8(0-2) 20171012. Benzo(b)fluoranthene was detected above its UUSCO and RRSCO of 1 mg/kg in 4 soil samples with a maximum concentration of 2.18 mg/kg at RI-SB-8(0-2) 20171012. Chrysene was detected above its UUSCO of 1 mg/kg, but below its RRSCO of 3.9 mg/kg in 3 soil samples with a maximum concentration of 1.7 mg/kg at RI-SB-8(0-2) 20171012. Dibenzo(a,h)anthracene was detected in soil sample RI-SB-8(0-2) 20171016 at a concentration of 0.333 mg/kg, above its UUSCO and RRSCO of 0.33 mg/kg. Indeno(1,2,3-cd)pyrene was detected above its UUSCO and RRSCO of 0.5 mg/kg in 4 soil samples with a maximum concentration of 1.04 mg/kg at RI-SB-8(0-2) 20171012.

Two pesticides (4,4'-DDE and dieldrin) were detected in at least one of the soil or sediment samples at concentrations above UUSCOs, but below RRSCOs. Pesticide concentrations above UUSCOs ranged from 0.0055 mg/kg to 0.0813 mg/kg.

Seven metals (copper, lead, manganese, mercury, nickel, silver, and zinc) were detected in at least one of the soil and/or sediment samples at concentrations above UUSCOs and/or RRSCOs. Metal concentrations above UUSCOs and/or RRSCOs ranged from 0.19 mg/kg to 4,520 mg/kg.

Soil analytes detected above UUSCOs and/or RRSCOs are listed in Table 1.

In-Text Table 1
Soil Analytes Detected Above UUSCOs and/or RRSCOs

Analyte	Sample ID	UUSCO (mg/kg)	RRSCO (mg/kg)	Result (mg/kg)
Acetone	RI-SB-1(0-2) 20171012 RI-SB-1(13-15) 20171012 RI-SB-1(16-18) 20171012 RI-DW-2(12-13) 20171012 RI-DW-3(11-12) 20171012 RI-SB-4(0-2) 20171013 RI-SB-4(3-5) 20171013 RI-SB-4(17-19) 20171013 RI-SB-13(0-2) 20171012 RI-SB-13(3-5) 20171012	0.05	100	0.0503 0.153 0.0701 0.14 0.155 0.0652 0.0733 0.114 0.283 0.058
Toluene	RI-DW-1(3-4) 20171012 RI-DW-3(11-12) 20171012	0.7	100	2.59 2.63
Benzo(a)anthracene	RI-SB-1(13-15) 20171012 RI-SB-6(0-2) 20171016 RI-SB-8(0-2) 20171016	1	1	1.53 1.12 1.44
Benzo(a)pyrene	RI-SB-1(13-15) 20171012 RI-SB-6(0-2) 20171016 RI-SB-8(0-2) 20171016	1	1	1.26 1.08 1.47
Benzo(b)fluoranthene	RI-SB-1(13-15) 20171012 RI-SB-5(0-2) 20171013 RI-SB-6(0-2) 20171016 RI-SB-8(0-2) 20171016	1	1	1.53 1.08 1.56 2.18
Chrysene	RI-SB-1(13-15) 20171012 RI-SB-6(0-2) 20171016 RI-SB-8(0-2) 20171016	1	3.9	1.66 1.19 1.70
Dibenzo(a,h)anthracene	RI-SB-8(0-2) 20171016	0.33	0.33	0.333
Indeno(1,2,3-cd)pyrene	RI-SB-1(13-15) 20171012 RI-SB-5(0-2) 20171013 RI-SB-6(0-2) 20171016 RI-SB-8(0-2) 20171016	0.5	0.5	0.822 0.512 0.709 1.04
4,4'-DDE	RI-SB-11(0-2) 20171016	0.0033	8.9	0.0125
Dieldrin	RI-SB-1(0-2) 20171012 RI-SB-1(13-15) 20171012 RI-SB-2(0-2) 20171012	0.005	0.2	0.0813 0.0134 0.0055
Copper	RI-DW-2(12-13) 20171012 RI-SB-12(0-2) 20171016 RI-SB-13(0-2) 20171012	50	270	87.6 81.6 60.8

Analyte	Sample ID	UUSCO (mg/kg)	RRSCO (mg/kg)	Result (mg/kg)
Lead	RI-SB-1(13-15) 20171012 RI-SB-2(0-2) 20171012 RI-SB-4(0-2) 20171013 RI-SB-5(0-2) 20171013 RI-SB-5(7-9) 20171013 RI-SB-6(0-2) 20171016 RI-SB-8(0-2) 20171016 RI-SB-11(0-2) 20171016 RI-SB-13(0-2) 20171012 RI-SB-13(3-5) 20171012 RI-SB-14(0-2) 20171012	63	400	1,960 98.4 179 178 128 73.9 1,640 977 235 84.2 215
Manganese	RI-SB-7(2-4) 20171012	1,600	2,000	4,520
Mercury	RI-SB-1(0-2) 20171012 RI-SB-8(0-2) 20171016 RI-SB-14(0-2) 20171012	0.18	0.81	0.19 0.64 0.22
Nickel	RI-DW-2(12-13) 20171012 RI-SB-13(3-5) 20171012	30	310	190 68.7
Silver	RI-SB-7(2-4) 20171012	2	180	3.5
Zinc	RI-SB-1(13-15) 20171012 RI-SB-2(0-2) 20171012 RI-DW-2(12-13) 20171012 RI-SB-8(0-2) 20171016 RI-SB-13(0-2) 20171012 RI-SB-14(0-2) 20171012	109	10,000	143 119 239 404 960 114
Hexavalent Chromium	RI-SB-X(3-5) 20171012 RI-SB-1(13-15) 20171012 RI-SB-4(17-19) 20171013 RI-SB-7(0-2) 20171012 RI-SB-8(0-2) 20171016 RI-SB-11(0-2) 20171016	1	110	1.3 1.6 1.2 1.2 5.2 1.3

Groundwater

Three of the 39 VOCs analyzed for were detected in at least 1 of the 5 groundwater samples at concentrations ranging from an estimated 0.30 micrograms per liter (µg/L) to 1.4 µg/L, which were below Ambient Water Quality Standards (AWQS). Chloroform was detected in each of the samples, samples ranging from 0.30 to 1.4 µg/L, below its AWQS of 7 µg/L. PCE was detected in samples RI-MW-4-20171025, RI-MW-5-20171025, RI-MW-8-20171025, and RI-MW-9-20171025 at concentrations between 0.6 and 1.2 µg/L, below its AWQS of 5 µg/L. TCE was detected in samples RI-MW-4-20171025, RI-MW-5-20171025, and RI-MW-9-20171025 at estimated concentrations of 0.51, 0.38 and 0.39 µg/L, respectively, all below the AWQS of 5 µg/L.

Several VOC detections were identified with "J" qualifiers, indicating that the reported concentrations were estimated values.

Three metals (iron, manganese, and sodium) were detected in at least one groundwater sample in either the total analyses or both the total and dissolved analyses at concentrations exceeding AWQSs. Metal concentrations above AWQSs ranged from 796 µg/L to 111,000 µg/L.

Groundwater analytes detected above AWQSs are listed in Table 2.

In-Text Table 2
Groundwater Analytes Detected Above AWQSs

Analyte	Sample ID	AWQS (µg/L)	Result (µg/L)
Iron (Total)	RI-MW-1-20171025 RI-MW-X-20171025 RI-MW-8-20171025	300	3,180 3,270 4,270
Manganese (Total)	RI-MW-1-20171025 RI-MW-X-20171025	300	931 994
Manganese (Dissolved)	RI-MW-1-20171025 RI-MW-X-20171025	300	801 796
Sodium (Total)	RI-MW-1-20171025 RI-MW-X-20171025 RI-MW-4-20171025 RI-MW-5-20171025 RI-MW-8-20171025 RI-MW-9-20171025	20,000	54,400 55,700 86,900 82,300 94,100 111,000
Sodium (Dissolved)	RI-MW-1-20171025 RI-MW-X-20171025 RI-MW-4-20171025 RI-MW-5-20171025 RI-MW-8-20171025 RI-MW-9-20171025	20,000	53,300 53,400 87,900 79,400 93,300 111,000

Soil Vapor

Twenty-nine VOCs were detected in the seven soil vapor samples. Acetone was detected in each of the samples ranging from 12 to 247 micrograms per cubic meter (µg/m^3). VOCs typically associated with petroleum [including benzene, toluene, ethylbenzene, xylenes (collectively referred to as BTEX), ethanol, heptane, and hexane] were detected at individual concentrations up to 2,130 µg/m^3. Solvent-related VOCs [including 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), carbon disulfide, chloroform, dichlorodifluoromethane, PCE, TCE], and the refrigerant gas trichlorofluoromethane were detected at individual concentrations up to 2,970 µg/m^3. PCE was detected in five samples at concentrations from 5.1 to 257 µg/m^3. PCE was detected above the Air Guidance Value (AGV) of 30 µg/m^3 in three samples and at concentrations above the NYSDOH matrix level of 100 µg/m^3 in two soil vapor samples. Indoor air and ambient sampling were not conducted as part of the RI, as the current buildings are to be demolished. TCE was detected above the AGV of 2 µg/m^3 in one soil vapor sample. Soil vapor analytes detected above AGVs or Matrix Values are listed in Table 3.

Soil vapor analytes detected above AGVs and/or Matrix Values are listed in Table 3.

In-Text Table 3

Soil Vapor Analytes Detected Abve AGVs and/or Matrix Values

Analyte	Sample(s)	AGV ($\mu g/m^3$)	Matrix Value ($\mu g/m^3$)	Result ($\mu g/m^3$)
Tetrachloroethylene (PCE)	RI-SV-1-20171017 RI-SV-2-20171017 RI-SV-7-20171017	30	100	257 33 199
Trichloroethylene (TCE)	RI-SV-7-20171017	2	6	5.9

Qualitative Human Health Exposure Assessment (QHHEA)

Currently, there is a potential for soil vapor intrusion into the existing (unoccupied) buildings. Once redevelopment activities begin, these buildings will be demolished and there will be a potential exposure pathway from contaminated surface soil/fill to construction workers, as these workers could ingest, inhale, or have dermal contact with any exposed contaminated fill/soil. If dewatering is required, there will be an additional potential exposure pathway, as workers could inhale/ingest or have dermal contact with the contaminated groundwater. Without remediation, once redevelopment of the Site has been completed, there would be a potential exposure pathway from the potential volatilization of residual organic vapors in the soil, groundwater, and/or soil vapor to adult and child residents, maintenance staff, visitors, and commercial workers through any cracks or openings in the foundations of the new building and surrounding buildings. In addition, there would be a potential exposure pathway from any particulates emanating from the Site to off-site pedestrians, visitors, cyclists, and adult and child residents if there were to be soil disturbance after redevelopment of the Site has been completed.

Summary of the Remedy

The proposed remedy includes the following elements:

1. The existing buildings will be demolished to enable the remediation of contaminated soils. Materials that cannot be beneficially reused on-site will be sent off-site for proper disposal.
2. Following demolition, site excavation will include removal of the underground storage tanks suspected to be present (along with associated fill ports, underground piping, and vents) followed by off-site disposal of on-site soil above Track 2 RRSCOs and/or Track 1 UUSCOs, as defined by 6 NYCRR Part 375-6.8, in the upper 15 feet below grade, and excavation and off-site disposal in the upper 6 feet below grade in the northern portion of the Site to achieve Track 4 site-specific soil cleanup objectives. Based on data gathered to date, this will require excavation of approximately 12,000 cubic yards of material.
3. Screening for indications of contamination [by visual means, odor, and monitoring with photoionization detector (PID)] of all excavated soil during any intrusive Site work.
4. Collection and analysis of endpoint samples site-wide to evaluate the performance of the remedy. If endpoint samples do not meet RRSCOs further excavation will be completed until they are met, otherwise a contingent (Track 4) remedy for portions of the Site will be pursued.
5. Appropriate off-site disposal of all material removed from the Site in accordance with all applicable federal, state, and local rules and regulations for handling, transport, and disposal. Waste disposal facilities will be selected based on the data that has been collected to date and waste classification soil sampling. Based on the requirements of the selected facilities,

additional soil waste characterization samples will be collected and analyzed as needed to obtain approval for soil disposal.

6. If needed, clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the Site. On-site soil that does not exceed the described excavation criteria (UUSCOs or RRSCOs) for any constituent may be used anywhere on-site, including below the water table, to backfill the excavation areas or re-grade the Site.
7. Unless Track 1 UUSCOs or Track 2 Residential SCOs (RSCOs) are achieved, an institutional control will be imposed in the form of an environmental easement for the controlled property that will: require the remedial party or Site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3); allow the use and development of the controlled property for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws; restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH or NYCDOH; and require compliance with the Department approved Site Management Plan (SMP).
8. If required, an SMP will be prepared, which will include an Institutional and Engineering Control Plan that will identify all use restrictions and engineering controls for the Site and detail the steps and media-specific requirements necessary to ensure the institutional and/or engineering controls remain in place and effective. The SMP will also include provisions for conducting a post-remedial soil vapor intrusion (SVI) evaluation. Although unlikely, should a Sub-Slab Depressurization System (SSDS) be needed as a result of the SVI evaluation, an Operation and Maintenance (O&M) Plan will be included in the SMP to ensure continued operation, maintenance, inspection and report of mechanical and/or physical components of the system.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document. All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the FER.

A Track 4 site-specific cleanup is proposed for the northern portion of the Site where minor excavation and grading will occur adjacent to the LIRR tracks, and in the eastern portion of the Site where excavation extends to approximately 3 feet below grade. In the event that a Track 2 restricted residential use cleanup is not achieved in the remainder of the Site, including meeting RRSCOs at a depth of 14 to 20 feet below grade, the contingent remedy will achieve a Track 4 site-specific cleanup at a minimum and will include a site cover as described below:

1. The contingent Track 4 site-specific cleanup would require many of the same elements as the Track 2 restricted residential cleanup, including underground storage tank (UST) removal, excavation, post-remedial soil vapor evaluation, and an SMP and environmental easement. The site-specific Track 4 contingent remedy has a goal of achieving the following site-specific soil cleanup objectives (SSSCOs): 200 parts per million (ppm) for total polycyclic aromatic hydrocarbons (PAHs); 2,000 ppm for lead; and 5,000 ppm for manganese. These objectives are acceptable, since groundwater has not been documented to contain unacceptably elevated concentrations of PAHs or metals and the composite cover system would prevent direct human exposure to residual PAHs and/or metals in soil.
2. A Site cover will be required at the Track 4 portion of the Site to allow for restricted residential use of the Site. The cover will consist of structures such as buildings, pavement, and sidewalks comprising the Site development.

3. Any fill material brought to the Site will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

J2 147-07 94th Avenue LLC is in the process of applying for entry into the Brownfield Cleanup Program (BCP) with the New York State Department of Environmental Conservation (NYSDEC) to remediate an approximately 0.8-acre property located at 147-25 94th Avenue in Queens, New York, hereafter referred to as the "Site". J2 147-07 94th Avenue LLC is applying to be a Volunteer in the Brownfield Cleanup Program (BCP). Residential and commercial use is proposed for the Site. When completed, the Site will contain a 23-story residential building with approximately 500 affordable units. The proposed redevelopment plans are included in Appendix A.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed by AKRF, Inc. (AKRF) in October 2017. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable federal, state, and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does not pose a significant threat to human health and the environment. The Remedial Investigation (RI) for this Site did not identify fish and wildlife resources.

A formal Remedial Design document will not be prepared.

1.1 Site Location and Description

The Site is located in the County of Queens, New York and is identified as Block 9998, Lot 25 on the New York City Tax Map. A Site Location Map is provided as Figure 1 and a Site Plan is provided as Figure 2. The Site is situated on an approximately 0.8-acre area bounded by: Long Island Rail Road (LIRR) tracks to the north; 94th Avenue, followed by a vacant lot and active construction site to the south; a scaffolding sales and installation facility to the east; and commercial uses to the west. A boundary map will be attached to the Brownfield Cleanup Agreement (BCA), as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The Site is fully described in Appendix B – Metes and Bounds. A global positioning system coordinate for the starting point is included.

1.2 Contemplated Redevelopment Plan

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use is described herein to provide the basis for this assessment. However, the Remedial Action contemplated under this RAWP may be implemented independent of the proposed redevelopment plan.

The proposed redevelopment plan consists of demolition of the existing structures and construction of one 23-story residential building with a partial cellar level. The cellar level will be set back approximately 20 feet from the north-adjacent LIRR train tracks, and will house building services, amenities, and retail space. The first three above-grade floors of the building will consist of parking spaces and retail uses, and only floors 2 and 3 will contain residential units. Floors 4 through 23 will be residential.

1.3 Description of Surrounding Property

The Site is bounded by: LIRR tracks to the north; 94th Avenue, followed by a vacant lot and active construction site to the south; a scaffolding sales and installation facility to the east; and commercial uses to the west. The surrounding area is developed primarily with commercial and industrial uses, with residential building located in the greater surrounding area to the north and south. The current zoning designation of the Site is C6-4 (commercial). The Site is located in the special purpose district referred to as "Special Downtown Jamaica District," which allows for residential uses. Potential sensitive receptors in the surrounding area include: schools, day care facilities, and residential areas. There are no waterbodies or wetlands on or immediately adjacent to the Site.

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved RI Work Plan (RIWP) dated October 2017. The investigation was conducted between October 12 and 30, 2017. The draft RI Report (RIR) was submitted to NYSDEC for review in December 2017.

2.1 Summary Remedial Investigations Performed

2.1.1 Soil Borings and Groundwater Monitoring Wells

Soil Boring Installation and Sampling

During the October 2017 RI, 14 soil borings (RI-SB-1 through RI-SB-14) were advanced using a Geoprobe® Direct Push Probe (DPP) operated by Eastern Environmental Solutions, Inc. (Eastern) of Manorville, New York. Sampling locations are shown on Figure 2. One to three soil samples were generally collected from each boring, with one sample collected from the upper 2 feet below grade, one sample at the bottom of the observed fill layer, and one sample at the bottom of the proposed excavation depth of 15 feet below grade. Sampling depths were modified for soil borings located within the buildings. Groundwater was encountered at approximately 20 feet below sidewalk grade. For QA/QC purposes, three trip blanks, three field blanks, three blind duplicate samples, and three matrix spike/matrix spike duplicate (MS/MSD) samples were collected and submitted with the soil samples.

Soil samples were analyzed for volatile organic compounds (VOCs) by the U.S. Environmental Protection Agency (EPA) Method 8260, semivolatile organic compounds (SVOCs) by EPA Method 8270, pesticides by EPA Method 8081, polychlorinated biphenyls (PCBs) by EPA Method 8082, and Target Analyte List (TAL) metals (6000/7000 series).

A summary of soil samples collected during the RI are presented in Table 4.

In-Text Table 4
Remedial Investigation Soil Sample Summary

Soil Boring ID	Termination Depth (feet below grade)	Soil Sample ID
RI-SB-1	30	RI-SB-1(0-2)20171012
		RI-SB-1(13-15)20171012
		RI-SB-1(16-18)20171012
RI-SB-2	15	RI-SB-2(0-2)20171012
		RI-SB-2(3-5)20171012
		RI-SB-2(13-15)20171012
RI-SB-3	15	RI-SB-3(0-2)20171012

Soil Boring ID	Termination Depth (feet below grade)	Soil Sample ID
		RI-SB-3(10-12)20171012
		RI-SB-3(13-15)20171012
RI-SB-4	35	RI-SB-4(0-2)20171013
		RI-SB-4(3-5)20171013
		RI-SB-4(17-19)20171013
RI-SB-5	35	RI-SB-5(0-2)20171013
		RI-SB-5(7-9)20171013
		RI-SB-5(17-19)20171013
RI-SB-6	20	RI-SB-6(0-2)20171016
		RI-SB-6(7-9)20171016
		RI-SB-6(17-19)20171016
RI-SB-7	20	RI-SB-7(0-2)20171012
		RI-SB-7(2-4)20171012
		RI-SB-7(13-15)20171012
RI-SB-8	35	RI-SB-8(0-2)20171016
		RI-SB-8(6-8)20171016
		RI-SB-8(17-19)20171016
RI-SB-9	25 (35 feet below sidewalk)	RI-SB-9(3-5)20171017
RI-SB-10	9 (19 feet below sidewalk)	RI-SB-10(3-5)20171017
RI-SB-11	20	RI-SB-11(0-2)20171016
		RI-SB-11(8-10)20171016
		RI-SB-11(17-19)20171016
RI-SB-12	20	RI-SB-12(0-2)20171016
		RI-SB-12(7-9)20171016
		RI-SB-12(17-19)20171016
RI-SB-13	15	RI-SB-13(0-2)20171012
		RI-SB-13(3-5)20171012
		RI-SB-13(13-15)20171012
RI-SB-14	15	RI-SB-14(0-2)20171012
		RI-SB-14(2-4)20171012
		RI-SB-14(13-15)20171012

Groundwater Monitoring Well Installation and Sampling

During the RI, 5 permanent groundwater monitoring wells (RI-MW-1, RI-MW-4, RI-MW-5, RI-MW-8, and RI-MW-9) were installed approximately 10 feet into the water table. Well construction consisted of 15 feet of 0.020-inch slotted polyvinyl chloride (PVC) monitoring well screen with a solid PVC riser to ground surface. A No. 2 morie sandpack was installed to 2 feet above the well screen. The annular space around the solid well riser was sealed with bentonite and the well was completed with a non-shrinking cement mixture. Each well was finished with a locking j-plug and flush-mounted protective locking well cover.

Immediately following installation, the wells were developed via pumping and surging, using a Whale® electric galley pump and dedicated polyethylene tubing, to remove any accumulated fines and establish a hydraulic connection with the surrounding aquifer. Purge water was monitored with a Horiba U-52 water quality monitor during development of the wells. Development continued until turbidity within the well was less than 50 nephelometric turbidity units (NTUs) for three successive readings.

Groundwater samples collected during the RI were analyzed for TCL VOCs by EPA Method 8260, TCL SVOCs by EPA Method 8270, pesticides by EPA Method 8081, PCBs by EPA Method 8082, and TAL metals (6000/7000 series). The groundwater analyses for metals were conducted on both filtered and unfiltered samples; filtering occurred in the field. For QA/QC purposes, one blind duplicate sample, one MS/MSD sample, one trip blank, and one field blank were collected and submitted with the groundwater samples.

A summary of groundwater samples collected during the RI is presented in Table 5.

In-Text Table 5
Remedial Investigation Groundwater Sample Summary

Groundwater Well ID	Soil Sample ID
RI-MW-1	RI-MW-1-20171025
RI-MW-4	RI-MW-4-20171025
RI-MW-5	RI-MW-5-20171025
RI-MW-8	RI-MW-8-20171025
RI-MW-9	RI-MW-9-20171025

Soil Vapor Sampling

During the RI, seven temporary soil vapor points (RI-SV-1 through RI-SV-7) were installed by advancing an expendable drive point using a Geoprobe® DPP. Exterior points were installed to approximately eight feet below grade and interior points were installed immediately beneath the existing building slabs. At each point, a six-inch stainless steel screen implant connected to Teflon™-lined polyethylene tubing was installed by hand and threaded into the drive point. The sampling tubing was extended to approximately two feet above grade. The borings were backfilled with clean silica sand to three to six inches above the point. Hydrated bentonite was used to fill the remaining void to the ground surface. The soil vapor samples were collected over two hours using six-liter batch-certified SUMMA® canisters. Soil vapor samples collected during the RI were analyzed for VOCs by EPA Method TO-15.

A summary of soil vapor samples collected during the RI is presented in Table 6.

In-Text Table 6
Remedial Investigation Soil Vapor Sample Summary

Soil Vapor Point ID	Soil Vapor Sample ID
RI-SV-1	SV-1-20171017
RI-SV-2	SV-2-20171017
RI-SV-3	SV-3-20171017
RI-SV-4	SV-4-20171017
RI-SV-5	SV-5-20171017
RI-SV-6	SV-6-20171017
RI-SV-7	SV-7-20171017

2.1.2 Geophysical Survey and Utility Mark-Outs

On October 12, 2017, a geophysical survey was conducted across accessible portions of the Site by Enviroprobe Service, Inc. (Enviroprobe) of Mount Laurel, New Jersey to clear the proposed boring locations for subsurface utilities and to locate other potential buried structures. The geophysical survey included both electromagnetic (EM) and ground penetrating radar (GPR) methods. The survey identified: an unknown utility line in the auxiliary asphalt-paved parking lot located in the southern portion of the Site; two electric lines within the primary asphalt-paved parking lot east of the loading dock area; two sanitary lines within the primary asphalt-paved parking lot immediately south of the loading dock area; three metallic anomalies measuring approximately 8 feet by 8 feet in the vicinity of the two former underground storage tank (UST) locations with an unknown utility line intersecting the second and third metallic anomaly south of the loading dock area within the primary parking lot; and one anomaly measuring approximately 8 feet by 8 feet in the southeastern corner of the primary asphalt-paved parking lot beneath a concrete patch. The Enviroprobe on-site representative indicated that the anomalies were consistent with the shape of a tank and/or buried metal debris. All utilities and anomalies were marked out with spray paint prior to the commencement of drilling activities.

2.1.3 Groundwater Monitoring Well Survey

On October 30, 2017, the five groundwater monitoring wells were surveyed by Roguski Land Surveying, P.C. (Roguski), a New York State-licensed surveyor. Elevation measurements were taken at the top surface of the manhole cover and at the top of the PVC casing at each well. Horizontal and vertical datum was tied to the North American Vertical Datum (NAVD-88).

Based on the depth to groundwater measured during the RI in each well and the elevation survey, the inferred direction of shallow groundwater beneath the Site was determined to be in a southwesterly direction. Groundwater contours, including a tabulation of the casing elevations and depth to water measurements, are provided on Figure 3.

2.1.4 Remedial Investigation Findings

Soil analytical results from the RI are presented in Tables 7 through 11; groundwater analytical results from the RI are presented in Tables 12 through 16; and soil vapor analytical results are presented in Table 17. Concentration maps indicating analytes detected above standards/guidelines for soil and groundwater are shown on Figures 4 and 5, respectively. A concentration map showing VOCs detected soil vapor is provided as

Figure 6. Tables 1 through 3 summarize soil, groundwater, and soil vapor detections above standards/guidelines.

2.2 Significant Threat

The NYSDEC and NYSDOH have determined that this Site does not pose a significant threat to human health and the environment. Notice of that determination will be provided for public review. As of the date of this RAWP, a Significant Threat determination has not been completed.

2.3 Site History

2.3.1 Past Uses and Ownership

Historical records indicated that the Site was developed with small, low-rise dwellings/residences by 1901. By 1925, the Site was identified as Armour & Co. Beef and Provisions and included a storage yard for the N.Y. Telephone Co. until approximately 1942. Between 1951 and 2006, the Site included a produce warehouse and meat storage facilities. A refrigeration sales and service facility was identified in the eastern portion of the Site between approximately 1967 and 2006. The Site became vacant in September 2017.

2.3.2 Previous Environmental Reports

Preliminary Geotechnical Investigation Report – 147-07 94th Avenue, Jamaica, New York, Soil Mechanics Drilling Corp., March 2016

Soil Mechanics Drilling Corp. (SMDC) conducted a preliminary geotechnical investigation at the Site in March 2016 related to potential future construction. This investigation consisted of the advancement of two borings with the collection of soil samples for geotechnical evaluation. Stratigraphy consisted of fill material comprising asphalt, concrete, and soil (sand with varying amounts of gravel and silt), from approximately 3 to 6 feet below grade, underlain by native coarse to fine sand with traces of silt and gravel extending to the deepest depths drilled, approximately 100 feet below grade. Bedrock was not encountered.

Phase I Environmental Site Assessment – 147-07 94th Avenue, Queens, New York, AKRF, Inc., October 2017

AKRF conducted a Phase I Environmental Site Assessment (ESA) in October 2017 in accordance with ASTM E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*. The study included a visual inspection of the Site, review of federal and state environmental regulatory sources, and a review of readily available historical sources, including Sanborn fire insurance maps and City Directories. The assessment identified the following Recognized Environmental Conditions (RECs) and additional environmental concerns:

- Two closed-in-place 550-gallon USTs formerly used to dispense diesel fuel were reportedly located beneath the asphalt-paved parking lot in the southeastern portion of the Site. Supporting paperwork provided by the current owner, indicated that the tanks were emptied and the interiors cleaned on May 2, 2014, but no soil sampling was conducted.
- The remnants of a former aboveground storage tank (AST) were observed behind a partially demolished concrete block wall in the basement of 147-147-25 94th Avenue. The building superintendent indicated that the AST was emptied and the interior cleaned at the time of the abandonment, but did not have any further information. This tank appeared to be the closed-in-place 2,000-gallon No. 2 fuel oil AST listed in the

NYSDEC Petroleum Bulk Storage (PBS) database. During the reconnaissance, no evidence of a leak or spill was observed.

- The Site was assigned an NYC (E) Designation for hazardous materials, noise, and air in September 2007 as a part of the Downtown Jamaica Redevelopment Plan. This designation requires that a subsurface testing protocol be submitted to, approved by, and completed to the satisfaction of the NYC Office of Environmental Remediation (OER) before the issuance of any building permits associated with subsurface disturbance.
- Historical Sanborn maps and the regulatory database information identified numerous industrial and automotive uses in the surrounding area between 1911 and 2006. Such uses with the potential to affect subsurface conditions beneath the Site included a saw clamps manufacturer, garages and gasoline tanks, a printing facility, filling stations and auto repair shops, Hyman's N.Y. & L.I. Express Inc. motor factory, and an air condition manufacturer. Several closed-status spills, some with documented subsurface contamination, were identified for the north-adjacent LIRR facility between 1984 and 2005.
- The regulatory database identified five Resource Conservation and Recovery Act (RCRA) hazardous waste non-generator/historical generators, six historic auto stations, spill listings, and PBS facilities in close proximity to the Site.

On-site Environmental Concerns:

- Based on the age of the buildings, asbestos-containing materials (ACM) may be present throughout the Site buildings. ACM observed during the reconnaissance included: plaster, sheetrock, joint compound, pipe insulation, electrical panels, caulks, putties, vinyl flooring and mastic, brick and block mortar, and roofing materials.
- Based on the age of the buildings, electrical equipment and lighting fixtures installed prior to 1979 may include polychlorinated biphenyl (PCB) - and/or mercury-containing components.

Remedial Investigation Work Plan – 147-07 94th Avenue, Queens, New York, AKRF, Inc., October 2017

AKRF prepared an RI Work Plan (RIWP) to investigate subsurface conditions at the Site in response to the findings of the October 2017 Phase I ESA and a meeting with OER. The RI scope of work proposed the following: a geophysical survey across exterior portions of the Site, the advancement of 14 soil borings with the collection and laboratory analysis of up to 3 soil samples per boring (for a total of 38 soil samples), 3 sediment samples from existing on-site drywells, the installation of 4 permanent groundwater monitoring wells, with the collection and laboratory analysis of a groundwater sample from each well, and the installation of 7 soil vapor sampling points for the collection and laboratory analysis of 7 soil vapor samples. The Remedial Investigation Work Plan was approved by OER and NYSDEC in October 2017.

Draft Remedial Investigation Report – 147-07 94th Avenue, Queens, New York, AKRF, Inc., December 2017

AKRF conducted an RI in October 2017 in accordance with the October 2017 RIWP with the addition of a survey of groundwater monitoring well elevations. The RI addressed both RECs and historical fill, as well as to provide general horizontal/vertical characterization across the Site for development purposes. The sampling procedures of the RI were performed in accordance with the NYSDEC Technical Guidance for Site Investigation and Remediation DER-10.

Historical fill materials (including concrete, sand, silt, gravel, brick, plastic, glass, asphalt, and wood) were observed from just below grade to approximately 15 feet below grade, underlain by silt, sand, and gravel to the boring termination depths. Groundwater was encountered at approximately 20 feet below grade. Soil samples were screened for volatile organic compounds with a photoionization detector (PID). PID readings up to 35.7 parts per million (ppm) were detected in boring RI-SB-3 from 0 to 2 feet below grade and 10 to 12 feet below grade. A faint petroleum-like odor was noted in RI-SB-3 from 1 to 2 feet below grade. No other evidence of contamination was observed in the soil borings.

Results of the soil and sediment sample analysis were as follows:

- Thirty-eight soil samples were collected for chemical analysis during the RI. At each boring, one to three soil samples were selected for laboratory analysis: one from the upper two feet below any existing pavement; a second sample from the bottom of the fill layer; and a third sample from the two-foot interval at the bottom of the proposed excavation depth (anticipated to be approximately 15 feet below grade).
- The volatile organic compound (VOC) acetone was detected above its Unrestricted Use Soil Cleanup Objective (UUSCO) of 0.05 milligrams per kilogram (mg/kg) but below its Restricted Residential Use Soil Cleanup Objective (RRSCO) of 100 mg/kg in 10 samples with a maximum concentration of 0.283 mg/kg at RI-SB-13(0-2) 20171012. Toluene was detected in two sediment samples with a maximum concentration of 2.63 mg/kg, above the UUSCO of 0.7 mg/kg but below the RRSCO of 100 mg/kg. No other VOCs were detected at concentrations above their respective UUSCOs or RRSCOs.
- Several polycyclic aromatic hydrocarbons (PAHs), a class of semivolatile organic compounds (SVOCs), were detected above their respective UUSCOs and RRSCOs in up to four samples at concentrations ranging from 0.333 to 3.9 mg/kg.
- The pesticides 4,4'-DDE and dieldrin were detected in at least one of the soil or sediment samples at concentrations above UUSCOs, but below RRSCOs. Pesticide concentrations above UUSCOs ranged from 0.0055 mg/kg to 0.0813 mg/kg.
- Seven metals (copper, lead, manganese, mercury, nickel, silver, and zinc) were detected in at least one of the soil and/or sediment samples at concentrations above UUSCOs and/or RRSCOs. Metal concentrations above UUSCOs and/or RRSCOs ranged from 0.19 mg/kg to 4,520 mg/kg.

Results of the groundwater sample analysis were as follows:

- Three of the 39 VOCs analyzed were detected in at least 1 of the 5 groundwater samples at concentrations ranging from an estimated 0.30 micrograms per liter (µg/L) to 1.4 µg/L. All were below the Ambient Water Quality Standards (AWQS). Chloroform was detected each of the samples ranging from 0.30 to 1.4 µg/L, below its AWQS of 7 µg/L. PCE was detected in samples RI-MW-4-20171025, RI-MW-5-20171025, RI-MW-8-20171025, and RI-MW-9-20171025 at concentrations ranging from of 0.6 to 1.2 µg/L, below its AWQS of 5 µg/L. TCE was detected in samples RI-MW-4-20171025, RI-MW-5-20171025, and RI-MW-9-20171025 at estimated concentrations of 0.51, 0.38 and 0.39 µg/L, respectively, below the AWQS of 5 µg/L.

Several VOC detections were identified with "J" qualifiers, indicating that the reported concentrations were estimated values.

- Three metals (iron, manganese, and sodium) were detected in at least one groundwater sample in either the total analyses or both the total and dissolved analyses at concentrations exceeding AWQSs. Metal concentrations above AWQSs ranged from 796 µg/L to 111,000 µg/L.

Soil vapor sample analytical results were compared to the New York State Department of Health (NYSDOH) 2006 *Guidance for Evaluating Soil Vapor Intrusion* indoor Air Guideline Values (AGVs), updated by the September 2013 NYSDOH Fact Sheet for PCE, the August 2015 Fact Sheet for TCE, and the May 2017 Soil/Indoor Air Decision Matrix Values.

Results of the soil vapor sample analyses were as follows:

- Petroleum-related VOCs were detected at individual concentrations up to 2,130 $\mu g/m^3$. Solvent-related VOCs were detected at individual concentrations up to 2,970 $\mu g/m^3$. Tetrachloroethene (PCE) was detected in 5 samples at concentrations ranging from 5.1 to 257 $\mu g/m^3$, above the NYSDOH AGV of 30 $\mu g/m^3$ and the NYSDOH Matrix Value of 100 $\mu g/m^3$. Indoor air sampling was not conducted as part of this RI, as the current buildings are to be demolished. TCE was detected above the AGV of 2 $\mu g/m^3$. The presence of chlorinated solvents, including PCE and TCE in soil vapor are likely related to historical operations at the Site or off-site locations.

Copies of the previous environmental investigations are provided in Appendix C.

2.3.3 Sanborn Maps

Sanborn Maps available for this Site were reviewed prior to preparation of the RAWP. Historical maps were reviewed for indications of uses (or other evidence) suggesting hazardous materials generation, usage or disposal on or near the Site. Specifically, Sanborn Fire Insurance Maps from 1901, 1911, 1925, 1942, 1951, 1963, 1967, 1981, 1982, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993, 1995, 1996, 1999, 2001, 2002, 2003, 2004, 2005, and 2006 were reviewed and are provided in Appendix D.

1901

The Site comprised seven lots: two vacant and five with dwellings.

The surrounding blocks were primarily vacant with few small, low-rise dwellings and sheds. Railroad tracks were noted approximately 75 feet north of the Site.

1911

Additional dwellings were noted in the central portion of the Site.

C.W. Cardwell Manufacturing Co. (manufacturer of saw clamps), was noted on the south-adjacent block, approximately 50 feet south of the Site. Additional dwellings were shown on the surrounding blocks.

1925

The lots comprising the Site were consolidated into one lot. The western portion was identified as Armour & Co. Beef & Provisions and contained one large structure used as a cooler, storage, and loading. An ammonia inlet was noted south-adjacent to this building, along 94th Avenue. The remainder of the Site was a N.Y. Telephone Co. storage yard with no structures.

The south-adjacent block contained a N.Y. Telephone Co. store house and garage with a gasoline tank, and two additional gasoline tanks associated with a dwelling and a private garage. Stores were shown in place of the C.W. Cardwell Manufacturing Co., previously shown on the south-adjacent block. A printing facility was shown on the west-adjacent block. Additional garages with gasoline tanks were located over 300 feet north of the Site.

1942

The Site was no longer identified as N.Y. Telephone Co. A newly depicted storage and attached garage was noted in the eastern portion of the Site. The remainder of the Property appeared similar to the 1925 map.

A filling station and gasoline tanks were noted approximately 300 feet north of the Site. A garage for the N.Y. Telephone Co. with several gasoline tanks was noted approximately 200 feet east of the Site, on the southeast-adjacent block. The former N.Y. Telephone Co. store house and garage was relabeled as a private garage and auto repair on the south-adjacent block. Additional cold storage and produce warehouses were noted on the south-adjacent block, in place of dwellings. The gasoline tank previously noted outside of a private garage was no longer shown on the south-adjacent block. Additional garages with gasoline tanks were noted over 300 feet southwest of the Site on the west-adjacent block.

1951

The store previously noted on the 1942 map was relabeled as wholesale produce. The remainder of the Site appeared similar to the 1942 map.

The surrounding area appeared similar to the 1942 map.

1963

The store in the eastern portion of the Site was relabeled as Merkel Inc. warehouse. No further significant changes were noted from the 1951 map.

An auto repair shop and Hyman's N.Y. & L.I. Express Inc. Motor Factory were noted approximately 170 feet northeast of the Site on the Site block. The N.Y. Telephone Co. garage previously noted on the southeast-adjacent block was relabeled as Falmark Fabrics, Inc. and the gasoline tanks were no longer identified. A toy warehouse was shown in place of the former private garage and auto repair on the south-adjacent block. A filling station was shown approximately 170 feet west of the Site on the west-adjacent block. In the greater surrounding area, a kitchen cabinet manufacturer was noted approximately 300 feet north of the Site, in place of a garage.

1967

The Merkel Inc. warehouse noted on earlier maps was relabeled as a refrigeration sales and service facility. The remainder of the Site appeared similar to the 1963 map.

An air condition manufacturer was shown in place of the toy warehouse on the south-adjacent block. No further significant changes were noted from the 1963 map.

1981

A one-story structure of unspecified use (with construction date of 1980) adjoined the meat cutting facility in the western portion of the Site.

An auto repair shop as noted approximately 300 feet north of the Site. Additional auto repair shops were noted over 300 feet northeast of the Site. The surrounding area appeared similar to the 1967 map.

1982

The Site and surrounding area appeared similar to the 1981 map.

1985-1986

The Site appeared similar to the 1982 map.

A filling station was noted on the west-adjacent block. No further significant changes were noted from the 1982 map.

1987-1993

The Site appeared similar to the 1986 map.

The filling station on the west-adjacent block was demolished and the lot was depicted as vacant. No further significant changes were noted from the 1986 map.

1995-1996

The Site appeared similar to the 1993 map.

Hyman's N.Y. & L.I. Express Inc. Motor Factory previously noted on the Site block east of the Site was depicted as unspecified manufacturing use. No further significant changes were noted from the 1993 map.

1999

The Site appeared similar to the 1996 map.

An unspecified manufacturing facility replaced the air condition manufacturer previously noted on the south-adjacent block. No further significant changes were noted from the 1996 map.

2001

The Site appeared similar to the 1999 map.

John Krauss Meat Packers noted on the west-adjacent block on previous maps was shown as a vacant lot. Government offices replaced several warehouses and meat storage facilities on the southwest-adjacent block.

2002-2006

The Site and surrounding area appeared similar to the 2001 map.

Summary

In summary, the Site and surrounding area were developed with small, low-rise dwellings and LIRR tracks by 1901. By 1925, the Site was identified as Armour & Co. Beef and Provisions with a storage yard for the N.Y. Telephone Co. until approximately 1942. Between 1951 and 2006, the Site contained a produce warehouse and meat storage facilities. A refrigeration sales and service facility was identified in the eastern portion of the Site between approximately 1967 and 2006.

Sanborn maps indicated that the surrounding area included primarily commercial and industrial uses, with some automotive facilities. Several of these facilities contained gasoline tanks. In the greater surrounding area, additional automotive and industrial uses were noted north of the LIRR train tracks, including filling stations, garages with gasoline tanks, auto repair shops, and a kitchen cabinet manufacturer.

2.4 Geological Conditions

The Site is at an elevation of approximately 40 to 42 feet NAVD 88. Soil observed in the borings conducted during the RI primarily included fill comprising sand, silt, and gravel with varying amounts of concrete, brick, wood, plastic, glass, and asphalt, down to approximately 5 to 15 feet below grade, underlain by sand, silt, and gravel to the terminus of the borings, which ranged from 15 to 35 feet below grade. Bedrock was not encountered.

Based on the findings of a 2016 geotechnical investigation, the stratigraphy beneath the Site, as observed from two borings, consisted of fill material comprising asphalt, concrete, and soil fill (sand with varying amounts of gravel and silt), down to approximately 3 to 6 feet below grade, underlain by native coarse to fine sand with traces of silt and gravel extending to the deepest depths drilled, approximately 100 feet below grade. Bedrock was not encountered.

Based on groundwater measurements taken during the RI, groundwater ranges from approximately 15.6 to 24.9 feet below grade or 18.7 to 19.6 feet NAVD. Groundwater flows beneath the Site in an approximately southwesterly direction. A groundwater contour map is shown as Figure 3.

2.5 Contamination Conditions

The data compiled during the October 2017 RI were compared to the following Standards, Criteria, and Guidance (SCGs) to determine the nature and extent of the contamination associated with the Site:

Soil – NYSDEC UUSCOs and RRSCOs

Groundwater – Class GA (Drinking Water) AWQS

Soil Vapor – NYSDOH 2006 Guidance for Evaluating Soil Vapor Intrusion AGVs, the September 2013 NYSDOH Fact Sheet update for PCE, the August 2015 Fact Sheet update for TCE, and the May 2017 update to the Soil/Indoor Air Decision Matrix Values

2.5.1 Conceptual Model of Site Contamination

Based on an evaluation of the data and information from the investigation, there is contaminated soil, groundwater, and soil vapor present at the Site, which is likely attributable to historical on- and off-site usage and fill material, which was observed across the Site subsurface. The elevated metals and PAHs concentrations are most likely attributable to historical fill rather than past operations at the Site. The presence of chlorinated solvents in soil vapor, including PCE and TCE, could be related to historical operations at the Site and/or off-site releases. The soil vapor concentrations detected during the RI are well below the level for mitigation recommend by NYSDOH. Although there were some compounds detected above the NYSDOH AGVs, the AGVs are conservative means for comparison and assume that any soil vapor would completely penetrate into the building, a condition that would likely not occur.

Based on measured groundwater elevations, the contaminants in the groundwater could be migrating to the southwest. Additionally, organic compounds can be released from the soil or groundwater and migrate in a vapor phase through the pore spaces in unsaturated soil. These vapors can build up beneath structures such as pavement and building foundations. The affected media for the existing or potential releases at the Site includes soil, groundwater, and soil vapor.

2.5.2 Description of Areas of Concern

- Petroleum Storage – Two closed-in-place 550-gallon USTs, that reportedly were used to dispense diesel fuel, are located beneath the asphalt-paved parking lot in the southeastern portion of the Site. A closed-in-place 2,000-gallon No. 2 fuel oil AST is located in the basement of the westernmost Site building. The Site address is listed in the PBS database as Facility ID 2-612215 pertaining to the former AST. Three metallic anomalies potentially consistent with USTs were detected during the RI in the southeastern portion of the Site, in addition to the two USTs previously identified in the parking lot.
- Historical Fill/Contaminated Soil – Historical fill material was observed beneath the Site during the RI down to approximately 5 to 15 feet below grade. PAHs and the metals copper, hexavalent chromium, lead, manganese, mercury, nickel, silver, and zinc, were detected at concentrations above UUSCOs and RRSCOs in soil samples collected from this fill.

2.5.3 Identification of Standards, Criteria and Guidance

The following remedial SCGs apply to the project and are the performance criteria used to determine whether the Remedial Action Objectives (RAOs) have been met:

- Soil – 6 NYCRR Part 375, UUSCOs and RRSCOs (December 2006); NYCRR Part 371 - Identification and Listing of Hazardous Wastes; 6 NYCRR Part 376 - Land Disposal Restrictions; and NYCRR Part 360 - Solid Waste Management Facilities.
- Groundwater – 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998), and TOGS 1.1.1 AWQS and Guidance Values and Groundwater Effluent Limitations.
- Soil Vapor – NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006) and Matrix Values (updated May 2017), the September 2013 NYSDOH Fact Sheet update for PCE, and the August 2015 Fact Sheet update for TCE.

In addition, the following SCGs are applicable to the remedial program at the Site:

- NYSDEC DER-10 – Technical Guidance for Site Investigation and Remediation (May 2010)
- NYSDEC Draft Brownfield Cleanup Program Guide (May 2004)
- NYSDOH Generic Community Air Monitoring Plan (CAMP)
- DER-23 (January 2010)
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste (November 1998)
- 6 NYCRR Part 375 – Environmental Remediation Programs (December 2006)
- 6 NYCRR Part 612 – Registration of Petroleum Storage Facilities (February 1992)
- 6 NYCRR Part 613 – Handling and Storage of Petroleum (February 1992)

- 6 NYCRR Part 614 – Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992)
- 40 CFR Part 280 – Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks
- 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response
- 40 CFR Part 144 – Underground Injection Control Program

Additional regulations and guidance may be applicable, relevant, and appropriate to the remedial alternatives and will be complied with in connection with implementation of the remedial program. However, the previous list is intended to represent the principal, but not necessarily exclusive, SCGs that should be considered in evaluating the remedial alternatives for the Site. SCGs for the Site are provided in Appendix E.

2.5.4 Soil/Fill Contamination

The RI documented that soil/fill beneath the Site is contaminated with PAHs, pesticides, and the metals copper, hexavalent chromium, lead, manganese, mercury, nickel, silver, and zinc. The highest concentrations of these various analytes were generally detected in the 2 to 4 foot depth, where historic fill material was observed during the investigation. Elevated concentrations of PAHs and metals were also detected in one soil sample collected from the proposed excavation depth of 15 feet.

Summary of Soil/Fill Data

VOCs were detected in the soil samples at concentrations ranging from 0.00066 to 0.785 mg/kg. Acetone, a common laboratory contaminant, was detected ranging from 0.0503 to 0.283 mg/kg, above its UUSCO of 0.05 mg/kg. No VOCs were detected above RRSCOs. PAHs including, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, ranged from 0.512 to 2.18 mg/kg, above UUSCOs and/or RRSCOs. Copper, lead, manganese, mercury, nickel, silver, and zinc ranged from 0.19 to 4,520 mg/kg, above UUSCOs and/or RRSCOs. Hexavalent chromium ranged from 1.2 to 5.2 mg/kg, above its UUSCO. The pesticide dieldrin was detected above its UUSCO, but below its RRSCO ranging from 0.0055 to 0.0813 mg/kg.

Comparison of Soil/Fill with SCGs

The VOCs acetone and toluene were detected above UUSCOs.

The SVOCs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected above UUSCOs and/or RRSCOs.

The pesticides 4,4'-DDE and Dieldrin were detected above UUSCOs.

The metals copper, hexavalent chromium, lead, manganese, mercury, nickel, silver, and zinc were detected above UUSCOs and/or RRSCOs.

Soil data collected during the RI is presented in Tables 7 through 11. A concentration map indicating the locations of exceedances of UUSCOs and RRSCOs is provided as Figure 4.

2.5.5 On-Site and Off-Site Groundwater Contamination

Groundwater samples collected during the RI exhibited levels of iron, manganese, and sodium above AWQSs.

Summary of Groundwater Data

Three metals (iron, manganese, and sodium) were detected in at least one unfiltered groundwater sample above the AWQSs. Manganese and sodium were detected in the filtered groundwater samples above the AWQSs. Exceedances ranged from 796 µg/L to 111,000 µg/L.

Comparison of Groundwater with SCGs

Total iron, total and dissolved manganese and total and dissolved sodium were detected above AWQSs.

Groundwater data collected during the RI is presented in Tables 12 through 16. A concentration map indicating the locations of exceedances of AWQSs is provided as Figure 5.

2.5.6 On-Site Soil Vapor Contamination

Comparison of Soil Vapor with SCGs

The chlorinated solvent-related VOCs, PCE and TCE, were detected above the NYSDOH indoor AGVs.

Soil vapor data collected during the RI is presented in Tables 17. A concentration map indicating the locations of VOC detections in soil vapor samples is provided as Figure 6.

2.5.7 Sediment Contamination

Summary of Sediment Data

VOCs were detected in the sediment samples ranging from 0.00029 to 2.63 mg/kg. Acetone and toluene were detected above UUSCOs. PAHs were detected in the sediment samples, but only at levels below the UUSCOs and RRSCOs.

Copper, nickel, and zinc ranged from 87.6 to 239 mg/kg, above UUSCOs.

Comparison of Sediment with SCGs

The VOCs acetone and toluene were detected above UUSCOs.

The metals copper, nickel, and zinc were detected above UUSCOs.

Sediment data collected during the RI is presented in Tables 7, 8 and 11. A concentration map indicating the locations of exceedances of UUSCOs is provided as Figure 4.

2.6 Environmental and Public Health Assessments

2.6.1 Qualitative Human Health Exposure Assessment

The objective of the Qualitative Human Health Exposure Assessment (QHHEA) is to identify potential receptors and pathways for human exposure to the Contaminants of Concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source within different environmental media to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposure actually occur.

The RI, as described in the RIR, is sufficient to complete a QHHEA. The QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is a significant health risk by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation. The full QHHEA, which describes the environmental media, contaminants of concern, potential routes of exposure, potential receptors, and existence of human health exposure pathways, is included in Section 6.0 of the RIR, which is provided in Appendix C.

2.7 Remedial Action Objectives

Based on the results of the RI, the following RAOs have been identified for this Site:

2.7.1 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

2.7.2 Soil Vapor

RAOs for Public Health Protection

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

3.0 SOIL PRE-CHARACTERIZATION SAMPLING FOR DISPOSAL

All work in this section will include implementation of the QAPP, provided in Appendix F, and the site-specific HASP, provided in Appendix G, which includes on-site and community air monitoring procedures.

3.1 Soil Waste Classification Sampling

The proposed remedy includes excavation of soil/fill to: approximately 15 feet below grade throughout a majority of the Site; to approximately 21 feet below grade for an elevator pit in the central portion of the Site; and to approximately 4 to 6 feet below grade along the northern Site boundary. It is estimated that approximately 12,000 cubic yards of material will be removed and disposed of at a facility(ies) licensed to accept such material. The identity of proposed disposal facilities and a copy of the facility's operating permit will be submitted to NYSDEC after completion of waste characterization sampling. The proposed remedial excavation areas and the associated excavation depths are indicated on Figure 8.

Soil pre-characterization sampling will be conducted across the Site to characterize the soil for acceptance at properly-permitted disposal facilities. At this time, disposal facility(ies) has not been selected. As such, the proposed testing will include sampling and laboratory analyses intended to satisfy the analytical requirements of numerous soil disposal/receiving facilities in New Jersey, New York, and Pennsylvania. Typical facilities require one sample per 800 cubic yards of material, therefore, approximately 15 samples consisting of a grab and 5-point composite would be collected from test pits excavated to varying depths across the Site to characterize the material in-place prior to the start of excavation.

In accordance with the typical requirements of disposal facilities permitted to receive historic fill/soil, the grab soil samples will be analyzed for VOCs plus 10 tentatively identified compounds (TICs) by EPA Method 8260 and total petroleum hydrocarbons (TPH) by EPA Method 8015 for diesel range organics (DRO). The five-point composite samples will be analyzed for SVOCs plus

20 TICs by EPA Method 8270, total Target Analyte List (TAL) metals and trivalent chromium, Toxicity Characteristic Leaching Procedure (TCLP) eight Resource Conservation and Recovery Act (RCRA) metals plus copper, nickel, and zinc, PCBs by EPA Method 8082, pesticides by EPA 8081; total cyanide, Extractable Petroleum Hydrocarbon (EPH), hexavalent chromium, ignitability, corrosivity, and reactivity. One sample for paint filter by EPA Method 9095 will be additionally collected.

Depending on the acceptance criteria of potential disposal facilities at the time of the excavation, these tests may be modified. Additionally, it is possible that once a specific facility is selected, additional testing and/or laboratory analysis may become necessary.

3.2 Soil Pre-Characterization Report

A report will be prepared following completion of the waste classification sampling event and receipt of the laboratory data. The report will be presented to potential disposal facilities and will include a summary of the Site's environmental history and the sampling methodologies, a sample location map, and copies of the analytical results. A copy of the Soil Pre-characterization Report and copies of facility acceptance letters and permits will be included in the Final Engineering Report for this Site.

4.0 DESCRIPTION OF REMEDIAL ACTION PLAN

4.1 Evaluation of Remedial Alternatives

This section includes a review of remediation alternatives that were considered for the remedy phase of the BCP. The purpose of completing the alternatives analysis is to identify, evaluate, and select a remedy to address the contamination identified by the RI. The RAOs for groundwater and soil include source removal to prevent the potential for exposure and contaminant migration. The RAOs for soil vapor include preventing soil vapor from entering the proposed Site buildings. The following performance measures were used to complete the evaluation of remedial alternatives:

- Protection of human health and the environment;
- Compliance with standards, criteria, and guidelines (SCGs);
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance; and
- Land use.

The following remedial SCGs apply to the project, and are the performance criteria used to determine if the RAOs have been met:

- 6 NYCRR Part 375-6 Soil Cleanup Objectives
- New York State Groundwater Quality Standards – 6 NYCRR Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;

- NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation - December 2002 (or later version if available);
- NYSDEC Draft Brownfield Cleanup Program Guide – May 2004;
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan;
- NYS Waste Transporter Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;
- DER-23 (January 2010);
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998);
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998);
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste (November 1998);
- 6 NYCRR Part 375 – Environmental Remediation Programs (December 2006);
- 6 NYCRR Part 612 – Registration of Petroleum Storage Facilities (February 1992);
- 6 NYCRR Part 613 – Handling and Storage of Petroleum (February 1992);
- 6 NYCRR Part 614 – Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992);
- 40 CFR Part 280 – Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks;
- 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response; and
- 40 CFR Part 144 – Underground Injection Control Program.

Remedial Alternative 1 – No Further Action

This alternative consists of allowing the Site to remain in its current condition. No remedial activities would occur under this remedy.

1. Protection of Human Health and the Environment – Not satisfied, as groundwater contamination and the potential for vapor intrusion into future and/or current adjacent off-site buildings would still exist.
2. Compliance with SCGs – Not satisfied, as contaminants would remain in soil, groundwater, and soil vapor at concentrations that exceed NYSDEC Part 375 UUSCOs and RRSCOs, NYSDEC AWQS, and NYSDOH AGVs, respectively.
3. Short-term Effectiveness and Impacts – Not satisfied, as there would be no measures in place to protect workers or the surrounding community from potential exposure to existing contaminated soil, groundwater, or vapors if redevelopment were to occur, or at existing or future adjacent off-site buildings.
4. Long-term Effectiveness and Permanence – While the no further action alternative would be the least costly, remediation would not be effective as potential exposure pathways identified in the QHHEA would remain if redevelopment activities began.
5. Reduction of Toxicity, Mobility, or Volume of Contaminated Material – Not satisfied, as the contaminated material would remain in place. Although the Site is currently capped, vapors could migrate from residual contamination in the soil, groundwater, and/or soil vapor and enter

the Site structures or adjacent buildings through any cracks or openings in the foundation. Additionally, if redevelopment of the Site were to occur, the exposure pathways identified in the QHHEA would remain.

6. Implementability – Very feasible, as no personnel or regulatory approvals would be needed, and natural attenuation would be the only remedial plan utilized.
7. Cost Effectiveness – Very cost effective to proceed with no further action; however, this criterion is not satisfied, as it requires a comparison of cost to long/short term effectiveness and toxicity reduction, which would not be achieved.
8. Community Acceptance – Not satisfied, as this alternative will allow the contamination to remain in place.
9. Land Use – Not satisfied. Currently, the Site is unoccupied. Its current use does not contribute to expanding affordable housing and community services in the surrounding area.

Remedial Alternative 2 – Track 1 Unrestricted Use Soil Cleanup Objectives (UUSCOs)

This alternative would include removal and/or treatment of all contaminated soil, groundwater, and soil vapor to comply with UUSCOs. This would include, but is not limited to, excavation of all soil beneath the Site to the groundwater interface to remove all soil above UUSCOs.

1. Protection of Human Health and the Environment – Satisfied, as the source of the soil contamination would be removed, the contaminants in groundwater would be significantly reduced, and elevated concentrations of chlorinated solvents in soil vapor would be significantly reduced.
2. Compliance with SCGs – Not necessarily satisfied, as some residual contamination in groundwater may remain.
3. Short-term Effectiveness and Impacts – Effective in reducing soil contamination in the short-term, as all contaminated soil would be removed from the Site. There is, however, a risk of short-term impacts to Site workers and the community, as the process of excavating contaminated soil may cause the release of particulates and organic vapors. This risk can be controlled by employing health and safety procedures during remediation and construction.
4. Long-term Effectiveness and Permanence – Satisfied, as RAOs will be achieved.
5. Reduction of Toxicity, Mobility, or Volume of Contaminated Material – As all of the contaminated soil at the Site would be removed, the toxicity, mobility, and the volume of contaminants would be greatly reduced.
6. Implementability – Complicated, but implementable. This alternative would require would require deeper excavation. Underpinning may be required, which requires permission from the adjacent property owners.
7. Cost Effectiveness – Not cost-effective, as it will require extensive excavation and underpinning along the northern property boundary along the LIRR tracks. Based on the dimensions of the Site, to achieve Track 1 UUSCOs, it is assumed that approximately 20,000 cubic yards of soil would need to be excavated. Using a conversion factor of 1.5, this would be approximately 30,000 tons. The market rate for the transportation and disposal of non-hazardous, regulated soil ranges from \$40-\$70 per ton. Using this range, the soil disposal for this amount of contaminated soil would be on the order of \$1,200,000 - \$2,100,000. To perform an excavation of this magnitude, additional shoring and sheeting, and underpinning would have to be performed for the existing roadways for an estimated cost of \$500,000. This assumes the remedial work would be performed concurrently with the planned redevelopment of the Site.

8. Community Acceptance – Not satisfied, as this alternative would require the adjoining property owners to allow their buildings or facilities to be underpinned.
9. Land Use – Satisfied, as this alternative would result in the cleanup of the Site for unrestricted use, which would allow for future redevelopment of the Site.

Remedial Alternative 3 – Track 1 with a Track 2 Contingency, and Track 4

Alternative 3 would include excavation and off-site disposal of soil up to a maximum depth of 21 feet below grade to achieve Track 1 UUSCOs in accordance with applicable federal, state, and local laws and regulations, as defined by 6 NYCRR Part 375-6.8. Based on data gathered to date, this will include excavation of approximately 12,000 cubic yards of soil/fill.

A Track 1 cleanup remedy is proposed for a majority of the Site in the location of the proposed cellar level. If post-excavation endpoint samples do not meet UUSCOs, it is anticipated that a contingent Track 2 RRSCOs can be achieved based on data collected to date. Due to the shallow excavation depths proposed in the northern and eastern portions of the Site, a Track 4 remedy with Site-Specific Soil Cleanup Objectives (SSSCOs) would be implemented outside of the proposed cellar area. A BCP Track 1/2 and 4 cleanup would allow for Institutional Controls (ICs) and Engineering Controls (ECs) to be implemented for long-term management of the Site and to prevent future exposure to any residual contamination. As such, an Environmental Easement would be recorded for the Site to implement the controls and a Site Management Plan (SMP) would be prepared to specify future soil handling requirements, include a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the Site, provisions for the management and inspection of the ECs that may be necessary, maintaining Site access controls, Department notification, and land use restrictions. Periodic inspection and reporting would be required to verify that the restrictions and requirements included in the easement remain in place and effective.

1. Protection of Human Health and the Environment – Satisfied, as all soil above Track 1 UUSCOs (or Track 2 RRSCOs) and Track 4 SSSCOs would be excavated and removed from the Site, along with any tanks, and vent lines/fill ports, if encountered. Additionally, ICs and ECs would be implemented to prevent future exposure to any residual contamination.
2. Compliance with SCGs – Satisfied, as RAOs would be achieved by removing the potential for human and environmental exposures to chemical constituents above UUSCOs (or RRSCOs) and Track 4 SSSCOs.
3. Short-term Effectiveness and Impacts – Satisfied, as this alternative would be effective in reducing soil contaminant levels in the short term, since soil exceeding UUSCOs (or RRSCOs) and SSSCOs, and any encountered tanks, fill ports, and vent lines would be removed from the Site. Mitigation measures included in this RAWP, including the HASP and CAMP, would protect and limit exposure of workers and the surrounding community to contaminated soil, dust, groundwater, and/or soil vapors during soil removal.
4. Long-term Effectiveness and Permanence – Satisfied, as removal of soil above UUSCOs (or RRSCOs) and SSSCOs, with the installation and maintenance of ECs, and the implementation of ICs, would limit exposure of future occupants to contaminated soil, groundwater, and/or soil vapor, thus achieving the RAOs.
5. Reduction of Toxicity, Mobility, or Volume of Contaminated Material – Satisfied, as approximately 12,000 cubic yards (approximately 16,800 tons) of soil would be removed; the volume of contaminants would be greatly reduced as well as any potential soil sources affecting soil vapor concentrations.

6. Implementability – Satisfied, as contaminated soil removal could be completed in a relatively short timeframe and the equipment and personnel needed to perform the proposed remedial actions are readily available. The majority of the soil to be excavated and disposed of off-site is expected to be classified as non-hazardous, regulated soil. Landfill/beneficial re-use space for these types of materials is readily available. This alternative would increase the time of development due to the installation and monitoring of ICs and ECs.
7. Cost Effectiveness – Satisfied, as this alternative is the most cost effective. Under this alternative, approximately 12,000 cubic yards (or approximately 16,800 tons) of contaminated soil would be excavated and disposed of off-site, based on the data collected to date. The market rate for the transportation and disposal of non-hazardous, regulated soil ranges from $40 to $70 per ton. Using this range, the soil disposal for this project would be on the order of $1,020,000 – $1,785,000. The cost for reporting is approximately $190,000.
8. Community Acceptance – Satisfied, as this alternative would result in the cleanup of the Site while contributing to additional affordable housing options in the neighborhood.
9. Land use – Satisfied, as this alternative would result in the cleanup of the Site while allowing for its redevelopment in the downtown Jamaica mixed-use district.

Areas where a Track 4 site-specific cleanup remedy is achieved will include a composite cover system. Any fill material brought to the Site will meet the SCOs for cover material, as set forth in 6 NYCRR Part 375-6.7(d).12492. Contingent Track 4 SSSCOs are presented in Table 18.

4.2 Selection of the Preferred Remedy

4.2.1 Zoning

The current zoning designation of the Site is C6-4 (commercial). The Site is located in special mixed-use district DJ (Special Downtown Jamaica District), which encourages mixed-use development and expanding affordable housing opportunities, specifically around major transportation neighborhoods. The proposed redevelopment complies with the current zoning and vision of the Special Downtown Jamaica District.

4.2.2 Applicable Comprehensive Community Master Plans or Land Use Plans

The Site is located within the Special Downtown Jamaica District, which strives to support the growth of downtown Jamaica and enforce its role as a transportation hub. The district aims to create affordable housing and expand economic opportunities in the community.

4.2.3 Surrounding Property Uses

The surrounding area is primarily developed with commercial and industrial properties with increased residential uses located to the north and south. The proposed redevelopment is consistent with the goals of the Special Downtown Jamaica District.

4.2.4 Citizen Participation

A Citizen Participation Plan (CPP) will be prepared upon execution of a Brownfield Cleanup Agreement. The CPP will be submitted to NYSDEC for review and approval.

4.2.5 Environmental Justice Concerns

The Site is located in an Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

4.2.6 Land Use Designations

The proposed redevelopment plan complies with the current land use designation for this Site. The proposed future use of the Site includes affordable housing and retail space. This use is consistent with current land use designations.

4.2.7 Population Growth Patterns

The population of the City of New York is expected to increase in the future. This project will help provide necessary affordable housing units to meet that need.

4.2.8 Accessibility to Existing Infrastructure

The Site is located within one block of the NYC Subway – Sutphin Boulevard-Archer Avenue Station (E, J, and Z lines), and the Jamaica LIRR station, which enables access to various LIRR lines and the AirTrain to JFK Airport. Nearby bus routes include the Q8, Q25, Q34, Q41, and Q65. The area is also supplied with municipal sewers and water, electric, telephone, natural gas, and fiber-optic lines.

4.2.9 Proximity to Cultural Resources

Many cultural resources are easily accessed from the Site via walking or public transportation, including the King Manor Museum, Rufus King Park, Jamaica Performing Arts Center, Queens Museum, public libraries, and designated landmarks, including Prospect Cemetery.

4.2.10 Proximity to Natural Resources

The Site is located in an area of Queens that does not contain significant natural resources. However, natural resources such as parks are easily accessible from the Site via walking or public transportation, including Rufus King Park, Baisley Pond Park, Roy Wilkins Recreation Center, and the Queens Botanical Garden.

4.2.11 Off-Site Groundwater Impacts

Based on water table measurements during the RI, groundwater beneath the Site ranges from approximately 15.6 to 24.9 feet below grade in the southwestern and central portions of the Site, respectively. Based on the well elevation survey conducted during the RI, groundwater flows in a southwesterly direction. A groundwater elevation map is included as Figure 3. Groundwater containing elevated levels of certain contaminants may be migrating off-site.

4.2.12 Proximity to Floodplains

The Site is not located within a floodplain.

4.2.13 Geography and Geology of the Site

Soil borings advanced during the RI generally encountered fill comprising sand, silt, and gravel with varying amounts of concrete, brick, wood, plastic, glass, and asphalt, down to approximately 5 to 15 feet below grade. Fill material was underlain by sand, silt, and gravel to the terminus of the borings, which ranged from 15 to 35 feet below grade. Bedrock was not encountered during the RI.

Based on the findings of a 2016 geotechnical investigation, the stratigraphy beneath the Site, as observed from two borings, consisted of fill material comprising of asphalt, concrete, and soil fill (sand with varying amounts of gravel and silt), down to approximately 3 to 6 feet below grade, underlain by native coarse to fine sand with traces of silt and gravel extending to the deepest depths drilled, approximately 100 feet below grade. Bedrock was not encountered.

Based on water table measurements during the RI, groundwater beneath the Site is approximately 20 feet below sidewalk grade or 18.7 to 19.6 feet NAVD. Groundwater flows beneath the Site in a southwesterly direction. A groundwater flow map is shown in Figure 3.

4.2.14 Current Institutional Controls

Currently, there are no known ICs for the Site.

4.3 Summary of Selected Remedial Actions

Remedial Alternative 3 (Track 1 with a Track 2 contingency, and Track 4 in select areas) achieves the RAOs while being implementable and cost-effective. After careful consideration with respect to the evaluation criteria listed, Remedial Alternative 3 is determined to be the preferred remedy, since it adequately addresses the subsurface contamination with the most cost-effective approach.

The proposed remedy includes the following elements:

1. The existing buildings will be demolished to enable the remediation of contaminated soils. Materials that cannot be beneficially reused on-site will be sent off-site for proper disposal.
2. Following demolition, site excavation will include removal of the underground storage tanks suspected to be present (along with associated fill ports, underground piping, and vents) followed by off-site disposal of on-site soil above Track 2 RRSCOs and/or Track 1 UUSCOs, as defined by 6 NYCRR Part 375-6.8, in the upper 15 feet below grade, and excavation and off-site disposal in the upper 6 feet below grade in the northern portion of the Site to achieve Track 4 site-specific soil cleanup objectives. Based on data gathered to date, this will require excavation of approximately 12,000 cubic yards of material.
3. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work.
4. Collection and analysis of endpoint samples site-wide to evaluate the performance of the remedy. If endpoint samples do not meet RRSCOs further excavation will be completed until they are met, otherwise a contingent (Track 4) remedy for portions of the Site will be pursued.
5. Appropriate off-site disposal of all material removed from the Site in accordance with all applicable federal, state, and local rules and regulations for handling, transport, and disposal. Waste disposal facilities will be selected based on the data that has been collected to date and waste classification soil sampling. Based on the requirements of the selected facilities, additional soil waste characterization samples will be collected and analyzed as needed to obtain approval for soil disposal.
6. If needed, clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to replace the excavated soil and establish the designed grades at the Site. On-site soil that does not exceed the described excavation criteria (UUSCOs or RRSCOs) for any constituent may be used anywhere on-site, including below the water table, to backfill the excavation areas or re-grade the Site.
7. Unless Track 1 UUSCOs or Track 2 Unrestricted Residential SCOs are achieved, an institutional control will be imposed in the form of an environmental easement for the

controlled property that will: require the remedial party or Site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3); allow the use and development of the controlled property for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws; restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH or NYCDOH; and require compliance with the Department approved Site Management Plan (SMP).

8. If required, an SMP will be prepared, which will include an Institutional and Engineering Control Plan that will identify all use restrictions and engineering controls for the Site and detail the steps and media-specific requirements necessary to ensure the institutional and/or engineering controls remain in place and effective. The SMP will also include provisions for conducting a post-remedial soil vapor intrusion (SVI) evaluation. Although unlikely, should a Sub-Slab Depressurization System (SSDS) be needed as a result of the SVI evaluation, an Operation and Maintenance (O&M) Plan will be included in the SMP to ensure continued operation, maintenance, inspection and report of mechanical and/or physical components of the system.

Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document. All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the FER.

A Track 4 site-specific cleanup is proposed for the northern portion of the Site where minor excavation and grading will occur adjacent to the LIRR tracks, and in the eastern portion of the Site where excavation extends to approximately 3 feet below grade. In the event that a Track 2 restricted residential use cleanup is not achieved in the remainder of the Site, including meeting RRSCOs at a depth of 14 to 20 feet below grade, the contingent remedy will achieve a Track 4 site-specific cleanup at a minimum and will include a site cover as described below:

1. The contingent Track 4 site-specific cleanup would require many of the same elements as the Track 2 restricted residential cleanup, including UST removal, excavation, post-remedial soil vapor evaluation, and an SMP and environmental easement. The site-specific Track 4 contingent remedy has a goal of achieving the following SSSCOs: 200 ppm for total PAHs; 2,000 ppm for lead; and 5,000 ppm for manganese. These objectives are acceptable, since groundwater has not been documented to contain unacceptably elevated concentrations of PAHs or metals and the composite cover system would prevent direct human exposure to residual PAHs and/or metals in soil.
2. A Site cover will be required at the Track 4 portion of the Site to allow for restricted residential use of the Site. The cover will consist of structures such as buildings, pavement, and sidewalks comprising the Site development.
3. Any fill material brought to the Site will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

5.0 REMEDIAL ACTION PROGRAM

5.1 Governing Documents

5.1.1 Site Specific Health & Safety Plan (HASP)

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan (HASP) and for the appropriate performance of work according to that plan and applicable laws.

The HASP and requirements defined in this RAWP pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

The Site Safety Officer (SSO) will be Jacob Menken of AKRF. Alternate SSOs are Mark Candelario and Tara Simmons, also of AKRF. The SSOs are subject to change. Resumes will be provided to the NYSDEC prior to the start of remedial construction.

Confined space entry, if required, will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

5.1.2 Quality Assurance Project Plan (QAPP)

Any sampling associated with this project will be conducted in accordance with the Quality Assurance Project Plan (QAPP) included in Appendix F, which details field screening and sampling methodologies, and sample submittal and reporting requirements. The QAPP includes the project team responsible for implementing the remediation requirements and provisions set forth in this RAWP.

5.1.3 Construction Quality Assurance Plan (CQAP)

The Construction Quality Assurance Plan (CQAP), provided as Appendix H, provides a detailed description of the observation and testing activities that will be used to monitor construction quality and confirm that remedial construction is in conformance with the remediation objectives and specifications.

5.1.4 Soil/Materials Management Plan (SMMP)

A Soil/Materials Management Plan (SMMP) is included in Section 6.4 of this document. The SMMP includes detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport, and disposal. It also includes all of the procedures that will be applied to assure effective, nuisance-free performance in compliance with all applicable federal, state, and local laws and regulations.

5.1.5 Storm Water Pollution Prevention Plan (SWPPP)

Based on a review of New York City Department of Environmental Protection (DEP) sewer mapping and the size of the Site, a SWPPP is not required. However, erosion and sediment controls will be in conformance with requirements of the New York State Guidelines for Urban Erosion and Sediment Control. Sediment control measures will be installed at the Site prior to conducting any ground-intrusive work. These measures will be installed according to all applicable or relevant and appropriate federal, state, and local laws. The measures will provide for abatement and control of environmental pollution arising from proposed remediation and construction activities. The control measures will include procedures for perimeter Site controls, stabilized construction pads at each construction entrance, equipment decontamination, drainage inlet protection, and dust suppression. The Remedial Engineer (RE), or her representative, will conduct routine inspections, any repairs and/or maintenance of control measures will be completed in a timely fashion to maintain the controls in proper working order. All vehicles leaving the Site will be inspected to ensure that no soil adheres to the wheels or undercarriage of the vehicle leaving the Site. Any situations involving material spilled in transit or mud and dust tracked off-site will be remedied. The access routes will be inspected for road conditions, overhead clearance, and weight restrictions.

5.1.6 Community Air Monitoring Plan (CAMP)

The CAMP was prepared as part of the Site-specific HASP, provided as Appendix G.

5.1.7 Contractors Site Operations Plan (SOP)

The RE will review plans and submittals for this remedial project (including those previously listed and contractor and sub-contractor document submittals) and confirm that they are in compliance with this RAWP. The RE is responsible to ensure that subsequent document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

5.1.8 Citizen Participation Plan

A CPP will be submitted to NYSDEC and NYSDOH upon completion of a BCA.

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed; (2) the date they were mailed; (3) a copy of the Fact Sheet; (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

Document repositories have been established at the following locations and contain all applicable project documents:

Queens Central Library
89-11 Merrick Boulevard
Jamaica, NY 11432
(718) 990-0700

Hours:
Monday through Thursday: 9 am-9 pm
Friday: 9 am-7 pm
Saturday: 10 am-5 pm
Sunday: 12 pm-5 pm

Queens Community Board District 12
90-28 161st Street
Jamaica, NY 11432
(718) 658-3308
Hours:
Monday through Friday: 9 am-5 pm

5.2 General Remedial Construction Information

5.2.1 Project Organization

An organization chart is included on Figure 9.

Resumes of key personnel involved in the Remedial Action are included in Appendix I.

5.2.2 Remedial Engineer

The RE for this project will be Michelle Lapin, P.E. The RE is a registered professional engineer licensed by the State of New York. The RE will have primary direct responsibility for implementation of the remedial program for the 147-25 94th Avenue Site (NYSDEC BCA Index No. C241206-03-18, Site No. C241206). The RE will certify in the Final Engineering Report (FER) that the remedial activities were observed by qualified environmental professionals under her supervision and that the remediation requirements set forth in the RAWP and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other RE certification requirements are listed later in this RAWP.

A designated person under the direct supervision of the RE will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal. The RE or designated person under the direct supervision of the RE will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The RE will review all pre-remedial plans submitted by contractors for compliance with this RAWP and will certify compliance in the FER.

The RE will provide the certifications listed in Section 10.1 in the FER.

5.2.3 Remedial Action Construction Schedule

A schedule for performance of the remedial work is included in Section 12.0.

5.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings construction code requirements, or construction permits or according to specific variances issued by that agency. NYSDEC will be notified by the Volunteer of any unusual variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours. The Volunteer will be requesting and has in the past received permit variances by the Department of Buildings.

5.2.5 Site Security

The Site will be completely closed from public access by using secured construction fencing. No unauthorized personnel will be able to access the Site. During off hours, the active portions of the Site will be completely enclosed within a locked gate. Twenty-four hour Site security will be provided by a third-party security company.

5.2.6 Traffic Control

It is not anticipated that traffic will be disrupted beyond normal contractor vehicle traffic going to and from the Site during construction. Any sidewalk closures that are required during the course of construction/remediation activities will be conducted in accordance with New York City Department of Transportation (NYCDOT) permits.

5.2.7 Contingency Plan

A contingency plan has been developed to describe the procedures to be followed upon discovery of an unknown source of contamination or Area of Concern (AOC) that may require remediation (e.g., USTs, stained soil, drums, etc.). The identification of an unknown source structure or unexpected contaminated media discovered by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will also be included in daily and periodic reports. If USTs or other previously unidentified contaminant sources are found during on-site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soil, etc. Chemical analytical work will be for full scan parameters (VOCs and SVOCs, pesticides, PCBs, and TAL metals). These analyses will not be limited to CP-51 parameters where tanks are identified without prior approval by NYSDEC.

5.2.8 Worker Training and Monitoring

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All construction personnel upon entering the Site must attend a brief training meeting, its purpose being to:

- Make workers aware of the potential hazards they may encounter;
- Instruct workers on how to identify potential hazards;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make workers aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Construction personnel will be responsible for identifying potential hazards in the work zone. The project manager will be responsible for ensuring that the training is conducted. Others who enter the Site must be accompanied by a suitably-trained construction worker. In addition, any site workers within the "work zone" will have received the OSHA 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and will be under a medical monitoring program. Current certifications for key personnel are included in Appendix I.

5.2.9 Agency Approvals

The Volunteer has addressed all environmental requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work will be included in the FER. This list includes a citation of the law, statute or code to be complied with, the originating agency, and a contact name and phone number in that agency. This list will be updated in the FER.

All planned remedial or construction work in regulated wetlands and adjacent areas will be specifically approved by the NYSDEC Division of Natural Resources to ensure that it meets the requirements for substantive compliance with those regulations prior to the start of construction. Nothing in the approved RAWP or its approval by NYSDEC should be construed as an approval for this purpose.

5.2.10 NYSDEC BCP Signage

Signs are optional for BCP sites and will be discussed with the NYSDEC Project Manager. If a sign is displayed, it will follow NYSDEC specifications for design and content, provided by the NYSDEC project manager.

5.2.11 Pre-Construction Meeting with NYSDEC

A pre-construction meeting with the NYSDEC will be scheduled prior to the start of major construction activities.

5.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in the Site-Specific HASP provided in Appendix G. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

5.2.13 Remedial Action Costs

The total estimated cost of the Remedial Action cannot be estimated at this time since. An itemized and detailed summary of estimated costs for all remedial activity will be submitted as an appendix to the Final Engineering Report.

5.3 Site Preparation

5.3.1 Mobilization

Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking and staking excavation areas will be performed prior to undertaking any Site remediation activities.

5.3.2 Erosion and Sedimentation Controls

Erosion and sediment control measures will be installed at the Site prior to conducting any ground-intrusive work. These measures will be installed according to all applicable or relevant and appropriate federal, state, and local laws. The measures will provide for abatement and control of environmental pollution arising from proposed remediation and construction activities. The control measures will include procedures for perimeter Site controls, stabilized construction pads at each construction entrance, equipment decontamination, drainage inlet protection, and particulate suppression. The RE, or her designated representative, will conduct routine inspections, any repairs and/or maintenance of control measures will be completed in a timely fashion to maintain the controls in proper working order. All vehicles leaving the project Site will be inspected to ensure that no soil adheres to the wheels or undercarriage of the vehicle leaving the Site. Any situations involving material spilled in transit or mud and dust tracked off-site will be remedied. The access routes will be inspected for road conditions, overhead clearance, and weight restrictions.

5.3.3 Stabilized Construction Entrance(s)

A crushed stone path will be constructed by the general contractor at all truck entrances for the Site. All trucks will drive over this path prior to leaving so that they do not get re-contaminated prior to departure from the Site. A laborer with a hose connected to a NYC fire hydrant will check the trucks as they leave. The hose will be used to wash off soil from the truck tires and body as it leaves the Site, as necessary. A fire hydrant permit must be obtained from the NYCDEP prior to use.

5.3.4 Utility Marker and Easements Layout

The Volunteer and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, state or federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the RE. It has been determined that no risk or impediment to the planned work under this RAWP is posed by utilities or easements on the Site.

5.3.5 Sheeting and Shoring

Appropriate management of structural stability of on-site or off-site structures during on-site activities including excavation is the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, state, or federal permits or approvals that may be required to perform work under this RAWP. Further, the Volunteer and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved RAWP.

5.3.6 Equipment and Material Staging

Staging and storage of equipment and materials will be contained within the secured Site or within a secured area on the street/sidewalk in accordance with a NYCDOT permit. By the nature of the work involved in this project, equipment and materials will be moved to different areas within the secured Site as work progresses.

5.3.7 Decontamination Area

A decontamination area will be established adjacent to the work areas. The floor of the decontamination area will be covered with 6-millimeter plastic sheeting as necessary and bermed to prevent spreading of decontamination fluids or potential discharge to the ground surface.

All equipment in direct contact with known or potentially contaminated material will be either dedicated or decontaminated prior to handling less contaminated material or removal from the Site. All liquids used in the decontamination procedure will be collected, stored and disposed of in accordance with federal, state, and local regulations. Personnel performing this task will wear the proper personal protective equipment (PPE) as prescribed in the HASP.

5.3.8 Site Fencing

The Site will be secured with a locking fence that will be placed around the entire perimeter. During all remedial activities access to the Site will be limited and all persons entering the Site will be required to sign a log book and meet all applicable health and safety requirements. The Site will be secured during non-working hours. Throughout the project, security patrols will be implemented during working and non-working hours.

5.3.9 Demobilization

Restoration of the excavation work will include backfilling and general Site earthwork to prepare for construction of the foundation elements. Upon completion of the remedial excavation work, any waste materials (i.e., plastic sheeting, absorbent pads, etc.) and the decontamination pad will be removed from the Site for proper disposal.

5.4 Reporting

All daily and monthly reports will be included in the FER.

5.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day following the reporting period and will include:

- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alpha-numeric map for Site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP findings, including excursions;
- An explanation of notable Site conditions;
- A look-ahead schedule for anticipated upcoming activities; and
- Photographs of the Site documenting daily activities.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the Site that identifies work areas. These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and all complaints received from the public.

A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports submitted to NYSDEC is attached in Figure 10.

The NYSDEC assigned project number will appear on all reports.

5.4.2 Monthly Reports

Monthly reports prepared in accordance with DER-10 Section 5.7(b) will be submitted to NYSDEC and NYSDOH Project Managers by the tenth day of the month following the reporting period and will include, at a minimum:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;

- Sampling results received following internal data review and validation, as applicable; and
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

5.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the FER.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

5.4.4 Complaint Management Plan

A log of all complaints from the public regarding nuisance or other Site conditions will be compiled by the project director. All complaints will be reported in the daily reports.

5.4.5 Deviations from the Remedial Action Work Plan

This section should provide a complete description of the process to be followed if there are any deviations from the RAWP. At a minimum, this section should include the following:

- Reasons for deviating from the approved RAWP;
- Approval process to be followed for changes/editions to the RAWP; and
- Effect of the deviations on overall remedy.

6.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

Based on data collected to date, removal of materials from the Site will include: (1) excavation of soil/fill to approximately 14 feet below grade throughout a majority of the Site, to approximately 16 feet below grade and 20 feet below grade for elevator and utility pits, and to approximately 3 feet below grade along the eastern Site boundary; (2) removal of known and unknown petroleum storage tanks, fill ports, and vents (if encountered); and (3) removal of building materials from demolition. It is estimated that approximately 12,000 cubic yards of contaminated soil and fill material will be removed from the Site and disposed of at a facility(ies) licensed to accept such material. Proposed disposal facilities will be submitted to NYSDEC after completion of waste characterization sampling.

6.1 Soil Cleanup Objectives

The Soil Cleanup Objectives (SCOs) for this Site are the Track 1 UUSCOs with a contingency for Track 2 RRSCOs for a majority of the Site where the proposed depth of excavation is approximately 14 to 20 feet below grade. Track 4 SCOs have been established for the northern and eastern portions of the Site, where excavation will extend up to approximately 3 feet below grade. An approximately 1,800-square foot area located at the northern Site boundary, outside of the building footprint, will not be excavated. This area will contain a retaining wall for the north-adjacent LIRR tracks and will be capped with concrete. The proposed remedial excavation plan is shown on Figure 7.

Soil and materials management on-site and off-site will be conducted in accordance with the SMMP as described in the following sections.

Table 1 summarizes all soil samples that exceed the SCOs proposed for this Remedial Action. A concentration map that shows all soil samples that exceed the SCOs proposed for this Remedial Action is included as Figure 4.

UST closures will, at a minimum, conform to criteria defined in DER-10.

6.2 Remedial Performance Evaluation (Post Excavation Endpoint Sampling)

Post-excavation endpoint samples will be collected at the proposed locations shown on Figure 8. Additional post-excavation soil samples will be collected around any USTs encountered on the Site, if necessary.

6.2.1 Endpoint Sampling Frequency

According to the sampling frequency outlined in Section 5.4 of DER-10, endpoint sampling for the general remedial excavation will include one bottom soil sample for every 900 square feet across the Site and one sidewall sample for every 30 linear feet around the perimeter of the Site. In addition, five endpoint samples, consisting of four sidewalls and one bottom sample, will be collected around any petroleum storage tanks encountered. A total of 37 soil endpoint samples will be collected (assuming no USTs are encountered).

6.2.2 Methodology

The post-excavation endpoint samples will be collected using a decontaminated stainless steel sampling trowel, hand auger, or a dedicated wooden tongue depressor and placed directly into pre-sterilized laboratory-issued containers. The sample containers will be properly labeled and immediately placed on ice within a cooler. Sample time, date, and location will be recorded on a chain of custody. The samples will be submitted to an Environmental Laboratory Approval Program (ELAP)-certified laboratory for analysis of VOCs by EPA Method 8260, PAHs by EPA Method 8270, pesticides by EPA Method 8081, PCBs by EPA Method 8082, and heavy metals by EPA Method 6000/7000 series. The laboratory will follow the NYSDEC – Analytical Services Protocol (ASP) dated 1995 using NYSDEC ASP Category B deliverables. Further details regarding the specific sampling methodology and analytical procedures are presented in the QAPP, included as Appendix F.

6.2.3 Reporting of Results

The analytical results of the post-excavation endpoint samples will be tabulated and compared to the UUSCOs and RRSCOs, or SSSCOs (depending on where the endpoint sample was collected). The tabulated data as well as the laboratory reports will be included in the FER. All analytical data will be submitted to NYSDEC in electronic data deliverable (EDD) format via EQuIS™.

6.2.4 Quality Assurance/Quality Control (QA/QC)

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision, and completeness requirements will be addressed by the laboratory for all data generated. Collected samples will be appropriately packaged, placed in coolers, and shipped or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved to maintain a temperature of 4 °C. Decontamination of non-dedicated sampling equipment will consist of the following: gently tap or scrape to remove adhered soil; rinse with tap water; wash with Simple Green/Alconox® detergent solution and scrub; rinse with tap water; rinse with distilled or deionized water; prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

One trip blank, one field blank, one blind duplicate sample, and one matrix spike/matrix spike duplicate (MS/MSD) will be collected per every 20 samples or sample digestion group (SDG) and submitted for analysis during the endpoint sampling event. The field blank(s), blind duplicate(s), and MS/MSD(s) will include all of the parameters included in the sample analysis while the trip blank will be analyzed for VOCs only. Additional QA/QC information is provided in the QAPP, provided as Appendix F.

6.2.5 Data Usability Summary Report (DUSR)

A qualified data validator (third-party) will review the endpoint sample laboratory reports and prepare a DUSR. The DUSR will be included in the FER.

6.2.6 Reporting of Endpoint Data in FER

The FER will include a detailed description of post-excavation endpoint sampling activities, data summary tables, a concentration map showing endpoint sample locations and respective concentrations, DUSRs, and laboratory data deliverables. Chemical labs used for all endpoint sample results and contingency sampling will be NYSDOH ELAP-certified.

Endpoint sampling, including bottom and sidewall sampling, will be performed in accordance with DER-10 sample frequency requirements. Sidewall samples will be collected a minimum of every 30 linear feet. Bottom samples will be collected at a rate of one for every 900 square feet. The FER will provide a tabulated and map summary of all endpoint sample results and exceedances of the applicable SCOs.

6.3 Estimated Material Removal Quantities

The proposed remedy includes excavation to: approximately 15 feet below grade throughout a majority of the Site; to 21 feet below grade for an elevator pit; and to approximately 4 to 6 feet below grade in the northern portion of the Site. No excavation is proposed for an approximately 1,900-square foot area located along the northern Site boundary. The estimated quantity of soil/fill to be removed from the Site is approximately 12,000 cubic yards (approximately 16,800tons). The estimated quantity of soil to be imported into the Site for backfill and cover cannot be estimated at this time. No soil is anticipated to be reused on-site. Final quantities of soil removed and imported from the Site will be included in the FER.

6.4 Soil/Materials Management Plan

The SMMP describes the procedures to be performed during the handling of soil/fill materials on-site during all intrusive work.

6.4.1 Soil Screening Methods

Visual, olfactory, and PID soil screening and assessment will be performed by a qualified environmental professional or experienced field geologist/engineer/scientist under the direction of the RE during all remedial and development excavations into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) if identified during Site characterization and the Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the FER.

Screening will be performed by qualified environmental professionals experienced field geologist/engineer/scientist under the direction of the RE. Resumes will be provided for all personnel responsible for field screening (i.e., those representing the RE) of invasive work for unknown contaminant sources during remediation and development work.

6.4.2 Stockpile Methods

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 NYSDEC.

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.

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

Water will be available on-site at suitable supply and pressure for use in dust control.

6.4.3 Materials Excavation and Load Out

The RE or a qualified environmental professional under her supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP.

The presence of utilities and easements on the Site has been investigated by the RE. It has been determined that no risk or impediment to the planned work under this RAWP 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. The RE or designated person under her supervision will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the remedial construction is complete.

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

The RE or designated person under her supervision will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the state, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The RE will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP.

There are currently no known hotspots; however, if encountered, as a result of waste characterization sampling and/or remedial excavation, hotspots and any structures to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and endpoint remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill and contaminated soil on-site is prohibited.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site characterization and the Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the FER.

6.4.4 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.

Truck transport routes are as follows:

- Trucks entering the Site will take Exit 5 from I-678 and continue onto the Van Wyck Expressway; turn left onto Atlantic Avenue; turn right onto 138th Place; turn left onto 95th Avenue; turn left onto 148th Street; and turn left onto 94th Avenue. The Site will be on the right.
- Trucks leaving the Site will continue west on 94th Avenue toward Sutphin Boulevard; turn right ono the Van Wyck Expressway; and use the left lane to merge onto I-678 toward Whitestone Bridge/Bronx.

All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

Proposed in-bound and out-bound truck routes to the Site are shown on Figure 11. 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 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 to minimize off-site disturbance. Off-site queuing will be prohibited.

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.

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

6.4.5 Materials Disposal Off-Site

The disposal facility locations will be reported to the NYSDEC project manager after completion of waste characterization testing and prior to commencing soil disposal activities.

The total quantity of material expected to be disposed off-site is approximately 12,000 cubic yards. Additional construction and demolition (C&D) debris will be removed from the Site following demolition of the existing structures. Final disposal quantities for each waste stream will be included in the FER.

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, state (including 6 NYCRR Part 360), and federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC's Project Manager. Unregulated off-site management of materials from this Site is prohibited without formal NYSDEC approval.

Material that does not meet Track 1 Unrestricted Use SCOs is prohibited from being taken to a New York State recycling facility (6 NYCRR Part 360-16 Registration Facility).

The following documentation will be obtained and reported by the RE for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the RE or BCP Volunteer to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the RE. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6 NYCRR Part 360-1.2.

Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Materials Management (DMM) in NYSDEC to be C&D materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C&D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DMM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DMM, special procedures will include, at a minimum, a letter to the C&D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-site or off-site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the RE. The letter will include as an attachment a summary of all chemical data for the material being transported.

The FER will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

Bill of Lading system or equivalent will be used for off-site movement of non-hazardous wastes and contaminated soils. This information will be reported in the FER.

Hazardous wastes derived from on-site will be stored, transported, and disposed of in full compliance with applicable local, state, and federal regulations.

Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, state, and federal regulations.

Waste characterization will be performed for off-site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

6.4.6 Materials Reuse On-Site

Chemical criteria for on-site reuse of material will be approved by NYSDEC. Materials planned for reuse (if any) will be segregated and stockpiled form materials slated for off-site disposal. Stockpiles will be placed on and covered with polyethylene sheeting. The stockpiled soil will be sampled and analyzed in accordance with Table 5.4(e)10 on page 161 of DER-10 Technical Guidance for Investigation and Remediation. All soil to be reused on-site will comply with Track 2 RRSCOs. The RE will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-site.

Demolition material will not be reused on-site. Concrete crushing or processing on-site is prohibited.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-site.

Contaminated on-site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer or as backfill for subsurface utility lines. This will be expressed in the final SMP.

6.4.7 Fluids Management

All liquids to be removed from the Site, including dewatering fluids (if applicable), will be handled, transported and disposed in accordance with applicable local, state, and federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-site.

Discharge of water generated during remedial construction to surface waters (i.e., a local pond, stream or river) is prohibited without a SPDES permit.

6.4.8 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the SMP. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the SMP. A map showing the survey results will be included in the FER and the SMP.

6.4.9 Backfill from Off-Site Sources

All materials proposed for import onto the Site will be approved by the RE and will be in compliance with provisions in this RAWP prior to receipt at the Site.

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

The FER will include the following certification by the RE: "I certify that all import of soils from off-site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan".

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are the lower of the protection of groundwater or the protection of public health soil cleanup objectives for Restricted Residential Use as set forth in Table 375-6.8(b) of 6 NYCRR Part 375. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved RAWP or its approval by NYSDEC should be construed as an approval for this purpose.

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. Nothing in this RAWP should be construed as an approval for this purpose.

Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

6.4.10 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 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 RAWP 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 remedial construction area.

6.4.11 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals, VOCs and SVOCs, pesticides, and PCBs). These analyses will not be limited to CP-51 VOCs and SVOCs where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

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. These findings will be also included in daily and periodic electronic media reports.

6.4.12 Community Air Monitoring Plan

A site-specific HASP containing a CAMP has been prepared for this Site and is enclosed as Appendix G. Community air monitoring and real-time air monitoring at the perimeter of the exclusion zone will be conducted during all intrusive Site activities in accordance with the NYSDOH Generic CAMP and as described in Section 2.6 of Appendix G. A minimum of one upwind and one downwind CAMP station will be in operation during all intrusive activities. The CAMP requirements may be modified in consultation with NYSDEC for activities involving minimal soil disturbance (e.g., site preparation, pile installation, etc.).

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. Exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report.

6.4.13 Odor, Dust, and Nuisance Control Plan

The FER will include the following certification by the RE: “I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan.”

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 will include the use of a PID to screen for VOCs and olfactory observations by a field technician. If nuisance odors are identified, 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 all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Volunteer’s RE, who is responsible for certifying the FER.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and (f) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

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:

- Water will be available on-site at suitable supply and pressure for use in dust control.
- Clearing and grubbing 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 spraying.

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 and will conform, at a minimum, to NYCDEP noise control standards.

7.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

Since residual contaminated soil, groundwater, and/or soil vapor may potentially exist beneath the Site after the remedy is complete, Engineering and Institutional Controls (ECs and ICs) are required to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a Site specific SMP that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. In the event of a Track 4 Site-specific cleanup remedy, the Controlled Property (the Site) will have two primary EC systems. These are: (1) an engineered composite cover system consisting concrete building slabs and foundation walls; and (2) a vapor barrier consisting of Grace Preprufe 300R® (or equivalent). The manufacturer's specifications for the vapor barrier are enclosed as Appendix J. A map showing the proposed composite cover types and locations is included as Figure 12.

The FER will report residual contamination on the Site and will be tabulated on a map. This will include presentation of exceedances of Track 1, Track 2, and/or Track 4 SCOs.

8.0 ENGINEERING CONTROLS: COMPOSITE COVER SYSTEM

For portions of the Site where a Track 4 remedy is proposed, exposure to residual contaminated soils will be prevented by an engineered, composite cover system that will be constructed on the Site. This composite cover system will comprise a vapor barrier, concrete building slabs, and foundation walls. A diagram showing the design detail for each cover type is shown on Figure 12.

A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual contamination are disturbed after the Remedial Action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the FER.

9.0 ENGINEERING CONTROLS: COMPOSITE COVER SYSTEM

In the event that a Track 2 remedy cannot be achieved and in the area of the proposed Track 4 remedy, exposure to residual contaminated soils will be prevented by an engineered, composite cover system that will be constructed on the Site. This composite cover system will comprise a waterproofing/vapor barrier membrane (Grace Preprufe 300R® or equivalent), which doubles as a demarcation barrier, concrete building slabs, and foundation walls. A diagram showing the design detail for the cover type is shown on Figure 12.

A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual contamination are disturbed after the Remedial Action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the FER.

10.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site may have residual contamination remaining in place. ECs for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and an SMP.

All as-built drawings, diagrams, calculation and manufacturer documentation for treatment systems will be presented in the FER. A Site-specific Environmental Easement will be recorded with Queens County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

10.1 Environmental Easement

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-site after the Remedial Action is complete. As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the Queens County Office of the City Register. The Environmental Easement will be submitted as part of the FER.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the Queens County Office of the City Register before the Certificate of Completion can be issued by NYSDEC. A series of ICs are required under this remedy to implement, maintain and monitor these EC systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to restricted residential and commercial uses only. These ICs are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. ICs can, generally, be subdivided between controls that support ECs, and those that place general restrictions on Site usage or other requirements. ICs in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

The ICs that support ECs are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All ECs must be operated and maintained as specified in this SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- On-site environmental monitoring devices, including but not limited to, (groundwater monitor wells and soil vapor probes), must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP; and
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.

Adherence to these Institutional Controls for the Site is mandated by the Environmental Easement and will be implemented under the Site Management Plan (discussed in the next section). The Controlled Property (Site) will also have a series of Institutional Controls in the form of Site restrictions and requirements. The Site restrictions that apply to the Controlled Property are:

- In-ground vegetable gardens and farming on the Controlled Property are prohibited;
- Use of groundwater underlying the Controlled Property is prohibited without treatment rendering it safe for intended purpose;
- All future activities on the Controlled Property that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the Site Management Plan;
- The Controlled Property may be used for restricted residential and commercial use only, provided the long-term Engineering and Institutional Controls included in the Site Management Plan are employed;
- The Controlled Property may not be used for a higher level of use, such as unrestricted use or single-family residential use without an amendment or extinguishment of this Environmental Easement; and
- Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the

previous certification or that any changes to the controls were approved by the NYSDEC; and (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This statement must be certified by an expert that the NYSDEC finds acceptable.

10.2 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the Final Engineering Report and issuance of the Certificate of Completion (COC) for the Remedial Action. The Site Management Plan is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the Site Management Plan are performed.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) an Operation and Maintenance Plan for implementation of remedial collection, containment, treatment, and recovery systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The SMP will be based on a calendar year and will be due for submission to NYSDEC by March 1 of the year following the reporting period.

The SMP in the FER will include a monitoring plan for groundwater at the down gradient Site perimeter to evaluate Site wide performance of the remedy.

No exclusions for handling of residual contaminated soils will be provided in the SMP. All handling of residual contaminated material will be subject to provisions contained in the SMP.

11.0 FINAL ENGINEERING REPORT

An FER will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The FER will include as-built drawings for all constructed elements, calculation and manufacturer documentation for treatment systems, certifications, manifests, bills of lading as well as the complete SMP (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabulated summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easement. This determination will be made by NYSDEC in the context of the Final Engineering Report review.

The Final Engineering Report will include written and photographic documentation of all remedial work performed under this remedy.

The FER will include an itemized tabulated description of actual costs incurred during all aspects of the Remedial Action.

The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (PDF).

11.1 Certifications

The following certification will appear in front of the Executive Summary of the FER. The certification will be signed by the RE, Michelle Lapin, P.E., who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

I, Michelle Lapin, P.E., am currently a registered professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 147-25 94th Avenue Site (NYSDEC BCA Index No. Wx-xxxx-xx-xx Site No. Cxxxxxx).

I certify that the Site description presented in this FER is identical to the Site descriptions presented in the Environmental Easement, the Site Management Plan, and the Brownfield Cleanup Agreement for the 147-25 94th Avenue Site and related amendments.

I certify that the Remedial Action Work Plan dated [month day year] and Stipulations [if any] in a letter dated [month day year] and approved by the NYSDEC were implemented and that all requirements in those documents have been substantively complied with.

I certify that the remedial activities were observed by qualified environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and all operation and maintenance requirements applicable to the Site are contained in an Environmental Easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded. A Site Management Plan has been submitted by the Volunteer for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by the NYSDEC.

I certify that the export of all contaminated soil, fill, water or other material from the property was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept this material in full compliance with all federal, state, and local laws.

I certify that all import of soils from off-site, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology and soil screening methodology defined in the Remedial Action Work Plan.

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

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

12.0 SCHEDULE

The following estimated schedule has been prepared for the project:

Activity	Time To Complete
Submit RIR, RAWP, and BCP Application	December 2017
NYSDEC Completeness Check of BCP Application and Determination that Application is Complete	January 2018
45-day Public Comment Period Initiated (Environmental News Bulletin, Newspaper)	January 2018
Public Comment Period Ends	March 2018
BCP Acceptance	March 2018
Issuance of Notice to Proceed from NYCOER	March 2018
Demolition of Existing Buildings in Conjunction with Execution of BCP Agreement	April/May 2018
Preparation and Submittal of CPP	May 2018
Submittal of Final RAWP to NYSDEC/NYSDEC Approves and Issues Decision Document	May 2018
Issue Remedial/Construction Notice Fact Sheet	May 2018
Begin Redevelopment (Construction) with Implementation of RAWP	June 2018
Draft SMP Submitted to NYSDEC	June 2019
Execution of Environmental Easement	30 days after SMP approval
Draft FER and Fact Sheet	August 2019
Certificate of Completion and Fact Sheet	December 2019
Completion of Building	December 2020

TABLES

Table 7
147-07 94th Avenue
Queens, NY
Remedial Investigation Soil Analytical Results
Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-1(0-2)20171012 JC53007-16 1 mg/kg	RI-SB-1(13-15)20171012 JC53007-17 1 mg/kg	RI-SB-1(16-18)20171012 JC53007-18 1 mg/kg	RI-SB-2(0-2)20171012 JC53007-12 1 mg/kg	RI-SB-2(3-5)20171012 JC53007-13 1 mg/kg
1,1,1-Trichloroethane	**0.68**	**100**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
1,1-Dichloroethane	**0.27**	**26**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
1,1-Dichloroethene	**0.33**	**100**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
1,2,4-Trimethylbenzene	**3.6**	**52**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
1,2-Dichlorobenzene	**1.1**	**100**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
1,2-Dichloroethane	**0.02**	**3.1**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
1,3,5-Trimethylbenzene	**8.4**	**52**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
1,3-Dichlorobenzene	**2.4**	**49**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
1,4-Dichlorobenzene	**1.8**	**13**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
1,4-Dioxane (P-Dioxane)	**0.1**	**13**	0.13 U	0.15 U	0.14 U	0.13 U	0.14 U
Acetone	**0.05**	**100**	**0.0503**	**0.153**	**0.0701**	0.01 U	0.0343
Benzene	**0.06**	**4.8**	0.00053 U	0.00061 U	0.00058 U	0.00051 U	0.00056 U
Carbon Tetrachloride	**0.76**	**2.4**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
Chlorobenzene	**1.1**	**100**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
Chloroform	**0.37**	**49**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
Cis-1,2-Dichloroethylene	**0.25**	**100**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
Ethylbenzene	**1**	**41**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
Methyl Ethyl Ketone	**0.12**	**100**	0.011 U	0.012 U	0.012 U	0.01 U	0.011 U
Methylene Chloride	**0.05**	**100**	0.0053 U	0.0061 U	0.0058 U	0.0051 U	0.0056 U
M/p-xylene	**0.26 TS**	**100 TS**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0..0011 U
N-Butylbenzene	**12**	**100**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
N-Propylbenzene	**3.9**	**100**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
O-Xylene	**0.26 TS**	**100 TS**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
Sec-Butylbenzene	**11**	**100**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
T-Butylbenzene	**5.9**	**100**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
Tert-Butyl Methyl Ether	**0.93**	**100**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
Tetrachloroethylene (PCE)	**1.3**	**19**	0.00083 J	0.001 J	0.0023 U	0.00089 J	0.0027
Toluene	**0.7**	**100**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
Trans-1,2-Dichloroethene	**0.19**	**100**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
Trichloroethylene (TCE)	**0.47**	**21**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U
Vinyl Chloride	**0.02**	**0.9**	0.0021 U	0.0024 U	0.0023 U	0.002 U	0.0022 U
Xylenes, Total	**0.26**	**100**	0.0011 U	0.0012 U	0.0012 U	0.001 U	0.0011 U

Table 7
147-07 94th Avenue
Queens, NY
Remedial Investigation Soil Analytical Results
Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-X(3-5)20171012 JC53007-14 1 mg/kg	RI-SB-2(13-15)20171012 JC53007-15 1 mg/kg	RI-SB-3(0-2)20171012 JC53007-3 1 mg/kg	RI-SB-3(10-12)20171012 JC53007-4 1 mg/kg	RI-SB-3(13-15)20171012 JC53007-5 1 mg/kg
1,1,1-Trichloroethane	0.68	100	0.0023 U	0.002 U	0.11 U	0.0022 U	0.0022 U
1,1-Dichloroethane	0.27	26	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
1,1-Dichloroethene	0.33	100	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
1,2,4-Trimethylbenzene	3.6	52	0.0023 U	0.002 U	0.11 U	0.0022 U	0.0022 U
1,2-Dichlorobenzene	1.1	100	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
1,2-Dichloroethane	0.02	3.1	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
1,3,5-Trimethylbenzene	8.4	52	0.0023 U	0.002 U	0.11 U	0.0022 U	0.0022 U
1,3-Dichlorobenzene	2.4	49	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
1,4-Dichlorobenzene	1.8	13	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
1,4-Dioxane (P-Dioxane)	0.1	13	0.14 U	0.13 U	7.1 U	0.13 U	0.13 U
Acetone	0.05	100	0.0483	0.013 J	0.57 U	0.0388	0.0311 J
Benzene	0.06	4.8	0.00058 U	0.0005 U	0.029 U	0.00054 U	0.00054 U
Carbon Tetrachloride	0.76	2.4	0.0023 U	0.002 U	0.11 U	0.0022 U	0.0022 U
Chlorobenzene	1.1	100	0.0023 U	0.002 U	0.11 U	0.0022 U	0.0022 U
Chloroform	0.37	49	0.0023 U	0.002 U	0.11 U	0.0022 U	0.0022 U
Cis-1,2-Dichloroethylene	0.25	100	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
Ethylbenzene	1	41	0.0012 U	0.001 U	0.152	0.00066 J	0.0011 U
Methyl Ethyl Ketone	0.12	100	0.012 U	0.01 U	0.57 U	0.011 U	0.011 U
Methylene Chloride	0.05	100	0.0058 U	0.005 U	0.29 U	0.0054 U	0.0054 U
M/p-xylene	0.26 TS	100 TS	0.0012 U	0.001 U	0.0428 J	0.0011 U	0.0011 U
N-Butylbenzene	12	100	0.0023 U	0.002 U	0.785	0.0052	0.0022 U
N-Propylbenzene	3.9	100	0.0023 U	0.002 U	0.341	0.0019 J	0.0022 U
O-Xylene	0.26 TS	100 TS	0.0012 U	0.001 U	0.0202 J	0.0011 U	0.0011 U
Sec-Butylbenzene	11	100	0.0023 U	0.002 U	0.503	0.0032	0.0022 U
T-Butylbenzene	5.9	100	0.0023 U	0.002 U	0.0259 J	0.0022 U	0.0022 U
Tert-Butyl Methyl Ether	0.93	100	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
Tetrachloroethylene (PCE)	1.3	19	0.0022 J	0.002 U	0.11 U	0.0022 U	0.0022 U
Toluene	0.7	100	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
Trans-1,2-Dichloroethene	0.19	100	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
Trichloroethylene (TCE)	0.47	21	0.0012 U	0.001 U	0.057 U	0.0011 U	0.0011 U
Vinyl Chloride	0.02	0.9	0.0023 U	0.002 U	0.11 U	0.0022 U	0.0022 U
Xylenes, Total	0.26	100	0.0012 U	0.001 U	0.063	0.0011 U	0.0011 U

Table 7
147-07 94th Avenue
Queens, NY
Remedial Investigation Soil Analytical Results
Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-4(0-2)20171013 JC53007-25 1 mg/kg	RI-SB-4(3-5)20171013 JC53007-26 1 mg/kg	RI-SB-4(17-19)20171013 JC53007-27 1 mg/kg	RI-SB-5(0-2)20171013 JC53007-28 1 mg/kg	RI-SB-5(7-9)20171013 JC53007-29 1 mg/kg
1,1,1-Trichloroethane	**0.68**	**100**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
1,1-Dichloroethane	**0.27**	**26**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
1,1-Dichloroethene	**0.33**	**100**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
1,2,4-Trimethylbenzene	**3.6**	**52**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
1,2-Dichlorobenzene	**1.1**	**100**	0.0011 U	0.001 U	0.0011 U	0.0036	0.0013 U
1,2-Dichloroethane	**0.02**	**3.1**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
1,3,5-Trimethylbenzene	**8.4**	**52**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
1,3-Dichlorobenzene	**2.4**	**49**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
1,4-Dichlorobenzene	**1.8**	**13**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
1,4-Dioxane (P-Dioxane)	**0.1**	**13**	0.13 U	0.13 U	0.14 U	0.14 U	0.16 U
Acetone	**0.05**	**100**	**0.0652**	**0.0733**	**0.114**	0.0393	0.013 U
Benzene	**0.06**	**4.8**	0.00054 U	0.00052 U	0.00055 U	0.00054 U	0.00063 U
Carbon Tetrachloride	**0.76**	**2.4**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
Chlorobenzene	**1.1**	**100**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
Chloroform	**0.37**	**49**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
Cis-1,2-Dichloroethylene	**0.25**	**100**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
Ethylbenzene	**1**	**41**	0.0011 U	0.001 U	0.0011 U	0.00034 J	0.0013 U
Methyl Ethyl Ketone	**0.12**	**100**	0.011 U	0.01 U	0.011 U	0.011 U	0.013 U
Methylene Chloride	**0.05**	**100**	0.0054 U	0.0052 U	0.0055 U	0.0054 U	0.0063 U
M/p-xylene	**0.26 TS**	**100 TS**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
N-Butylbenzene	**12**	**100**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
N-Propylbenzene	**3.9**	**100**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
O-Xylene	**0.26 TS**	**100 TS**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
Sec-Butylbenzene	**11**	**100**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
T-Butylbenzene	**5.9**	**100**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
Tert-Butyl Methyl Ether	**0.93**	**100**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
Tetrachloroethylene (PCE)	**1.3**	**19**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
Toluene	**0.7**	**100**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
Trans-1,2-Dichloroethene	**0.19**	**100**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
Trichloroethylene (TCE)	**0.47**	**21**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U
Vinyl Chloride	**0.02**	**0.9**	0.0021 U	0.0021 U	0.0022 U	0.0022 U	0.0025 U
Xylenes, Total	**0.26**	**100**	0.0011 U	0.001 U	0.0011 U	0.0011 U	0.0013 U

Table 7
147-07 94th Avenue
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Remedial Investigation Soil Analytical Results
Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-5(17-19)20171013 JC53007-30 1 mg/kg	RI-SB-6(0-2)20171016 JC53007-40 1 mg/kg	RI-SB-6(7-9)20171016 JC53007-41 1 mg/kg	RI-SB-6(17-19)20171016 JC53007-42 1 mg/kg	RI-SB-7(0-2)20171012 JC53007-19 1 mg/kg
1,1,1-Trichloroethane	0.68	100	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
1,1-Dichloroethane	0.27	26	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
1,1-Dichloroethene	0.33	100	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
1,2,4-Trimethylbenzene	3.6	52	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
1,2-Dichlorobenzene	1.1	100	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
1,2-Dichloroethane	0.02	3.1	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
1,3,5-Trimethylbenzene	8.4	52	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
1,3-Dichlorobenzene	2.4	49	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
1,4-Dichlorobenzene	1.8	13	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
1,4-Dioxane (P-Dioxane)	0.1	13	0.14 U	0.13 U	0.14 U	0.15 U	0.14 U
Acetone	0.05	100	0.011 U	0.01 U	0.011 U	0.012 U	0.016
Benzene	0.06	4.8	0.00054 U	0.00052 U	0.00055 U	0.0006 U	0.00054 U
Carbon Tetrachloride	0.76	2.4	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
Chlorobenzene	1.1	100	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
Chloroform	0.37	49	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
Cis-1,2-Dichloroethylene	0.25	100	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
Ethylbenzene	1	41	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
Methyl Ethyl Ketone	0.12	100	0.011 U	0.01 U	0.011 U	0.012 U	0.011 U
Methylene Chloride	0.05	100	0.0034 J	0.0052 U	0.0055 U	0.006 U	0.0054 U
M/p-xylene	0.26 TS	100 TS	0.0013 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
N-Butylbenzene	12	100	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
N-Propylbenzene	3.9	100	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
O-Xylene	0.26 TS	100 TS	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
Sec-Butylbenzene	11	100	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
T-Butylbenzene	5.9	100	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
Tert-Butyl Methyl Ether	0.93	100	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
Tetrachloroethylene (PCE)	1.3	19	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
Toluene	0.7	100	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
Trans-1,2-Dichloroethene	0.19	100	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
Trichloroethylene (TCE)	0.47	21	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U
Vinyl Chloride	0.02	0.9	0.0022 U	0.0021 U	0.0022 U	0.0024 U	0.0022 U
Xylenes, Total	0.26	100	0.0011 U	0.001 U	0.0011 U	0.0012 U	0.0011 U

Table 7
147-07 94th Avenue
Queens, NY
Remedial Investigation Soil Analytical Results
Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-7(2-4)20171012 JC53007-20 1 mg/kg	RI-SB-7(13-15)2017012 JC53007-21 1 mg/kg	RI-SB-8(0-2)20171016 JC53007-33 1 mg/kg	RI-SB-8(6-8)20171016 JC53007-34 1 mg/kg	RI-SB-8(17-19)20171016 JC53007-35 1 mg/kg
1,1,1-Trichloroethane	0.68	100	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
1,1-Dichloroethane	0.27	26	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
1,1-Dichloroethene	0.33	100	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
1,2,4-Trimethylbenzene	3.6	52	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
1,2-Dichlorobenzene	1.1	100	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
1,2-Dichloroethane	0.02	3.1	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
1,3,5-Trimethylbenzene	8.4	52	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
1,3-Dichlorobenzene	2.4	49	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
1,4-Dichlorobenzene	1.8	13	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
1,4-Dioxane (P-Dioxane)	0.1	13	0.12 U	0.16 U	0.15 U	0.15 U	0.14 U
Acetone	0.05	100	0.0265	0.013 U	0.012 U	0.012 U	0.011 U
Benzene	0.06	4.8	0.00049 U	0.00065 U	0.00062 U	0.00061 U	0.00056 U
Carbon Tetrachloride	0.76	2.4	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
Chlorobenzene	1.1	100	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
Chloroform	0.37	49	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
Cis-1,2-Dichloroethylene	0.25	100	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
Ethylbenzene	1	41	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
Methyl Ethyl Ketone	0.12	100	0.0098 U	0.013 U	0.012 U	0.012 U	0.011 U
Methylene Chloride	0.05	100	0.0049 U	0.0065 U	0.0062 U	0.0061 U	0.0056 U
M/p-xylene	0.26 TS	100 TS	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
N-Butylbenzene	12	100	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
N-Propylbenzene	3.9	100	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
O-Xylene	0.26 TS	100 TS	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
Sec-Butylbenzene	11	100	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
T-Butylbenzene	5.9	100	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
Tert-Butyl Methyl Ether	0.93	100	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
Tetrachloroethylene (PCE)	1.3	19	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
Toluene	0.7	100	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
Trans-1,2-Dichloroethene	0.19	100	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
Trichloroethylene (TCE)	0.47	21	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U
Vinyl Chloride	0.02	0.9	0.002 U	0.0026 U	0.0025 U	0.0024 U	0.0022 U
Xylenes, Total	0.26	100	0.00098 U	0.0013 U	0.0012 U	0.0012 U	0.0011 U

Table 7
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Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-9(3-5)20171017 JC53007-49 1 mg/kg	RI-SB-10(3-5)20171017 JC53007-50 1 mg/kg	RI-SB-11(0-2)20171016 JC53007-36 1 mg/kg	RI-SB-11(8-10)20171016 JC53007-37 1 mg/kg	RI-SB-X(8-10)20171016 JC53007-38 1 mg/kg
1,1,1-Trichloroethane	**0.68**	**100**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
1,1-Dichloroethane	**0.27**	**26**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
1,1-Dichloroethene	**0.33**	**100**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
1,2,4-Trimethylbenzene	**3.6**	**52**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
1,2-Dichlorobenzene	**1.1**	**100**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
1,2-Dichloroethane	**0.02**	**3.1**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
1,3,5-Trimethylbenzene	**8.4**	**52**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
1,3-Dichlorobenzene	**2.4**	**49**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
1,4-Dichlorobenzene	**1.8**	**13**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
1,4-Dioxane (P-Dioxane)	**0.1**	**13**	0.14 U	0.18 U	0.14 U	0.14 U	0.14 U
Acetone	**0.05**	**100**	0.011 U	0.014 U	0.011 U	0.011 U	0.011 U
Benzene	**0.06**	**4.8**	0.00056 U	0.00071 U	0.00055 U	0.00055 U	0.00055 U
Carbon Tetrachloride	**0.76**	**2.4**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
Chlorobenzene	**1.1**	**100**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
Chloroform	**0.37**	**49**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
Cis-1,2-Dichloroethylene	**0.25**	**100**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
Ethylbenzene	**1**	**41**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
Methyl Ethyl Ketone	**0.12**	**100**	0.011 U	0.014 U	0.011 U	0.011 U	0.011 U
Methylene Chloride	**0.05**	**100**	0.0056 U	0.0071 U	0.0055 U	0.0055 U	0.0055 U
M/p-xylene	**0.26 TS**	**100 TS**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
N-Butylbenzene	**12**	**100**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
N-Propylbenzene	**3.9**	**100**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
O-Xylene	**0.26 TS**	**100 TS**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
Sec-Butylbenzene	**11**	**100**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
T-Butylbenzene	**5.9**	**100**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
Tert-Butyl Methyl Ether	**0.93**	**100**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
Tetrachloroethylene (PCE)	**1.3**	**19**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
Toluene	**0.7**	**100**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
Trans-1,2-Dichloroethene	**0.19**	**100**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
Trichloroethylene (TCE)	**0.47**	**21**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U
Vinyl Chloride	**0.02**	**0.9**	0.0023 U	0.0028 U	0.0022 U	0.0022 U	0.0022 U
Xylenes, Total	**0.26**	**100**	0.0011 U	0.0014 U	0.0011 U	0.0011 U	0.0011 U

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Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-11(17-19)20171016 JC53007-39 1 mg/kg	RI-SB-12(0-2)20171016 JC53007-43 1 mg/kg	RI-SB-12(7-9)20171016 JC53007-44 1 mg/kg	RI-SB-X(7-9)20171016 JC53007-45 1 mg/kg	RI-SB-12(17-19)20171016 JC53007-46 1 mg/kg
1,1,1-Trichloroethane	0.68	100	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
1,1-Dichloroethane	0.27	26	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
1,1-Dichloroethene	0.33	100	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
1,2,4-Trimethylbenzene	3.6	52	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
1,2-Dichlorobenzene	1.1	100	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
1,2-Dichloroethane	0.02	3.1	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
1,3,5-Trimethylbenzene	8.4	52	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
1,3-Dichlorobenzene	2.4	49	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
1,4-Dichlorobenzene	1.8	13	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
1,4-Dioxane (P-Dioxane)	0.1	13	0.13 U	0.15 U	0.15 U	0.16 U	0.15 U
Acetone	0.05	100	0.011 U	0.012 U	0.012 U	0.013 U	0.012 U
Benzene	0.06	4.8	0.00053 U	0.00059 U	0.0006 U	0.00066 U	0.0006 U
Carbon Tetrachloride	0.76	2.4	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
Chlorobenzene	1.1	100	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
Chloroform	0.37	49	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
Cis-1,2-Dichloroethylene	0.25	100	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
Ethylbenzene	1	41	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
Methyl Ethyl Ketone	0.12	100	0.011 U	0.012 U	0.012 U	0.013 U	0.012 U
Methylene Chloride	0.05	100	0.0053 U	0.0059 U	0.006 U	0.0066 U	0.006 U
M/p-xylene	0.26 TS	100 TS	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
N-Butylbenzene	12	100	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
N-Propylbenzene	3.9	100	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
O-Xylene	0.26 TS	100 TS	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
Sec-Butylbenzene	11	100	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
T-Butylbenzene	5.9	100	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
Tert-Butyl Methyl Ether	0.93	100	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
Tetrachloroethylene (PCE)	1.3	19	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
Toluene	0.7	100	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
Trans-1,2-Dichloroethene	0.19	100	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
Trichloroethylene (TCE)	0.47	21	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U
Vinyl Chloride	0.02	0.9	0.0021 U	0.0024 U	0.0024 U	0.0026 U	0.0024 U
Xylenes, Total	0.26	100	0.0011 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U

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Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-13(0-2)20171012 JC53007-6 1 mg/kg	RI-SB-13(3-5)20171012 JC53007-7 1 mg/kg	RI-SB-13(13-15)20171012 JC53007-8 1 mg/kg	RI-SB-14(0-2)20171012 JC53007-9 1 mg/kg	RI-SB-14(2-4)20171012 JC53007-10 1 mg/kg
1,1,1-Trichloroethane	**0.68**	**100**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
1,1-Dichloroethane	**0.27**	**26**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
1,1-Dichloroethene	**0.33**	**100**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
1,2,4-Trimethylbenzene	**3.6**	**52**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
1,2-Dichlorobenzene	**1.1**	**100**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
1,2-Dichloroethane	**0.02**	**3.1**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
1,3,5-Trimethylbenzene	**8.4**	**52**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
1,3-Dichlorobenzene	**2.4**	**49**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
1,4-Dichlorobenzene	**1.8**	**13**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
1,4-Dioxane (P-Dioxane)	**0.1**	**13**	0.14 U	0.13 U	0.13 U	0.12 U	0.12 U
Acetone	**0.05**	**100**	**0.283**	**0.058 J**	0.0074 J	0.0443 J	0.0487
Benzene	**0.06**	**4.8**	0.00055 U	0.00053 U	0.00052 U	0.00047 U	0.00049 U
Carbon Tetrachloride	**0.76**	**2.4**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
Chlorobenzene	**1.1**	**100**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
Chloroform	**0.37**	**49**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
Cis-1,2-Dichloroethylene	**0.25**	**100**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
Ethylbenzene	**1**	**41**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
Methyl Ethyl Ketone	**0.12**	**100**	0.011 U	0.011 U	0.01 U	0.0094 U	0.0097 U
Methylene Chloride	**0.05**	**100**	0.0055 U	0.0053 U	0.0052 U	0.0047 U	0.0049 U
M/p-xylene	**0.26 TS**	**100 TS**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
N-Butylbenzene	**12**	**100**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
N-Propylbenzene	**3.9**	**100**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
O-Xylene	**0.26 TS**	**100 TS**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
Sec-Butylbenzene	**11**	**100**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
T-Butylbenzene	**5.9**	**100**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
Tert-Butyl Methyl Ether	**0.93**	**100**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
Tetrachloroethylene (PCE)	**1.3**	**19**	0.0043	0.0018 J	0.0021 U	0.0013 J	0.0019 U
Toluene	**0.7**	**100**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
Trans-1,2-Dichloroethene	**0.19**	**100**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
Trichloroethylene (TCE)	**0.47**	**21**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U
Vinyl Chloride	**0.02**	**0.9**	0.0022 U	0.0021 U	0.0021 U	0.0019 U	0.0019 U
Xylenes, Total	**0.26**	**100**	0.0011 U	0.0011 U	0.001 U	0.00094 U	0.00097 U

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Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-14(13-15)20171012 JC53007-11 1 mg/kg	RI-DW-1(3-4)20171012 JC53007-22 1 mg/kg	RI-DW-2(12-13)20171012 JC53007-23 1 mg/kg	RI-DW-3(11-12)20171012 JC53007-24 1 mg/kg
1,1,1-Trichloroethane	**0.68**	**100**	0.0022 U	0.042 U	0.00085 U	0.00065 U
1,1-Dichloroethane	**0.27**	**26**	0.0011 U	0.019 U	0.00038 U	0.00029 U
1,1-Dichloroethene	**0.33**	**100**	0.0011 U	0.051 U	0.001 U	0.00079 U
1,2,4-Trimethylbenzene	**3.6**	**52**	0.0022 U	0.175	0.0483	0.496 E
1,2-Dichlorobenzene	**1.1**	**100**	0.0011 U	0.038 U	0.00076 U	0.00058 U
1,2-Dichloroethane	**0.02**	**3.1**	0.0011 U	0.013 U	0.00026 U	0.0002 U
1,3,5-Trimethylbenzene	**8.4**	**52**	0.0022 U	0.073 U	0.0132	0.15
1,3-Dichlorobenzene	**2.4**	**49**	0.0011 U	0.021 U	0.00042 U	0.00032 U
1,4-Dichlorobenzene	**1.8**	**13**	0.0011 U	0.035 U	0.0007 U	0.00054 U
1,4-Dioxane (P-Dioxane)	**0.1**	**13**	0.14 U	3.4 U	0.07 U	0.053 U
Acetone	**0.05**	**100**	0.0349	0.47 U	**0.14**	**0.155**
Benzene	**0.06**	**4.8**	0.00055 U	0.0078 U	0.00016 U	0.00029 J
Carbon Tetrachloride	**0.76**	**2.4**	0.0022 U	0.047 U	0.00095 U	0.00073 U
Chlorobenzene	**1.1**	**100**	0.0022 U	0.021 U	0.00042 U	0.00032 U
Chloroform	**0.37**	**49**	0.0022 U	0.023 U	0.00047 U	0.00036 U
Cis-1,2-Dichloroethylene	**0.25**	**100**	0.0011 U	0.029 U	0.00059 U	0.00045 U
Ethylbenzene	**1**	**41**	0.0011 U	0.021 U	0.0082	0.0261
Methyl Ethyl Ketone	**0.12**	**100**	0.011 U	0.38 U	0.0337	0.0186
Methylene Chloride	**0.05**	**100**	0.0055 U	0.18 U	0.0037 U	0.0028 U
M/p-xylene	**0.26 TS**	**100 TS**	0.0011 U	0.04 U	0.0105	0.0625
N-Butylbenzene	**12**	**100**	0.0022 U	0.026 U	0.0049	0.105
N-Propylbenzene	**3.9**	**100**	0.0022 U	0.0293 J	0.0043	0.0528
O-Xylene	**0.26 TS**	**100 TS**	0.0011 U	0.018 U	0.007	0.0333
Sec-Butylbenzene	**11**	**100**	0.0022 U	0.017 U	0.0021 J	0.0391
T-Butylbenzene	**5.9**	**100**	0.0022 U	0.032 U	0.00065 U	0.00049 U
Tert-Butyl Methyl Ether	**0.93**	**100**	0.0011 U	0.031 U	0.00063 U	0.00048 U
Tetrachloroethylene (PCE)	**1.3**	**19**	0.0022 U	0.046 U	0.00094 U	0.0011 J
Toluene	**0.7**	**100**	0.0011 U	**2.59**	0.0016	**2.63 E**
Trans-1,2-Dichloroethene	**0.19**	**100**	0.0011 U	0.042 U	0.00086 U	0.00065 U
Trichloroethylene (TCE)	**0.47**	**21**	0.0011 U	0.04 U	0.0008 U	0.00061 U
Vinyl Chloride	**0.02**	**0.9**	0.0022 U	0.056 U	0.0011 U	0.00086 U
Xylenes, Total	**0.26**	**100**	0.0011 U	0.018 U	0.0175	0.0958

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Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-FB-1-20171012 JC53007-2 1 µg/L	RI-FB-2-20171013 JC53007-31 1 µg/L	RI-FB-3-20171016 JC53007-47 1 µg/L
1,1,1-Trichloroethane	0.68	100	1 U	1 U	1 U
1,1-Dichloroethane	0.27	26	1 U	1 U	1 U
1,1-Dichloroethene	0.33	100	1 U	1 U	1 U
1,2,4-Trimethylbenzene	3.6	52	2 U	2 U	2 U
1,2-Dichlorobenzene	1.1	100	1 U	1 U	1 U
1,2-Dichloroethane	0.02	3.1	1 U	1 U	1 U
1,3,5-Trimethylbenzene	8.4	52	2 U	2 U	2 U
1,3-Dichlorobenzene	2.4	49	1 U	1 U	1 U
1,4-Dichlorobenzene	1.8	13	1 U	1 U	1 U
1,4-Dioxane (P-Dioxane)	0.1	13	130 U	130 U	130 U
Acetone	0.05	100	10 U	10 U	10 U
Benzene	0.06	4.8	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.76	2.4	1 U	1 U	1 U
Chlorobenzene	1.1	100	1 U	1 U	1 U
Chloroform	0.37	49	1 U	1 U	1 U
Cis-1,2-Dichloroethylene	0.25	100	1 U	1 U	1 U
Ethylbenzene	1	41	1 U	1 U	1 U
Methyl Ethyl Ketone	0.12	100	10 U	10 U	10 U
Methylene Chloride	0.05	100	2 U	2 U	2 U
M/p-xylene	0.26 TS	100 TS	1 U	1 U	1 U
N-Butylbenzene	12	100	2 U	2 U	2 U
N-Propylbenzene	3.9	100	2 U	2 U	2 U
O-Xylene	0.26 TS	100 TS	1 U	1 U	1 U
Sec-Butylbenzene	11	100	2 U	2 U	2 U
T-Butylbenzene	5.9	100	2 U	2 U	2 U
Tert-Butyl Methyl Ether	0.93	100	1 U	1 U	1 U
Tetrachloroethylene (PCE)	1.3	19	1 U	1 U	1 U
Toluene	0.7	100	1 U	1 U	1 U
Trans-1,2-Dichloroethene	0.19	100	1 U	1 U	1 U
Trichloroethylene (TCE)	0.47	21	1 U	1 U	1 U
Vinyl Chloride	0.02	0.9	1 U	1 U	1 U
Xylenes, Total	0.26	100	1 U	1 U	1 U

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Volaitile Organic Comopunds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-TB-1-20171012 JC53007-1 1 µg/L	RI-TB-2-20171013 JC53007-32 1 µg/L	RI-TB-3-20171016 JC53007-48 1 µg/L
1,1,1-Trichloroethane	0.68	100	1 U	1 U	1 U
1,1-Dichloroethane	0.27	26	1 U	1 U	1 U
1,1-Dichloroethene	0.33	100	1 U	1 U	1 U
1,2,4-Trimethylbenzene	3.6	52	2 U	2 U	2 U
1,2-Dichlorobenzene	1.1	100	1 U	1 U	1 U
1,2-Dichloroethane	0.02	3.1	1 U	1 U	1 U
1,3,5-Trimethylbenzene	8.4	52	2 U	2 U	2 U
1,3-Dichlorobenzene	2.4	49	1 U	1 U	1 U
1,4-Dichlorobenzene	1.8	13	1 U	1 U	1 U
1,4-Dioxane (P-Dioxane)	0.1	13	130 U	130 U	130 U
Acetone	0.05	100	10 U	10 U	10 U
Benzene	0.06	4.8	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.76	2.4	1 U	1 U	1 U
Chlorobenzene	1.1	100	1 U	1 U	1 U
Chloroform	0.37	49	1 U	1 U	1 U
Cis-1,2-Dichloroethylene	0.25	100	1 U	1 U	1 U
Ethylbenzene	1	41	1 U	1 U	1 U
Methyl Ethyl Ketone	0.12	100	10 U	10 U	10 U
Methylene Chloride	0.05	100	2 U	2 U	2 U
M/p-xylene	0.26 TS	100 TS	1 U	1 U	1 U
N-Butylbenzene	12	100	2 U	2 U	2 U
N-Propylbenzene	3.9	100	2 U	2 U	2 U
O-Xylene	0.26 TS	100 TS	1 U	1 U	1 U
Sec-Butylbenzene	11	100	2 U	2 U	2 U
T-Butylbenzene	5.9	100	2 U	2 U	2 U
Tert-Butyl Methyl Ether	0.93	100	1 U	1 U	1 U
Tetrachloroethylene (PCE)	1.3	19	1 U	1 U	1 U
Toluene	0.7	100	1 U	1 U	1 U
Trans-1,2-Dichloroethene	0.19	100	1 U	1 U	1 U
Trichloroethylene (TCE)	0.47	21	1 U	1 U	1 U
Vinyl Chloride	0.02	0.9	1 U	1 U	1 U
Xylenes, Total	0.26	100	1 U	1 U	1 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-1(0-2)20171012 JC53007-16 1 mg/kg	RI-SB-1(13-15)20171012 JC53007-17 1 mg/kg	RI-SB-1(16-18)20171012 JC53007-18 1 mg/kg	RI-SB-2(0-2)20171012 JC53007-12 1 mg/kg
2-Methylphenol (O-Cresol)	0.33	100	0.071 U	0.07 U	0.066 U	0.072 U
4-Methylphenol (P-Cresol)	0.33	100	0.071 U	0.07 U	0.066 U	0.072 U
Acenaphthene	20	100	0.0319 J	0.503	0.033 U	0.036 U
Acenaphthylene	100	100	0.0367	0.0459	0.033 U	0.036 U
Anthracene	100	100	0.0986	0.813	0.033 U	0.036 U
Benzo(A)Anthracene	1	1	0.275	**1.53**	0.033 U	0.0821
Benzo(A)Pyrene	1	1	0.28	**1.26**	0.033 U	0.0865
Benzo(B)Fluoranthene	1	1	0.343	**1.53**	0.033 U	0.124
Benzo(G,H,I)Perylene	100	100	0.203	0.694	0.033 U	0.0656
Benzo(K)Fluoranthene	0.8	3.9	0.133	0.609	0.033 U	0.0411
Chrysene	1	3.9	0.316	**1.66**	0.033 U	0.0977
Dibenz(A,H)Anthracene	0.33	0.33	0.0599	0.251	0.033 U	0.0175 J
Dibenzofuran	7	59	0.0277 J	0.221	0.066 U	0.072 U
Fluoranthene	100	100	0.55	2.76	0.033 U	0.138
Fluorene	30	100	0.0375	0.463	0.033 U	0.036 U
Hexachlorobenzene	0.33	1.2	0.071 U	0.07 U	0.066 U	0.072 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.222	**0.822**	0.033 U	0.0752
Naphthalene	12	100	0.0367	0.14	0.033 U	0.036 U
Pentachlorophenol	0.8	6.7	0.14 U	0.14 U	0.13 U	0.14 U
Phenanthrene	100	100	0.497	4.25 D	0.033 U	0.0763
Phenol	0.33	100	0.071 U	0.07 U	0.066 U	0.072 U
Pyrene	100	100	0.653	3.27	0.033 U	0.167

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-2(3-5)20171012 JC53007-13 1 mg/kg	RI-SB-X(3-5)20171012 JC53007-14 1 mg/kg	RI-SB-2(13-15)20171012 JC53007-15 1 mg/kg	RI-SB-3(0-2)20171012 JC53007-3 1 mg/kg
2-Methylphenol (O-Cresol)	0.33	100	0.075 U	0.078 U	0.067 U	0.073 U
4-Methylphenol (P-Cresol)	0.33	100	0.075 U	0.078 U	0.067 U	0.073 U
Acenaphthene	20	100	0.0156 J	0.039 U	0.034 U	0.726
Acenaphthylene	100	100	0.038 U	0.039 U	0.034 U	0.037 U
Anthracene	100	100	0.0371 J	0.039 U	0.034 U	0.037 U
Benzo(A)Anthracene	1	1	0.0732	0.0213 J	0.034 U	0.0568
Benzo(A)Pyrene	1	1	0.0657	0.0225 J	0.034 U	0.0489
Benzo(B)Fluoranthene	1	1	0.0702	0.0246 J	0.034 U	0.0631
Benzo(G,H,I)Perylene	100	100	0.0322 J	0.039 U	0.034 U	0.041
Benzo(K)Fluoranthene	0.8	3.9	0.0324 J	0.039 U	0.034 U	0.0234 J
Chrysene	1	3.9	0.0701	0.0209 J	0.034 U	0.112
Dibenz(A,H)Anthracene	0.33	0.33	0.038 U	0.039 U	0.034 U	0.037 U
Dibenzofuran	7	59	0.075 U	0.078 U	0.067 U	0.562
Fluoranthene	100	100	0.155	0.0278 J	0.034 U	0.242 D
Fluorene	30	100	0.038 U	0.039 U	0.034 U	2.15
Hexachlorobenzene	0.33	1.2	0.075 U	0.078 U	0.067 U	0.073 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.0351 J	0.039 U	0.034 U	0.0409
Naphthalene	12	100	0.038 U	0.039 U	0.034 U	1.86
Pentachlorophenol	0.8	6.7	0.15 U	0.16 U	0.13 U	0.15 U
Phenanthrene	100	100	0.158	0.0228 J	0.034 U	4.79 D
Phenol	0.33	100	0.075 U	0.078 U	0.067 U	0.073 U
Pyrene	100	100	0.154	0.0301 J	0.034 U	0.682

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2-Methylphenol (O-Cresol)	0.33	100	0.069 U	0.068 U	0.067 U	0.07 U
4-Methylphenol (P-Cresol)	0.33	100	0.069 U	0.068 U	0.067 U	0.07 U
Acenaphthene	20	100	0.192	0.034 U	0.0523	0.035 U
Acenaphthylene	100	100	0.034 U	0.034 U	0.023 J	0.0534
Anthracene	100	100	0.034 U	0.034 U	0.2	0.168
Benzo(A)Anthracene	1	1	0.0251 J	0.034 U	0.633	0.209
Benzo(A)Pyrene	1	1	0.0169 J	0.034 U	0.62	0.219
Benzo(B)Fluoranthene	1	1	0.0213 J	0.034 U	0.894	0.297
Benzo(G,H,I)Perylene	100	100	0.034 U	0.034 U	0.508	0.18
Benzo(K)Fluoranthene	0.8	3.9	0.034 U	0.034 U	0.276	0.118
Chrysene	1	3.9	0.0303 J	0.034 U	0.677	0.253
Dibenz(A,H)Anthracene	0.33	0.33	0.034 U	0.034 U	0.136	0.0495
Dibenzofuran	7	59	0.171	0.068 U	0.0512 J	0.07 U
Fluoranthene	100	100	0.0626	0.034 U	1.29	0.364
Fluorene	30	100	0.55	0.034 U	0.0698	0.0194 J
Hexachlorobenzene	0.33	1.2	0.069 U	0.068 U	0.067 U	0.07 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.034 U	0.034 U	0.452	0.154
Naphthalene	12	100	0.272	0.034 U	0.0245 J	0.035 U
Pentachlorophenol	0.8	6.7	0.14 U	0.14 U	0.13 U	0.14 U
Phenanthrene	100	100	1.14	0.034 U	1.17	0.175
Phenol	0.33	100	0.069 U	0.068 U	0.067 U	0.07 U
Pyrene	100	100	0.175	0.034 U	1.25	0.364

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-4(17-19)20171013 JC53007-27 1 mg/kg	RI-SB-5(0-2)20171013 JC53007-28 1 mg/kg	RI-SB-5(7-9)20171013 JC53007-29 1 mg/kg	RI-SB-5(17-19)20171013 JC53007-30 1 mg/kg
2-Methylphenol (O-Cresol)	0.33	100	0.066 U	0.36 U	0.073 U	0.066 U
4-Methylphenol (P-Cresol)	0.33	100	0.066 U	0.36 U	0.073 U	0.066 U
Acenaphthene	20	100	0.033 U	0.0763 J	0.037 U	0.033 U
Acenaphthylene	100	100	0.033 U	0.18 U	0.037 U	0.033 U
Anthracene	100	100	0.0361	0.266	0.037 U	0.033 U
Benzo(A)Anthracene	1	1	0.1	0.772	0.0762	0.033 U
Benzo(A)Pyrene	1	1	0.0971	0.782	0.0845	0.033 U
Benzo(B)Fluoranthene	1	1	0.131	**1.08**	0.0918	0.033 U
Benzo(G,H,I)Perylene	100	100	0.075	0.57	0.0532	0.033 U
Benzo(K)Fluoranthene	0.8	3.9	0.0482	0.33	0.0369 J	0.033 U
Chrysene	1	3.9	0.105	0.902	0.0776	0.033 U
Dibenz(A,H)Anthracene	0.33	0.33	0.0189 J	0.167 J	0.037 U	0.033 U
Dibenzofuran	7	59	0.066 U	0.36 U	0.073 U	0.066 U
Fluoranthene	100	100	0.211	1.71	0.0912	0.033 U
Fluorene	30	100	0.033 U	0.0943 J	0.037 U	0.033 U
Hexachlorobenzene	0.33	1.2	0.066 U	0.36 U	0.073 U	0.066 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.0663	**0.512**	0.0456	0.033 U
Naphthalene	12	100	0.033 U	0.18 U	0.037 U	0.033 U
Pentachlorophenol	0.8	6.7	0.13 U	0.72 U	0.15 U	0.13 U
Phenanthrene	100	100	0.194	1.49	0.0533	0.033 U
Phenol	0.33	100	0.066 U	0.36 U	0.073 U	0.066 U
Pyrene	100	100	0.227	1.71	0.117	0.033 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-6(0-2)20171016 JC53007-40 1 mg/kg	RI-SB-6(7-9)20171016 JC53007-41 1 mg/kg	RI-SB-6(17-19)20171016 JC53007-42 1 mg/kg	RI-SB-7(0-2)20171012 JC53007-19 1 mg/kg
2-Methylphenol (O-Cresol)	0.33	100	0.07 U	0.067 U	0.062 U	0.076 U
4-Methylphenol (P-Cresol)	0.33	100	0.07 U	0.067 U	0.062 U	0.076 U
Acenaphthene	20	100	0.139	0.034 U	0.031 U	0.038 U
Acenaphthylene	100	100	0.0284 J	0.034 U	0.031 U	0.038 U
Anthracene	100	100	0.416	0.034 U	0.031 U	0.038 U
Benzo(A)Anthracene	1	1	**1.12**	0.034 U	0.031 U	0.0394
Benzo(A)Pyrene	1	1	**1.08**	0.034 U	0.031 U	0.045
Benzo(B)Fluoranthene	1	1	**1.56**	0.034 U	0.031 U	0.0568
Benzo(G,H,I)Perylene	100	100	0.797	0.034 U	0.031 U	0.0361 J
Benzo(K)Fluoranthene	0.8	3.9	0.392	0.034 U	0.031 U	0.0238 J
Chrysene	1	3.9	**1.19**	0.034 U	0.031 U	0.0458
Dibenz(A,H)Anthracene	0.33	0.33	0.215	0.034 U	0.031 U	0.038 U
Dibenzofuran	7	59	0.151	0.067 U	0.062 U	0.076 U
Fluoranthene	100	100	2.29	0.034 U	0.031 U	0.0876
Fluorene	30	100	0.207	0.034 U	0.031 U	0.038 U
Hexachlorobenzene	0.33	1.2	0.07 U	0.067 U	0.062 U	0.076 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	**0.709**	0.034 U	0.031 U	0.0356 J
Naphthalene	12	100	0.049	0.034 U	0.031 U	0.038 U
Pentachlorophenol	0.8	6.7	0.14 U	0.13 U	0.12 U	0.15 U
Phenanthrene	100	100	2.46	0.034 U	0.031 U	0.0545
Phenol	0.33	100	0.07 U	0.067 U	0.062 U	0.076 U
Pyrene	100	100	2.13	0.034 U	0.031 U	0.0845

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2-Methylphenol (O-Cresol)	0.33	100	0.078 U	0.069 U	0.069 U	0.067 U
4-Methylphenol (P-Cresol)	0.33	100	0.078 U	0.069 U	0.069 U	0.067 U
Acenaphthene	20	100	0.039 U	0.034 U	0.171	0.033 U
Acenaphthylene	100	100	0.039 U	0.034 U	0.1	0.033 U
Anthracene	100	100	0.039 U	0.034 U	0.57	0.033 U
Benzo(A)Anthracene	1	1	0.039 U	0.034 U	**1.44**	0.033 U
Benzo(A)Pyrene	1	1	0.039 U	0.034 U	**1.47**	0.033 U
Benzo(B)Fluoranthene	1	1	0.039 U	0.034 U	**2.18**	0.033 U
Benzo(G,H,I)Perylene	100	100	0.039 U	0.034 U	1.18	0.033 U
Benzo(K)Fluoranthene	0.8	3.9	0.039 U	0.034 U	0.529	0.033 U
Chrysene	1	3.9	0.039 U	0.034 U	**1.7**	0.033 U
Dibenz(A,H)Anthracene	0.33	0.33	0.039 U	0.034 U	**0.333**	0.033 U
Dibenzofuran	7	59	0.078 U	0.069 U	0.239	0.067 U
Fluoranthene	100	100	0.039 U	0.034 U	2.99	0.033 U
Fluorene	30	100	0.039 U	0.034 U	0.268	0.033 U
Hexachlorobenzene	0.33	1.2	0.078 U	0.069 U	0.069 U	0.067 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.039 U	0.034 U	**1.04**	0.033 U
Naphthalene	12	100	0.039 U	0.034 U	0.192	0.033 U
Pentachlorophenol	0.8	6.7	0.16 U	0.14 U	0.14 U	0.13 U
Phenanthrene	100	100	0.039 U	0.034 U	3.34	0.033 U
Phenol	0.33	100	0.078 U	0.069 U	0.069 U	0.067 U
Pyrene	100	100	0.039 U	0.034 U	2.91	0.033 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-8(17-19)20171016 JC53007-35 1 mg/kg	RI-SB-9(3-5)20171017 JC53007-49 1 mg/kg	RI-SB-10(3-5)20171017 JC53007-50 1 mg/kg	RI-SB-11(0-2)20171016 JC53007-36 1 mg/kg
2-Methylphenol (O-Cresol)	0.33	100	0.059 U	0.067 U	0.064 U	0.072 U
4-Methylphenol (P-Cresol)	0.33	100	0.059 U	0.067 U	0.064 U	0.072 U
Acenaphthene	20	100	0.03 U	0.033 U	0.032 U	0.0445
Acenaphthylene	100	100	0.03 U	0.033 U	0.032 U	0.036 U
Anthracene	100	100	0.03 U	0.033 U	0.032 U	0.151
Benzo(A)Anthracene	1	1	0.03 U	0.033 U	0.032 U	0.43
Benzo(A)Pyrene	1	1	0.03 U	0.033 U	0.032 U	0.42
Benzo(B)Fluoranthene	1	1	0.03 U	0.033 U	0.032 U	0.583
Benzo(G,H,I)Perylene	100	100	0.03 U	0.033 U	0.032 U	0.329
Benzo(K)Fluoranthene	0.8	3.9	0.03 U	0.033 U	0.032 U	0.185
Chrysene	1	3.9	0.03 U	0.033 U	0.032 U	0.471
Dibenz(A,H)Anthracene	0.33	0.33	0.03 U	0.033 U	0.032 U	0.0806
Dibenzofuran	7	59	0.059 U	0.067 U	0.064 U	0.0405 J
Fluoranthene	100	100	0.03 U	0.033 U	0.032 U	0.971
Fluorene	30	100	0.03 U	0.033 U	0.032 U	0.0537
Hexachlorobenzene	0.33	1.2	0.059 U	0.067 U	0.064 U	0.072 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.03 U	0.033 U	0.032 U	0.338
Naphthalene	12	100	0.03 U	0.033 U	0.032 U	0.0222 J
Pentachlorophenol	0.8	6.7	0.12 U	0.13 U	0.13 U	0.14 U
Phenanthrene	100	100	0.03 U	0.033 U	0.032 U	0.829
Phenol	0.33	100	0.059 U	0.067 U	0.064 U	0.072 U
Pyrene	100	100	0.03 U	0.033 U	0.032 U	0.883

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2-Methylphenol (O-Cresol)	0.33	100	0.064 U	0.067 U	0.07 U	0.071 U
4-Methylphenol (P-Cresol)	0.33	100	0.064 U	0.067 U	0.07 U	0.071 U
Acenaphthene	20	100	0.032 U	0.034 U	0.035 U	0.0322 J
Acenaphthylene	100	100	0.032 U	0.034 U	0.035 U	0.036 U
Anthracene	100	100	0.032 U	0.034 U	0.035 U	0.137
Benzo(A)Anthracene	1	1	0.032 U	0.034 U	0.035 U	0.388
Benzo(A)Pyrene	1	1	0.032 U	0.034 U	0.035 U	0.374
Benzo(B)Fluoranthene	1	1	0.032 U	0.034 U	0.035 U	0.499
Benzo(G,H,I)Perylene	100	100	0.032 U	0.034 U	0.035 U	0.272
Benzo(K)Fluoranthene	0.8	3.9	0.032 U	0.034 U	0.035 U	0.171
Chrysene	1	3.9	0.032 U	0.034 U	0.035 U	0.402
Dibenz(A,H)Anthracene	0.33	0.33	0.032 U	0.034 U	0.035 U	0.0654
Dibenzofuran	7	59	0.064 U	0.067 U	0.07 U	0.0337 J
Fluoranthene	100	100	0.032 U	0.034 U	0.035 U	0.922
Fluorene	30	100	0.032 U	0.034 U	0.035 U	0.0431
Hexachlorobenzene	0.33	1.2	0.064 U	0.067 U	0.07 U	0.071 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.032 U	0.034 U	0.035 U	0.284
Naphthalene	12	100	0.032 U	0.034 U	0.035 U	0.0214 J
Pentachlorophenol	0.8	6.7	0.13 U	0.13 U	0.14 U	0.14 U
Phenanthrene	100	100	0.032 U	0.034 U	0.035 U	0.762
Phenol	0.33	100	0.064 U	0.067 U	0.07 U	0.071 U
Pyrene	100	100	0.0133 J	0.034 U	0.035 U	0.8

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2-Methylphenol (O-Cresol)	0.33	100	0.062 U	0.068 U	0.068 U	0.076 U
4-Methylphenol (P-Cresol)	0.33	100	0.062 U	0.068 U	0.068 U	0.076 U
Acenaphthene	20	100	0.0136 J	0.0372	0.034 U	0.0181 J
Acenaphthylene	100	100	0.031 U	0.034 U	0.034 U	0.038
Anthracene	100	100	0.0502	0.134	0.034 U	0.0801
Benzo(A)Anthracene	1	1	0.153	0.408	0.034 U	0.333
Benzo(A)Pyrene	1	1	0.154	0.42	0.034 U	0.335
Benzo(B)Fluoranthene	1	1	0.222	0.601	0.034 U	0.448
Benzo(G,H,I)Perylene	100	100	0.109	0.319	0.034 U	0.27
Benzo(K)Fluoranthene	0.8	3.9	0.077	0.191	0.034 U	0.156
Chrysene	1	3.9	0.159	0.442	0.034 U	0.387
Dibenz(A,H)Anthracene	0.33	0.33	0.0311	0.0859	0.034 U	0.0675
Dibenzofuran	7	59	0.014 J	0.0384 J	0.068 U	0.0153 J
Fluoranthene	100	100	0.369	0.99	0.034 U	0.528
Fluorene	30	100	0.0195 J	0.0537	0.034 U	0.038 U
Hexachlorobenzene	0.33	1.2	0.062 U	0.068 U	0.068 U	0.076 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.0963	0.283	0.034 U	0.282
Naphthalene	12	100	0.031 U	0.018 J	0.034 U	0.0239 J
Pentachlorophenol	0.8	6.7	0.12 U	0.14 U	0.14 U	0.15 U
Phenanthrene	100	100	0.297	0.834	0.034 U	0.296
Phenol	0.33	100	0.062 U	0.068 U	0.068 U	0.076 U
Pyrene	100	100	0.323	0.874	0.034 U	0.701

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Semivolaitile Organic Comopunds (SVOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-13(3-5)20171012 JC53007-7 1 mg/kg	RI-SB-13(13-15)20171012 JC53007-8 1 mg/kg	RI-SB-14(0-2)20171012 JC53007-9 1 mg/kg	RI-SB-14(2-4)20171012 JC53007-10 1 mg/kg
2-Methylphenol (O-Cresol)	0.33	100	0.074 U	0.071 U	0.074 U	0.079 U
4-Methylphenol (P-Cresol)	0.33	100	0.074 U	0.071 U	0.074 U	0.079 U
Acenaphthene	20	100	0.037 U	0.036 U	0.037 U	0.039 U
Acenaphthylene	100	100	0.037 U	0.036 U	0.037 U	0.039 U
Anthracene	100	100	0.0266 J	0.036 U	0.0485	0.039 U
Benzo(A)Anthracene	1	1	0.151	0.036 U	0.197	0.039 U
Benzo(A)Pyrene	1	1	0.171	0.036 U	0.18	0.039 U
Benzo(B)Fluoranthene	1	1	0.18	0.036 U	0.251	0.039 U
Benzo(G,H,I)Perylene	100	100	0.132	0.036 U	0.135	0.039 U
Benzo(K)Fluoranthene	0.8	3.9	0.08	0.036 U	0.082	0.039 U
Chrysene	1	3.9	0.17	0.036 U	0.203	0.039 U
Dibenz(A,H)Anthracene	0.33	0.33	0.0392	0.036 U	0.0352 J	0.039 U
Dibenzofuran	7	59	0.074 U	0.071 U	0.074 U	0.079 U
Fluoranthene	100	100	0.163	0.036 U	0.455	0.039 U
Fluorene	30	100	0.037 U	0.036 U	0.037 U	0.039 U
Hexachlorobenzene	0.33	1.2	0.074 U	0.071 U	0.074 U	0.079 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.115	0.036 U	0.135	0.039 U
Naphthalene	12	100	0.037 U	0.036 U	0.037 U	0.039 U
Pentachlorophenol	0.8	6.7	0.15 U	0.14 U	0.15 U	0.16 U
Phenanthrene	100	100	0.126	0.036 U	0.314	0.039 U
Phenol	0.33	100	0.074 U	0.071 U	0.074 U	0.079 U
Pyrene	100	100	0.24	0.036 U	0.405	0.039 U

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Semivolaitile Organic Comopunds (SVOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-14(13-15)20171012 JC53007-11 1 mg/kg	RI-DW-1(3-4)20171012 JC53007-22 1 mg/kg	RI-DW-2(12-13)20171012 JC53007-23 1 mg/kg	RI-DW-3(11-12)20171012 JC53007-24 1 mg/kg
2-Methylphenol (O-Cresol)	0.33	100	0.067 U	0.027 U	0.03 U	0.055 U
4-Methylphenol (P-Cresol)	0.33	100	0.067 U	1.53	0.039 U	0.071 U
Acenaphthene	20	100	0.034 U	0.0531	0.166	0.138
Acenaphthylene	100	100	0.034 U	0.021 U	0.024 U	0.044 U
Anthracene	100	100	0.034 U	0.177	0.029 U	0.053 U
Benzo(A)Anthracene	1	1	0.034 U	0.53	0.0573	0.0444 J
Benzo(A)Pyrene	1	1	0.034 U	0.494	0.0671	0.039 U
Benzo(B)Fluoranthene	1	1	0.034 U	0.683	0.124	0.0906
Benzo(G,H,I)Perylene	100	100	0.034 U	0.369	0.085	0.0476 J
Benzo(K)Fluoranthene	0.8	3.9	0.034 U	0.247	0.0372 J	0.04 U
Chrysene	1	3.9	0.034 U	0.617	0.134	0.087
Dibenz(A,H)Anthracene	0.33	0.33	0.034 U	0.102	0.021 U	0.038 U
Dibenzofuran	7	59	0.067 U	0.0443 J	0.019 U	0.035 U
Fluoranthene	100	100	0.034 U	1.2	0.204	0.133
Fluorene	30	100	0.034 U	0.0639	0.311	0.185
Hexachlorobenzene	0.33	1.2	0.067 U	0.011 U	0.012 U	0.022 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	0.034 U	0.416	0.0656	0.04 U
Naphthalene	12	100	0.034 U	0.0217 J	0.181	0.21 D
Pentachlorophenol	0.8	6.7	0.13 U	0.039 U	0.045 U	0.081 U
Phenanthrene	100	100	0.034 U	1.05	0.584	0.495
Phenol	0.33	100	0.067 U	0.126	0.025 U	0.045 U
Pyrene	100	100	0.034 U	1.27	0.337	0.26

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Semivolaitile Organic Comopunds (SVOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-FB-1-20171012 JC53007-2 1 µg/L	RI-FB-2-20171013 JC53007-31 1 µg/L	RI-FB-3-20171016 JC53007-47 1 µg/L
2-Methylphenol (O-Cresol)	0.33	100	2 U	2 U	2 U
4-Methylphenol (P-Cresol)	0.33	100	2 U	2 U	2 U
Acenaphthene	20	100	1 U	1 U	1 U
Acenaphthylene	100	100	1 U	1 U	1 U
Anthracene	100	100	1 U	1 U	1 U
Benzo(A)Anthracene	1	1	1 U	1 U	1 U
Benzo(A)Pyrene	1	1	1 U	1 U	1 U
Benzo(B)Fluoranthene	1	1	1 U	1 U	1 U
Benzo(G,H,I)Perylene	100	100	1 U	1 U	1 U
Benzo(K)Fluoranthene	0.8	3.9	1 U	1 U	1 U
Chrysene	1	3.9	1 U	1 U	1 U
Dibenz(A,H)Anthracene	0.33	0.33	1 U	1 U	1 U
Dibenzofuran	7	59	5 U	5 U	5 U
Fluoranthene	100	100	1 U	1 U	1 U
Fluorene	30	100	1 U	1 U	1 U
Hexachlorobenzene	0.33	1.2	1 U	1 U	1 U
Indeno(1,2,3-C,D)Pyrene	0.5	0.5	1 U	1 U	1 U
Naphthalene	12	100	1 U	1 U	1 U
Pentachlorophenol	0.8	6.7	4 U	4 U	4 U
Phenanthrene	100	100	1 U	1 U	1 U
Phenol	0.33	100	2 U	2 U	2 U
Pyrene	100	100	1 U	1 U	1 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-1(0-2)20171012 JC53007-16 1 mg/kg	RI-SB-1(13-15)20171012 JC53007-17 1 mg/kg	RI-SB-1(16-18)20171012 JC53007-18 1 mg/kg	RI-SB-2(0-2)20171012 JC53007-12 1 mg/kg
PCB-1016 (Aroclor 1016)	NS	NS	0.014 U	0.014 U	0.013 U	0.014 U
PCB-1221 (Aroclor 1221)	NS	NS	0.014 U	0.015 U	0.013 U	0.014 U
PCB-1232 (Aroclor 1232)	NS	NS	0.0091 U	0.0096 U	0.0087 U	0.0094 U
PCB-1242 (Aroclor 1242)	NS	NS	0.0054 U	0.0057 U	0.0051 U	0.0056 U
PCB-1248 (Aroclor 1248)	NS	NS	0.02 U	0.021 U	0.019 U	0.02 U
PCB-1254 (Aroclor 1254)	NS	NS	0.0084 U	0.0088 U	0.0079 U	0.0086 U
PCB-1260 (Aroclor 1260)	NS	NS	0.011 U	0.011 U	0.01 U	0.011 U
Total PCBs	0.1	1	0.0819 U	0.0851 U	0.0767 U	0.0826 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-2(3-5)20171012 JC53007-13 1 mg/kg	RI-SB-X(3-5)20171012 JC53007-14 1 mg/kg	RI-SB-2(13-15)20171012 JC53007-15 1 mg/kg	RI-SB-3(0-2)20171012 JC53007-3 1 mg/kg
PCB-1016 (Aroclor 1016)	**NS**	**NS**	0.015 U	0.015 U	0.013 U	0.015 U
PCB-1221 (Aroclor 1221)	**NS**	**NS**	0.015 U	0.016 U	0.013 U	0.015 U
PCB-1232 (Aroclor 1232)	**NS**	**NS**	0.0097 U	0.01 U	0.0088 U	0.0098 U
PCB-1242 (Aroclor 1242)	**NS**	**NS**	0.0057 U	0.0061 U	0.0052 U	0.0058 U
PCB-1248 (Aroclor 1248)	**NS**	**NS**	0.021 U	0.023 U	0.019 U	0.021 U
PCB-1254 (Aroclor 1254)	**NS**	**NS**	0.0089 U	0.0095 U	0.0081 U	0.009 U
PCB-1260 (Aroclor 1260)	**NS**	**NS**	0.011 U	0.012 U	0.01 U	0.012 U
Total PCBs	**0.1**	**1**	0.0863 U	0.0916 U	0.0771 U	0.0876 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-3(10-12)20171012 JC53007-4 1 mg/kg	RI-SB-3(13-15)20171012 JC53007-5 1 mg/kg	RI-SB-4(0-2)20171013 JC53007-25 1 mg/kg	RI-SB-4(3-5)20171013 JC53007-26 1 mg/kg
PCB-1016 (Aroclor 1016)	**NS**	**NS**	0.013 U	0.013 U	0.013 U	0.014 U
PCB-1221 (Aroclor 1221)	**NS**	**NS**	0.013 U	0.014 U	0.013 U	0.014 U
PCB-1232 (Aroclor 1232)	**NS**	**NS**	0.0086 U	0.009 U	0.0086 U	0.0093 U
PCB-1242 (Aroclor 1242)	**NS**	**NS**	0.0051 U	0.0053 U	0.0051 U	0.0055 U
PCB-1248 (Aroclor 1248)	**NS**	**NS**	0.019 U	0.02 U	0.019 U	0.02 U
PCB-1254 (Aroclor 1254)	**NS**	**NS**	0.0079 U	0.0083 U	0.0079 U	0.0085 U
PCB-1260 (Aroclor 1260)	**NS**	**NS**	0.01 U	0.011 U	0.01 U	0.011 U
Total PCBs	**0.1**	**1**	0.0766 U	0.0806 U	0.0766 U	0.0823 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-4(17-19)20171013 JC53007-27 1 mg/kg	RI-SB-5(0-2)20171013 JC53007-28 1 mg/kg	RI-SB-5(7-9)20171013 JC53007-29 1 mg/kg	RI-SB-5(17-19)20171013 JC53007-30 1 mg/kg
PCB-1016 (Aroclor 1016)	NS	NS	0.013 U	0.014 U	0.014 U	0.013 U
PCB-1221 (Aroclor 1221)	NS	NS	0.013 U	0.014 U	0.014 U	0.014 U
PCB-1232 (Aroclor 1232)	NS	NS	0.0087 U	0.0093 U	0.0094 U	0.0089 U
PCB-1242 (Aroclor 1242)	NS	NS	0.0052 U	0.0055 U	0.0056 U	0.0053 U
PCB-1248 (Aroclor 1248)	NS	NS	0.019 U	0.02 U	0.021 U	0.019 U
PCB-1254 (Aroclor 1254)	NS	NS	0.008 U	0.0085 U	0.0086 U	0.0081 U
PCB-1260 (Aroclor 1260)	NS	NS	0.01 U	0.011 U	0.011 U	0.01 U
Total PCBs	0.1	1	0.0769 U	0.0823 U	0.0836 U	0.0783 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-6(0-2)20171016 JC53007-40 1 mg/kg	RI-SB-6(7-9)20171016 JC53007-41 1 mg/kg	RI-SB-6(17-19)20171016 JC53007-42 1 mg/kg	RI-SB-7(0-2)20171012 JC53007-19 1 mg/kg
PCB-1016 (Aroclor 1016)	NS	NS	0.014 U	0.014 U	0.012 U	0.014 U
PCB-1221 (Aroclor 1221)	NS	NS	0.014 U	0.014 U	0.013 U	0.014 U
PCB-1232 (Aroclor 1232)	NS	NS	0.0092 U	0.0092 U	0.0083 U	0.0095 U
PCB-1242 (Aroclor 1242)	NS	NS	0.0054 U	0.0055 U	0.0049 U	0.0056 U
PCB-1248 (Aroclor 1248)	NS	NS	0.02 U	0.02 U	0.018 U	0.021 U
PCB-1254 (Aroclor 1254)	NS	NS	0.0084 U	0.0084 U	0.0076 U	0.0087 U
PCB-1260 (Aroclor 1260)	NS	NS	0.011 U	0.011 U	0.0098 U	0.011 U
Total PCBs	0.1	1	0.082 U	0.0821 U	0.0736 U	0.0838 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-7(2-4)20171012 JC53007-20 1 mg/kg	RI-SB-7(13-15)2017012 JC53007-21 1 mg/kg	RI-SB-8(0-2)20171016 JC53007-33 1 mg/kg	RI-SB-8(6-8)20171016 JC53007-34 1 mg/kg
PCB-1016 (Aroclor 1016)	NS	NS	0.015 U	0.013 U	0.013 U	0.013 U
PCB-1221 (Aroclor 1221)	NS	NS	0.016 U	0.013 U	0.013 U	0.013 U
PCB-1232 (Aroclor 1232)	NS	NS	0.01 U	0.0088 U	0.0088 U	0.0085 U
PCB-1242 (Aroclor 1242)	NS	NS	0.0061 U	0.0052 U	0.0052 U	0.005 U
PCB-1248 (Aroclor 1248)	NS	NS	0.022 U	0.019 U	0.019 U	0.019 U
PCB-1254 (Aroclor 1254)	NS	NS	0.0094 U	0.0081 U	0.0528	0.0078 U
PCB-1260 (Aroclor 1260)	NS	NS	0.012 U	0.01 U	0.01 U	0.01 U
Total PCBs	0.1	1	0.0905 U	0.0771 U	0.0528	0.0763 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-8(17-19)20171016 JC53007-35 1 mg/kg	RI-SB-9(3-5)20171017 JC53007-49 1 mg/kg	RI-SB-10(3-5)20171017 JC53007-50 1 mg/kg	RI-SB-11(0-2)20171016 JC53007-36 1 mg/kg
PCB-1016 (Aroclor 1016)	NS	NS	0.013 U	0.013 U	0.013 U	0.014 U
PCB-1221 (Aroclor 1221)	NS	NS	0.014 U	0.014 U	0.013 U	0.014 U
PCB-1232 (Aroclor 1232)	NS	NS	0.0089 U	0.0089 U	0.0086 U	0.0094 U
PCB-1242 (Aroclor 1242)	NS	NS	0.0053 U	0.0053 U	0.0051 U	0.0056 U
PCB-1248 (Aroclor 1248)	NS	NS	0.019 U	0.019 U	0.019 U	0.021 U
PCB-1254 (Aroclor 1254)	NS	NS	0.0082 U	0.0082 U	0.0079 U	0.0086 U
PCB-1260 (Aroclor 1260)	NS	NS	0.01 U	0.01 U	0.01 U	0.011 U
Total PCBs	0.1	1	0.0784 U	0.0784 U	0.0766 U	0.0836 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-11(8-10)20171016 JC53007-37 1 mg/kg	RI-SB-X(8-10)20171016 JC53007-38 1 mg/kg	RI-SB-11(17-19)20171016 JC53007-39 1 mg/kg
PCB-1016 (Aroclor 1016)	NS	NS	0.014 U	0.013 U	0.015 U
PCB-1221 (Aroclor 1221)	NS	NS	0.014 U	0.013 U	0.015 U
PCB-1232 (Aroclor 1232)	NS	NS	0.0093 U	0.0088 U	0.0097 U
PCB-1242 (Aroclor 1242)	NS	NS	0.0055 U	0.0052 U	0.0058 U
PCB-1248 (Aroclor 1248)	NS	NS	0.02 U	0.019 U	0.021 U
PCB-1254 (Aroclor 1254)	NS	NS	0.0085 U	0.0081 U	0.0089 U
PCB-1260 (Aroclor 1260)	NS	NS	0.011 U	0.01 U	0.011 U
Total PCBs	0.1	1	0.0823 U	0.0771 U	0.0864 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-12(0-2)20171016 JC53007-43 1 mg/kg	RI-SB-12(7-9)20171016 JC53007-44 1 mg/kg	RI-SB-X(7-9)20171016 JC53007-45 1 mg/kg	RI-SB-12(17-19)20171016 JC53007-46 1 mg/kg
PCB-1016 (Aroclor 1016)	**NS**	**NS**	0.013 U	0.013 U	0.014 U	0.013 U
PCB-1221 (Aroclor 1221)	**NS**	**NS**	0.014 U	0.013 U	0.014 U	0.013 U
PCB-1232 (Aroclor 1232)	**NS**	**NS**	0.0089 U	0.0087 U	0.0092 U	0.0087 U
PCB-1242 (Aroclor 1242)	**NS**	**NS**	0.0053 U	0.0052 U	0.0055 U	0.0052 U
PCB-1248 (Aroclor 1248)	**NS**	**NS**	0.019 U	0.019 U	0.02 U	0.019 U
PCB-1254 (Aroclor 1254)	**NS**	**NS**	0.0082 U	0.008 U	0.0085 U	0.008 U
PCB-1260 (Aroclor 1260)	**NS**	**NS**	0.01 U	0.01 U	0.011 U	0.01 U
Total PCBs	**0.1**	**1**	0.0784 U	0.0769 U	0.0822 U	0.0769 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-13(0-2)20171012 JC53007-6 1 mg/kg	RI-SB-13(3-5)20171012 JC53007-7 1 mg/kg	RI-SB-13(13-15)20171012 JC53007-8 1 mg/kg
PCB-1016 (Aroclor 1016)	NS	NS	0.015 U	0.014 U	0.014 U
PCB-1221 (Aroclor 1221)	NS	NS	0.015 U	0.015 U	0.014 U
PCB-1232 (Aroclor 1232)	NS	NS	0.0098 U	0.0096 U	0.0091 U
PCB-1242 (Aroclor 1242)	NS	NS	0.0058 U	0.0057 U	0.0054 U
PCB-1248 (Aroclor 1248)	NS	NS	0.021 U	0.021 U	0.02 U
PCB-1254 (Aroclor 1254)	NS	NS	0.009 U	0.0088 U	0.0083 U
PCB-1260 (Aroclor 1260)	NS	NS	0.012 U	0.011 U	0.011 U
Total PCBs	0.1	1	0.0876 U	0.0851 U	0.0818 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-14(0-2)20171012 JC53007-9 1 mg/kg	RI-SB-14(2-4)20171012 JC53007-10 1 mg/kg	RI-SB-14(13-15)20171012 JC53007-11 1 mg/kg
PCB-1016 (Aroclor 1016)	**NS**	**NS**	0.014 U	0.015 U	0.013 U
PCB-1221 (Aroclor 1221)	**NS**	**NS**	0.014 U	0.015 U	0.013 U
PCB-1232 (Aroclor 1232)	**NS**	**NS**	0.0091 U	0.01 U	0.0086 U
PCB-1242 (Aroclor 1242)	**NS**	**NS**	0.0054 U	0.0059 U	0.0051 U
PCB-1248 (Aroclor 1248)	**NS**	**NS**	0.02 U	0.022 U	0.019 U
PCB-1254 (Aroclor 1254)	**NS**	**NS**	0.0083 U	0.0092 U	0.0079 U
PCB-1260 (Aroclor 1260)	**NS**	**NS**	0.011 U	0.012 U	0.01 U
Total PCBs	**0.1**	**1**	0.0818 U	0.0891 U	0.0766 U

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Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-FB-1-20171012 JC53007-2 1 µg/L	RI-FB-2-20171013 JC53007-31 1 µg/L	RI-FB-3-20171016 JC53007-47 1 µg/L
PCB-1016 (Aroclor 1016)	NS	NS	0.33 U	0.33 U	0.33 U
PCB-1221 (Aroclor 1221)	NS	NS	0.33 U	0.33 U	0.33 U
PCB-1232 (Aroclor 1232)	NS	NS	0.33 U	0.33 U	0.33 U
PCB-1242 (Aroclor 1242)	NS	NS	0.33 U	0.33 U	0.33 U
PCB-1248 (Aroclor 1248)	NS	NS	0.33 U	0.33 U	0.33 U
PCB-1254 (Aroclor 1254)	NS	NS	0.33 U	0.33 U	0.33 U
PCB-1260 (Aroclor 1260)	NS	NS	0.33 U	0.33 U	0.33 U
Total PCBs	0.1	1	0.33 U	0.33 U	0.33 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-1(0-2)20171012 JC53007-16 5 mg/kg	RI-SB-1(13-15)20171012 JC53007-17 1 mg/kg	RI-SB-1(16-18)20171012 JC53007-18 1 mg/kg
Aldrin	**0.005**	**0.097**	0.004	0.00072 U	0.00065 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.02**	**0.48**	0.00068 U	0.00072 U	0.00065 U
Alpha Endosulfan	**NS**	**NS**	0.00068 U	0.00072 U	0.00065 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.036**	**0.36**	0.00068 U	0.00072 U	0.00065 U
Beta Endosulfan	**NS**	**NS**	0.00068 U	0.00072 U	0.00065 U
cis-Chlordane	**0.094**	**4.2**	0.003	0.0054	0.00065 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	**100**	0.00068 U	0.00072 U	0.00065 U
Dieldrin	**0.005**	**0.2**	**0.0813 D**	**0.0134**	0.00065 U
Endosulfan Sulfate	**NS**	**NS**	0.00068 U	0.00072 U	0.00065 U
Endrin	**0.014**	**11**	0.00068 U	0.00072 U	0.00065 U
Gamma Bhc (Lindane)	**0.1**	**1.3**	0.00068 U	0.00072 U	0.00065 U
Heptachlor	**0.042**	**2.1**	0.00068 U	0.00072 U	0.00065 U
P,P'-DDD	**0.0033**	**13**	0.00068 U	0.00072 U	0.00065 U
P,P'-DDE	**0.0033**	**8.9**	0.00068 U	0.00072 U	0.00065 U
P,P'-DDT	**0.0033**	**7.9**	0.00068 U	0.002	0.00065 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-2(0-2)20171012 JC53007-12 1 mg/kg	RI-SB-2(3-5)20171012 JC53007-13 1 mg/kg	RI-SB-X(3-5)20171012 JC53007-14 1 mg/kg
Aldrin	**0.005**	**0.097**	0.0007 U	0.00072 U	0.00077 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.02**	**0.48**	0.0007 U	0.00072 U	0.00077 U
Alpha Endosulfan	**NS**	**NS**	0.0007 U	0.00072 U	0.00077 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.036**	**0.36**	0.0007 U	0.00072 U	0.00077 U
Beta Endosulfan	**NS**	**NS**	0.0007 U	0.00072 U	0.00077 U
cis-Chlordane	**0.094**	**4.2**	0.0073	0.00072 U	0.00077 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	**100**	0.0007 U	0.00072 U	0.00077 U
Dieldrin	**0.005**	**0.2**	**0.0055**	0.00072 U	0.00077 U
Endosulfan Sulfate	**NS**	**NS**	0.0007 U	0.00072 U	0.00077 U
Endrin	**0.014**	**11**	0.0007 U	0.00072 U	0.00077 U
Gamma Bhc (Lindane)	**0.1**	**1.3**	0.0007 U	0.00072 U	0.00077 U
Heptachlor	**0.042**	**2.1**	0.0007 U	0.00072 U	0.00077 U
P,P'-DDD	**0.0033**	**13**	0.0007 U	0.00072 U	0.00077 U
P,P'-DDE	**0.0033**	**8.9**	0.0007 U	0.00072 U	0.00077 U
P,P'-DDT	**0.0033**	**7.9**	0.0007 U	0.00072 U	0.00077 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-2(13-15)20171012 JC53007-15 1 mg/kg	RI-SB-3(0-2)20171012 JC53007-3 1 mg/kg	RI-SB-3(10-12)20171012 JC53007-4 1 mg/kg
Aldrin	**0.005**	**0.097**	0.00066 U	0.00073 U	0.00064 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.02**	**0.48**	0.00066 U	0.00073 U	0.00064 U
Alpha Endosulfan	**NS**	**NS**	0.00066 U	0.00073 U	0.00064 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.036**	**0.36**	0.00066 U	0.00073 U	0.00064 U
Beta Endosulfan	**NS**	**NS**	0.00066 U	0.00073 U	0.00064 U
cis-Chlordane	**0.094**	**4.2**	0.00066 U	0.00073 U	0.00064 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	**100**	0.00066 U	0.00073 U	0.00064 U
Dieldrin	**0.005**	**0.2**	0.00066 U	0.00073 U	0.00064 U
Endosulfan Sulfate	**NS**	**NS**	0.00066 U	0.00073 U	0.00064 U
Endrin	**0.014**	**11**	0.00066 U	0.00073 U	0.00064 U
Gamma Bhc (Lindane)	**0.1**	**1.3**	0.00066 U	0.00073 U	0.00064 U
Heptachlor	**0.042**	**2.1**	0.00066 U	0.00073 U	0.00064 U
P,P'-DDD	**0.0033**	**13**	0.00066 U	0.00073 U	0.00064 U
P,P'-DDE	**0.0033**	**8.9**	0.00066 U	0.00073 U	0.00064 U
P,P'-DDT	**0.0033**	**7.9**	0.00066 U	0.00073 U	0.00064 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-3(13-15)20171012 JC53007-5 1 mg/kg	RI-SB-4(0-2)20171013 JC53007-25 1 mg/kg	RI-SB-4(3-5)20171013 JC53007-26 1 mg/kg
Aldrin	0.005	0.097	0.00067 U	0.00064 U	0.00069 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.00067 U	0.00064 U	0.00069 U
Alpha Endosulfan	NS	NS	0.00067 U	0.00064 U	0.00069 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.00067 U	0.00064 U	0.00069 U
Beta Endosulfan	NS	NS	0.00067 U	0.00064 U	0.00069 U
cis-Chlordane	0.094	4.2	0.00067 U	0.00064 U	0.00069 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.00067 U	0.00064 U	0.00069 U
Dieldrin	0.005	0.2	0.00067 U	0.00064 U	0.00069 U
Endosulfan Sulfate	NS	NS	0.00067 U	0.00064 U	0.00069 U
Endrin	0.014	11	0.00067 U	0.00064 U	0.00069 U
Gamma Bhc (Lindane)	0.1	1.3	0.00067 U	0.00064 U	0.00069 U
Heptachlor	0.042	2.1	0.00067 U	0.00064 U	0.00069 U
P,P'-DDD	0.0033	13	0.00067 U	0.00064 U	0.00069 U
P,P'-DDE	0.0033	8.9	0.00067 U	0.00064 U	0.00069 U
P,P'-DDT	0.0033	7.9	0.00067 U	0.00064 U	0.00069 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-4(17-19)20171013 JC53007-27 1 mg/kg	RI-SB-5(0-2)20171013 JC53007-28 1 mg/kg	RI-SB-5(7-9)20171013 JC53007-29 1 mg/kg
Aldrin	**0.005**	**0.097**	0.00065 U	0.00069 U	0.0007 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.02**	**0.48**	0.00065 U	0.00069 U	0.0007 U
Alpha Endosulfan	**NS**	**NS**	0.00065 U	0.00069 U	0.0007 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.036**	**0.36**	0.00065 U	0.00069 U	0.0007 U
Beta Endosulfan	**NS**	**NS**	0.00065 U	0.00069 U	0.0007 U
cis-Chlordane	**0.094**	**4.2**	0.00065 U	0.00069 U	0.0007 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	**100**	0.00065 U	0.00069 U	0.0007 U
Dieldrin	**0.005**	**0.2**	0.00065 U	0.00069 U	0.0007 U
Endosulfan Sulfate	**NS**	**NS**	0.00065 U	0.00069 U	0.0007 U
Endrin	**0.014**	**11**	0.00065 U	0.00069 U	0.0007 U
Gamma Bhc (Lindane)	**0.1**	**1.3**	0.00065 U	0.00069 U	0.0007 U
Heptachlor	**0.042**	**2.1**	0.00065 U	0.00069 U	0.0007 U
P,P'-DDD	**0.0033**	**13**	0.00065 U	0.00069 U	0.0007 U
P,P'-DDE	**0.0033**	**8.9**	0.00065 U	0.00069 U	0.0007 U
P,P'-DDT	**0.0033**	**7.9**	0.00065 U	0.00069 U	0.0007 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-5(17-19)20171013 JC53007-30 1 mg/kg	RI-SB-6(0-2)20171016 JC53007-40 1 mg/kg	RI-SB-6(7-9)20171016 JC53007-41 1 mg/kg
Aldrin	0.005	0.097	0.00066 U	0.00068 U	0.00069 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.00066 U	0.00068 U	0.00069 U
Alpha Endosulfan	NS	NS	0.00066 U	0.00068 U	0.00069 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.00066 U	0.00068 U	0.00069 U
Beta Endosulfan	NS	NS	0.00066 U	0.00068 U	0.00069 U
cis-Chlordane	0.094	4.2	0.00066 U	0.00068 U	0.00069 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.00066 U	0.00068 U	0.00069 U
Dieldrin	0.005	0.2	0.00066 U	0.00068 U	0.00069 U
Endosulfan Sulfate	NS	NS	0.00066 U	0.00068 U	0.00069 U
Endrin	0.014	11	0.00066 U	0.00068 U	0.00069 U
Gamma Bhc (Lindane)	0.1	1.3	0.00066 U	0.00068 U	0.00069 U
Heptachlor	0.042	2.1	0.00066 U	0.00068 U	0.00069 U
P,P'-DDD	0.0033	13	0.00066 U	0.00068 U	0.00069 U
P,P'-DDE	0.0033	8.9	0.00066 U	0.00068 U	0.00069 U
P,P'-DDT	0.0033	7.9	0.00066 U	0.00068 U	0.00069 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-6(17-19)20171016 JC53007-42 1 mg/kg	RI-SB-7(0-2)20171012 JC53007-19 1 mg/kg	RI-SB-7(2-4)20171012 JC53007-20 1 mg/kg
Aldrin	0.005	0.097	0.00062 U	0.00071 U	0.00076 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.00062 U	0.00071 U	0.00076 U
Alpha Endosulfan	NS	NS	0.00062 U	0.00071 U	0.00076 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.00062 U	0.00071 U	0.00076 U
Beta Endosulfan	NS	NS	0.00062 U	0.00071 U	0.00076 U
cis-Chlordane	0.094	4.2	0.00062 U	0.00071 U	0.00076 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.00062 U	0.00071 U	0.00076 U
Dieldrin	0.005	0.2	0.00062 U	0.00071 U	0.00076 U
Endosulfan Sulfate	NS	NS	0.00062 U	0.00071 U	0.00076 U
Endrin	0.014	11	0.00062 U	0.00071 U	0.00076 U
Gamma Bhc (Lindane)	0.1	1.3	0.00062 U	0.00071 U	0.00076 U
Heptachlor	0.042	2.1	0.00062 U	0.00071 U	0.00076 U
P,P'-DDD	0.0033	13	0.00062 U	0.00071 U	0.00076 U
P,P'-DDE	0.0033	8.9	0.00062 U	0.00071 U	0.00076 U
P,P'-DDT	0.0033	7.9	0.00062 U	0.00071 U	0.00076 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-7(13-15)2017012 JC53007-21 1 mg/kg	RI-SB-8(0-2)20171016 JC53007-33 1 mg/kg	RI-SB-8(6-8)20171016 JC53007-34 1 mg/kg
Aldrin	**0.005**	**0.097**	0.00066 U	0.00066 U	0.00063 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.02**	**0.48**	0.00066 U	0.00066 U	0.00063 U
Alpha Endosulfan	**NS**	**NS**	0.00066 U	0.00066 U	0.00063 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.036**	**0.36**	0.00066 U	0.00066 U	0.00063 U
Beta Endosulfan	**NS**	**NS**	0.00066 U	0.00066 U	0.00063 U
cis-Chlordane	**0.094**	**4.2**	0.00066 U	0.00066 U	0.00063 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	**100**	0.00066 U	0.00066 U	0.00063 U
Dieldrin	**0.005**	**0.2**	0.00066 U	0.0012	0.00063 U
Endosulfan Sulfate	**NS**	**NS**	0.00066 U	0.00066 U	0.00063 U
Endrin	**0.014**	**11**	0.00066 U	0.00066 U	0.00063 U
Gamma Bhc (Lindane)	**0.1**	**1.3**	0.00066 U	0.00066 U	0.00063 U
Heptachlor	**0.042**	**2.1**	0.00066 U	0.00066 U	0.00063 U
P,P'-DDD	**0.0033**	**13**	0.00066 U	0.00066 U	0.00063 U
P,P'-DDE	**0.0033**	**8.9**	0.00066 U	0.00066 U	0.00063 U
P,P'-DDT	**0.0033**	**7.9**	0.00066 U	0.0026	0.00063 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-8(17-19)20171016 JC53007-35 1 mg/kg	RI-SB-9(3-5)20171017 JC53007-49 1 mg/kg	RI-SB-10(3-5)20171017 JC53007-50 1 mg/kg
Aldrin	0.005	0.097	0.00066 U	0.00066 U	0.00064 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.00066 U	0.00066 U	0.00064 U
Alpha Endosulfan	NS	NS	0.00066 U	0.00066 U	0.00064 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.00066 U	0.00066 U	0.00064 U
Beta Endosulfan	NS	NS	0.00066 U	0.00066 U	0.00064 U
cis-Chlordane	0.094	4.2	0.00066 U	0.00066 U	0.00064 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.00066 U	0.00066 U	0.00064 U
Dieldrin	0.005	0.2	0.00066 U	0.00066 U	0.00064 U
Endosulfan Sulfate	NS	NS	0.00066 U	0.00066 U	0.00064 U
Endrin	0.014	11	0.00066 U	0.00066 U	0.00064 U
Gamma Bhc (Lindane)	0.1	1.3	0.00066 U	0.00066 U	0.00064 U
Heptachlor	0.042	2.1	0.00066 U	0.00066 U	0.00064 U
P,P'-DDD	0.0033	13	0.00066 U	0.00066 U	0.00064 U
P,P'-DDE	0.0033	8.9	0.00066 U	0.00066 U	0.00064 U
P,P'-DDT	0.0033	7.9	0.00066 U	0.00066 U	0.00064 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-11(0-2)20171016 JC53007-36 1 mg/kg	RI-SB-11(8-10)20171016 JC53007-37 1 mg/kg	RI-SB-X(8-10)20171016 JC53007-38 1 mg/kg
Aldrin	**0.005**	**0.097**	0.0007 U	0.00069 U	0.00066 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.02**	**0.48**	0.0007 U	0.00069 U	0.00066 U
Alpha Endosulfan	**NS**	**NS**	0.0007 U	0.00069 U	0.00066 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.036**	**0.36**	0.0007 U	0.00069 U	0.00066 U
Beta Endosulfan	**NS**	**NS**	0.0007 U	0.00069 U	0.00066 U
cis-Chlordane	**0.094**	**4.2**	0.0007 U	0.00069 U	0.00066 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	**100**	0.0007 U	0.00069 U	0.00066 U
Dieldrin	**0.005**	**0.2**	0.00084	0.00069 U	0.00066 U
Endosulfan Sulfate	**NS**	**NS**	0.0007 U	0.00069 U	0.00066 U
Endrin	**0.014**	**11**	0.0007 U	0.00069 U	0.00066 U
Gamma Bhc (Lindane)	**0.1**	**1.3**	0.0007 U	0.00069 U	0.00066 U
Heptachlor	**0.042**	**2.1**	0.0007 U	0.00069 U	0.00066 U
P,P'-DDD	**0.0033**	**13**	0.0007 U	0.00069 U	0.00066 U
P,P'-DDE	**0.0033**	**8.9**	**0.0125**	0.00069 U	0.00066 U
P,P'-DDT	**0.0033**	**7.9**	0.0007 U	0.00069 U	0.00066 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-11(17-19)20171016 JC53007-39 1 mg/kg	RI-SB-12(0-2)20171016 JC53007-43 1 mg/kg	RI-SB-12(7-9)20171016 JC53007-44 1 mg/kg
Aldrin	0.005	0.097	0.00072 U	0.00066 U	0.00065 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.00072 U	0.00066 U	0.00065 U
Alpha Endosulfan	NS	NS	0.00072 U	0.00066 U	0.00065 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.00072 U	0.00066 U	0.00065 U
Beta Endosulfan	NS	NS	0.00072 U	0.00066 U	0.00065 U
cis-Chlordane	0.094	4.2	0.00072 U	0.0038	0.00065 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.00072 U	0.00066 U	0.00065 U
Dieldrin	0.005	0.2	0.00072 U	0.00078	0.00065 U
Endosulfan Sulfate	NS	NS	0.00072 U	0.00066 U	0.00065 U
Endrin	0.014	11	0.00072 U	0.00066 U	0.00065 U
Gamma Bhc (Lindane)	0.1	1.3	0.00072 U	0.00066 U	0.00065 U
Heptachlor	0.042	2.1	0.00072 U	0.00092	0.00065 U
P,P'-DDD	0.0033	13	0.00072 U	0.00066 U	0.00065 U
P,P'-DDE	0.0033	8.9	0.00072 U	0.00066 U	0.00065 U
P,P'-DDT	0.0033	7.9	0.00072 U	0.00066 U	0.00065 U

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-X(7-9)20171016 JC53007-45 1 mg/kg	RI-SB-12(17-19)20171016 JC53007-46 1 mg/kg	RI-SB-13(0-2)20171012 JC53007-6 1 mg/kg
Aldrin	**0.005**	**0.097**	0.00069 U	0.00065 U	0.00073 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.02**	**0.48**	0.00069 U	0.00065 U	0.00073 U
Alpha Endosulfan	**NS**	**NS**	0.00069 U	0.00065 U	0.00073 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.036**	**0.36**	0.00069 U	0.00065 U	0.00073 U
Beta Endosulfan	**NS**	**NS**	0.00069 U	0.00065 U	0.00073 U
cis-Chlordane	**0.094**	**4.2**	0.00069 U	0.00065 U	0.00073 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	**100**	0.00069 U	0.00065 U	0.00073 U
Dieldrin	**0.005**	**0.2**	0.00069 U	0.00065 U	0.00073 U
Endosulfan Sulfate	**NS**	**NS**	0.00069 U	0.00065 U	0.00073 U
Endrin	**0.014**	**11**	0.00069 U	0.00065 U	0.00073 U
Gamma Bhc (Lindane)	**0.1**	**1.3**	0.00069 U	0.00065 U	0.00073 U
Heptachlor	**0.042**	**2.1**	0.00069 U	0.00065 U	0.00073 U
P,P'-DDD	**0.0033**	**13**	0.00069 U	0.00065 U	0.00073 U
P,P'-DDE	**0.0033**	**8.9**	0.00069 U	0.00065 U	0.00073 U
P,P'-DDT	**0.0033**	**7.9**	0.00069 U	0.00065 U	0.00073 U

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Pesticides

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-13(3-5)20171012 JC53007-7 1 mg/kg	RI-SB-13(13-15)20171012 JC53007-8 1 mg/kg	RI-SB-14(0-2)20171012 JC53007-9 1 mg/kg
Aldrin	0.005	0.097	0.00072 U	0.00068 U	0.00068 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.00072 U	0.00068 U	0.00068 U
Alpha Endosulfan	NS	NS	0.00072 U	0.00068 U	0.00068 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.00072 U	0.00068 U	0.00068 U
Beta Endosulfan	NS	NS	0.00072 U	0.00068 U	0.00068 U
cis-Chlordane	0.094	4.2	0.00072 U	0.00068 U	0.00068 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.00072 U	0.00068 U	0.00068 U
Dieldrin	0.005	0.2	0.00072 U	0.00068 U	0.00068 U
Endosulfan Sulfate	NS	NS	0.00072 U	0.00068 U	0.00068 U
Endrin	0.014	11	0.00072 U	0.00068 U	0.00068 U
Gamma Bhc (Lindane)	0.1	1.3	0.00072 U	0.00068 U	0.00068 U
Heptachlor	0.042	2.1	0.00072 U	0.00068 U	0.00068 U
P,P'-DDD	0.0033	13	0.00072 U	0.00068 U	0.00068 U
P,P'-DDE	0.0033	8.9	0.00072 U	0.00068 U	0.00068 U
P,P'-DDT	0.0033	7.9	0.00072 U	0.00068 U	0.00068 U

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Pesticides

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-14(2-4)20171012 JC53007-10 1 mg/kg	RI-SB-14(13-15)20171012 JC53007-11 1 mg/kg	RI-FB-1-20171012 JC53007-2 1 ug/L
Aldrin	0.005	0.097	0.00075 U	0.00064 U	0.0067 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.00075 U	0.00064 U	0.0067 U
Alpha Endosulfan	NS	NS	0.00075 U	0.00064 U	0.0067 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.00075 U	0.00064 U	0.0067 U
Beta Endosulfan	NS	NS	0.00075 U	0.00064 U	0.0067 U
cis-Chlordane	0.094	4.2	0.00075 U	0.00064 U	0.0067 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.00075 U	0.00064 U	0.0067 U
Dieldrin	0.005	0.2	0.00075 U	0.00064 U	0.0067 U
Endosulfan Sulfate	NS	NS	0.00075 U	0.00064 U	0.0067 U
Endrin	0.014	11	0.00075 U	0.00064 U	0.0067 U
Gamma Bhc (Lindane)	0.1	1.3	0.00075 U	0.00064 U	0.0067 U
Heptachlor	0.042	2.1	0.00075 U	0.00064 U	0.0067 U
P,P'-DDD	0.0033	13	0.00075 U	0.00064 U	0.0067 U
P,P'-DDE	0.0033	8.9	0.00075 U	0.00064 U	0.0067 U
P,P'-DDT	0.0033	7.9	0.00075 U	0.00064 U	0.0067 U

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Pesticides

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-FB-2-20171013 JC53007-31 1 ug/L	RI-FB-3-20171016 JC53007-47 1 ug/L
Aldrin	0.005	0.097	0.0067 U	0.0067 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.02	0.48	0.0067 U	0.0067 U
Alpha Endosulfan	NS	NS	0.0067 U	0.0067 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	0.0067 U	0.0067 U
Beta Endosulfan	NS	NS	0.0067 U	0.0067 U
cis-Chlordane	0.094	4.2	0.0067 U	0.0067 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	100	0.0067 U	0.0067 U
Dieldrin	0.005	0.2	0.0067 U	0.0067 U
Endosulfan Sulfate	NS	NS	0.0067 U	0.0067 U
Endrin	0.014	11	0.0067 U	0.0067 U
Gamma Bhc (Lindane)	0.1	1.3	0.0067 U	0.0067 U
Heptachlor	0.042	2.1	0.0067 U	0.0067 U
P,P'-DDD	0.0033	13	0.0067 U	0.0067 U
P,P'-DDE	0.0033	8.9	0.0067 U	0.0067 U
P,P'-DDT	0.0033	7.9	0.0067 U	0.0067 U

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TAL Metals

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-1(0-2)20171012 JC53007-16 1 mg/kg	RI-SB-1(13-15)20171012 JC53007-17 1 mg/kg	RI-SB-1(16-18)20171012 JC53007-18 1 mg/kg	RI-SB-2(0-2)20171012 JC53007-12 1 mg/kg
Arsenic	13	16	3.2	3.6	2.1 U	3.1
Barium	350	400	67.9	72.4	21 U	46.1
Beryllium	7.2	72	0.28	0.27	0.21 U	0.32
Cadmium	2.5	4.3	0.55 U	0.56 U	0.52 U	0.57 U
Chromium	NS	NS	18.3	13.5	6.7	14.2
Copper	50	270	27.9	38	5.3	23.4
Hexavalent Chromium	1	110	0.59	**1.6**	0.42 U	0.44 U
Lead	63	400	**123**	**1,960**	2.1 U	**98.4**
Manganese	1,600	2,000	347	277	151	191
Mercury	0.18	0.81	**0.19**	0.084	0.03 U	0.063
Nickel	30	310	23.4	10.8	5.4	14.5
Selenium	3.9	180	2.2 U	2.2 U	2.1 U	2.3 U
Silver	2	180	0.55 U	0.56 U	0.52 U	0.57 U
Zinc	109	10,000	107	**143**	9.7	**119**

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TAL Metals

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-2(3-5)20171012 JC53007-13 1 mg/kg	RI-SB-X(3-5)20171012 JC53007-14 1 mg/kg	RI-SB-2(13-15)20171012 JC53007-15 1 mg/kg	RI-SB-3(0-2)20171012 JC53007-3 1 mg/kg
Arsenic	**13**	**16**	3.8	4.6	2.1 U	2.5
Barium	**350**	**400**	40	51.7	25.6	57
Beryllium	**7.2**	**72**	0.53	0.65	0.21	0.45
Cadmium	**2.5**	**4.3**	0.59 U	0.58 U	0.51 U	0.53 U
Chromium	**NS**	**NS**	23.7	25.9	8.6	16.1
Copper	**50**	**270**	14	14	11.5	5.3
Hexavalent Chromium	**1**	**110**	0.47 U	**1.3**	0.64	0.45 U
Lead	**63**	**400**	11.1	14.8	2.3	9.5
Manganese	**1,600**	**2,000**	520	644	277	162
Mercury	**0.18**	**0.81**	0.098	0.083	0.033 U	0.037 U
Nickel	**30**	**310**	13.7	14.1	8.7	8.9
Selenium	**3.9**	**180**	2.3 U	2.3 U	2.1 U	2.1 U
Silver	**2**	**180**	0.59 U	0.58 U	0.51 U	0.53 U
Zinc	**109**	**10,000**	37.4	41.5	18.6	22.3

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-3(10-12)20171012 JC53007-4 1 mg/kg	RI-SB-3(13-15)20171012 JC53007-5 1 mg/kg	RI-SB-4(0-2)20171013 JC53007-25 1 mg/kg	RI-SB-4(3-5)20171013 JC53007-26 1 mg/kg
Arsenic	**13**	**16**	2.6	2.1 U	3.4	3
Barium	**350**	**400**	38.5	21 U	47.6	91.3
Beryllium	**7.2**	**72**	0.23	0.21 U	0.32	0.73
Cadmium	**2.5**	**4.3**	0.51 U	0.52 U	0.52 U	0.57 U
Chromium	**NS**	**NS**	14.4	6.7	15.1	17.2
Copper	**50**	**270**	13	5.9	17.6	10.7
Hexavalent Chromium	**1**	**110**	0.54	0.41 U	0.79	0.44 U
Lead	**63**	**400**	3.9	2.1 U	**179**	21.6
Manganese	**1,600**	**2,000**	347	169	364	526
Mercury	**0.18**	**0.81**	0.031 U	0.033 U	0.1	0.15
Nickel	**30**	**310**	11.1	5.2	10.7	12.8
Selenium	**3.9**	**180**	2 U	2.1 U	2.1 U	2.3 U
Silver	**2**	**180**	0.51 U	0.52 U	0.52 U	0.57 U
Zinc	**109**	**10,000**	46.5	11.4	57.4	27.3

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-4(17-19)20171013 JC53007-27 1 mg/kg	RI-SB-5(0-2)20171013 JC53007-28 1 mg/kg	RI-SB-5(7-9)20171013 JC53007-29 1 mg/kg	RI-SB-5(17-19)20171013 JC53007-30 1 mg/kg
Arsenic	13	16	2.1 U	5.7	4.5	2.1 U
Barium	350	400	26.8	158	96.9	21.3
Beryllium	7.2	72	0.21 U	0.58	0.44	0.21 U
Cadmium	2.5	4.3	0.52 U	0.57 U	0.58 U	0.53 U
Chromium	NS	NS	10.9	18.5	18.3	8.6
Copper	50	270	12.4	19.2	18.9	8.6
Hexavalent Chromium	1	110	**1.2**	0.82	0.44 U	0.41 U
Lead	63	400	5.9	**178**	**128**	2.1 U
Manganese	1,600	2,000	308	503	398	204
Mercury	0.18	0.81	0.03 U	0.038 U	0.036 U	0.03 U
Nickel	30	310	8.2	12.7	13	7.9
Selenium	3.9	180	2.1 U	2.3 U	2.3 U	2.1 U
Silver	2	180	0.52 U	0.57 U	0.58 U	0.53 U
Zinc	109	10,000	24.9	80	77.7	10.5

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-6(0-2)20171016 JC53007-40 1 mg/kg	RI-SB-6(7-9)20171016 JC53007-41 1 mg/kg	RI-SB-6(17-19)20171016 JC53007-42 1 mg/kg	RI-SB-7(0-2)20171012 JC53007-19 1 mg/kg
Arsenic	**13**	**16**	3.8	2 U	2.1 U	6.4
Barium	**350**	**400**	57.1	26.5	21 U	63.2
Beryllium	**7.2**	**72**	0.47	0.2 U	0.21 U	0.57
Cadmium	**2.5**	**4.3**	0.51 U	0.5 U	0.51 U	0.58 U
Chromium	**NS**	**NS**	17.3	8.1	5.9	28.8
Copper	**50**	**270**	19.9	6.6	3.9	10.1
Hexavalent Chromium	**1**	**110**	0.74	0.41 U	0.41 U	**1.2**
Lead	**63**	**400**	**73.9**	2 U	2.1 U	13.1
Manganese	**1,600**	**2,000**	453	199	183	357
Mercury	**0.18**	**0.81**	0.1	0.031 U	0.033 U	0.036 U
Nickel	**30**	**310**	13.3	7	6.2	14.2
Selenium	**3.9**	**180**	2 U	2 U	2.1 U	2.3 U
Silver	**2**	**180**	0.51 U	0.5 U	0.51 U	0.58 U
Zinc	**109**	**10,000**	56.9	10.6	10 U	30.6

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-7(2-4)20171012 JC53007-20 1 mg/kg	RI-SB-7(13-15)2017012 JC53007-21 1 mg/kg	RI-SB-8(0-2)20171016 JC53007-33 1 mg/kg	RI-SB-8(6-8)20171016 JC53007-34 1 mg/kg
Arsenic	**13**	**16**	12 f U	2 U	7.3	2 U
Barium	**350**	**400**	62.3	24.5	148	50.9
Beryllium	**7.2**	**72**	0.88	0.22	0.39	0.45
Cadmium	**2.5**	**4.3**	0.6 U	0.5 U	1.1	0.51 U
Chromium	**NS**	**NS**	41.5	11.5	35.6	18.1
Copper	**50**	**270**	21.9 f	9.8	44.9	14.3
Hexavalent Chromium	**1**	**110**	0.47 U	0.42 U	**5.2**	0.41 U
Lead	**63**	**400**	12 f U	2	**1,640**	3.4
Manganese	**1,600**	**2,000**	**4,520**	253	342	414
Mercury	**0.18**	**0.81**	0.039 U	0.032 U	**0.64**	0.033 U
Nickel	**30**	**310**	22.4	8.6	14.5	14.8
Selenium	**3.9**	**180**	12 U	2 U	2.1 U	2 U
Silver	**2**	**180**	**3.5**	0.5 U	0.53	0.51 U
Zinc	**109**	**10,000**	36	15.3	**404**	22.3

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-8(17-19)20171016 JC53007-35 1 mg/kg	RI-SB-9(3-5)20171017 JC53007-49 1 mg/kg	RI-SB-10(3-5)20171017 JC53007-50 1 mg/kg	RI-SB-11(0-2)20171016 JC53007-36 1 mg/kg
Arsenic	**13**	**16**	1.9 U	2.1 U	2 U	4.6
Barium	**350**	**400**	19 U	24.7	29.1	57.7
Beryllium	**7.2**	**72**	0.19 U	0.21 U	0.37	0.37
Cadmium	**2.5**	**4.3**	0.49 U	0.52 U	0.49 U	0.54 U
Chromium	**NS**	**NS**	10.4	7.9	7.7	15.5
Copper	**50**	**270**	4.9	8.1	8.2	17
Hexavalent Chromium	**1**	**110**	0.41 U	0.41 U	0.41 U	**1.3**
Lead	**63**	**400**	1.9 U	5.4	2.5	**977**
Manganese	**1,600**	**2,000**	103	260	223	224
Mercury	**0.18**	**0.81**	0.033 U	0.032 U	0.045	0.088
Nickel	**30**	**310**	4.3	8.2	7	10.3
Selenium	**3.9**	**180**	1.9 U	2.1 U	2 U	2.2 U
Silver	**2**	**180**	0.49 U	0.52 U	0.49 U	0.54 U
Zinc	**109**	**10,000**	9.7 U	14.7	17.7	85.6

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-11(8-10)20171016 JC53007-37 1 mg/kg	RI-SB-X(8-10)20171016 JC53007-38 1 mg/kg	RI-SB-11(17-19)20171016 JC53007-39 1 mg/kg	RI-SB-12(0-2)20171016 JC53007-43 1 mg/kg
Arsenic	**13**	**16**	2.1	2 U	2.1 U	10.1
Barium	**350**	**400**	59.1	39.6	21 U	45.2
Beryllium	**7.2**	**72**	0.28	0.28	0.21 U	0.32
Cadmium	**2.5**	**4.3**	0.51 U	0.51 U	0.53 U	0.52 U
Chromium	**NS**	**NS**	12.7	11.8	8.6	24.9
Copper	**50**	**270**	12.3	10.6	6.5	**81.6**
Hexavalent Chromium	**1**	**110**	0.42 U	0.41 U	0.58	0.43 U
Lead	**63**	**400**	50.3	4.8	2.3	58.6 f
Manganese	**1,600**	**2,000**	356	458	270	599
Mercury	**0.18**	**0.81**	0.033 U	0.031 U	0.034 U	0.051
Nickel	**30**	**310**	9.6	10.1	7.3	20.9
Selenium	**3.9**	**180**	2 U	2 U	2.1 U	10 U
Silver	**2**	**180**	0.51 U	0.51 U	0.53 U	2.6 U
Zinc	**109**	**10,000**	33.5	19.6	14.3	50.1

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-12(7-9)20171016 JC53007-44 1 mg/kg	RI-SB-X(7-9)20171016 JC53007-45 1 mg/kg	RI-SB-12(17-19)20171016 JC53007-46 1 mg/kg	RI-SB-13(0-2)20171012 JC53007-6 1 mg/kg
Arsenic	**13**	**16**	2.1	2.9	2 U	5.4
Barium	**350**	**400**	40.8	45.4	20 U	107
Beryllium	**7.2**	**72**	0.36	0.36	0.2	0.39
Cadmium	**2.5**	**4.3**	0.5 U	0.52 U	0.51 U	2.3
Chromium	**NS**	**NS**	17	18.1	8	17.3
Copper	**50**	**270**	17.6	16.3	7.2	**60.8**
Hexavalent Chromium	**1**	**110**	0.7	0.61	0.44	0.46 U
Lead	**63**	**400**	22.9	52.8	2 U	**235**
Manganese	**1,600**	**2,000**	443	508	174	374
Mercury	**0.18**	**0.81**	0.034 U	0.048	0.034 U	0.14
Nickel	**30**	**310**	14.3	13.2	5	15.9
Selenium	**3.9**	**180**	2 U	2.1 U	2 U	2.3 U
Silver	**2**	**180**	0.5 U	0.52 U	0.51 U	0.57 U
Zinc	**109**	**10,000**	26.7	43.2	10.1	**960**

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-13(3-5)20171012 JC53007-7 1 mg/kg	RI-SB-13(13-15)20171012 JC53007-8 1 mg/kg	RI-SB-14(0-2)20171012 JC53007-9 1 mg/kg	RI-SB-14(2-4)20171012 JC53007-10 1 mg/kg
Arsenic	13	16	4.8	2.1 U	3.6	3.4
Barium	350	400	64.8	21 U	61.8	33.8
Beryllium	7.2	72	0.45	0.21 U	0.33	0.6
Cadmium	2.5	4.3	0.96	0.53 U	0.55 U	0.57 U
Chromium	NS	NS	22.1	7.6	14.2	21.8
Copper	50	270	42.1	6.7	24.9	17.2
Hexavalent Chromium	1	110	0.45 U	0.43 U	0.45 U	0.47 U
Lead	63	400	**84.2**	2.2	**215**	11.1
Manganese	1,600	2,000	446	278	427	957
Mercury	0.18	0.81	0.14	0.033 U	**0.22**	0.036 U
Nickel	30	310	**68.7**	6.8	10.6	16.5
Selenium	3.9	180	2.2 U	2.1 U	2.2 U	2.3 U
Silver	2	180	0.54 U	0.53 U	0.55 U	0.57 U
Zinc	109	10,000	85.7	13.1	**114**	43

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Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-SB-14(13-15)20171012 JC53007-11 1 mg/kg	RI-DW-1(3-4)20171012 JC53007-22 1 mg/kg	RI-DW-2(12-13)20171012 JC53007-23 1 mg/kg	RI-DW-3(11-12)20171012 JC53007-24 1 mg/kg
Arsenic	**13**	**16**	2 U	2.5 U	3.2	2.6 U
Barium	**350**	**400**	20 U	25 U	240	60.6
Beryllium	**7.2**	**72**	0.2 U	0.25 U	0.28 U	0.26 U
Cadmium	**2.5**	**4.3**	0.51 U	0.63 U	0.7 U	0.64 U
Chromium	**NS**	**NS**	6.9	20.8	406	12.5
Copper	**50**	**270**	6.7	24.5	**87.6**	18.2
Hexavalent Chromium	**1**	**110**	0.42 U	NA	NA	NA
Lead	**63**	**400**	2 U	38	28.3	10.5
Manganese	**1,600**	**2,000**	222	193	266	125
Mercury	**0.18**	**0.81**	0.031 U	0.051	0.041	0.04 U
Nickel	**30**	**310**	6.4	8	**190**	7.9
Selenium	**3.9**	**180**	2 U	2.5 U	2.8 U	2.6 U
Silver	**2**	**180**	0.51 U	0.63 U	0.7 U	0.64 U
Zinc	**109**	**10,000**	9.5	106	**239**	72.3

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Remedial Investigation Soil Analytical Results
TAL Metals

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Part 375 UUSCOs mg/kg	NYSDEC Part 375 RRSCOs mg/kg	RI-FB-1-20171012 JC53007-2 1 µg/L	RI-FB-2-20171013 JC53007-31 1 µg/L	RI-FB-3-20171016 JC53007-47 1 µg/L
Arsenic	13	16	3 U	3 U	3 U
Barium	350	400	200 U	200 U	200 U
Beryllium	7.2	72	1 U	1 U	1 U
Cadmium	2.5	4.3	3 U	3 U	3 U
Chromium	NS	NS	10 U	10 U	10 U
Copper	50	270	10 U	10 U	10 U
Hexavalent Chromium	1	110	10 U	10 U	10 U
Lead	63	400	3 U	3 U	3 U
Manganese	1,600	2,000	15 U	15 U	15 U
Mercury	0.18	0.81	0.2 U	0.2 U	0.2 U
Nickel	30	310	10 U	10 U	10 U
Selenium	3.9	180	10 U	10 U	10 U
Silver	2	180	10 U	10 U	10 U
Zinc	109	10,000	20 U	20 U	20 U

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Notes

Part 375 Soil Cleanup Objectives (SCOs):
Soil Cleanup Objectives (SCOs) listed in New York State Department of Environmental Conservation (NYSDEC) Part 375 Regulations (6 NYCRR Part 375).

Exceedances of Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) are in bold font.
Exceedances of Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs) are highlighted in gray.

RI-SB-X(3-5)20171012 is a blind duplicate sample of RI-SB-2(3-5)20171012.
RI-SB-X(8-10)20171016 is a blind duplicate sample of RI-SB-11(8-10)20171016.
RI-SB-X(7-9)20171016 is a blind duplicate sample of RI-SB-12(7-9)20171016.

D : The reported result is from a diluted analysis.

E : The detected concentration exceeds the calibration range.

J : The analyte was positively identified; the associated numerical value is approximate and may be inaccurate or imprecise.

U : The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NA : The analyte was not analyzed in the specified sample.

NS : A standard has not been established for the analyte.

TS : Value represents a sum total standard.

mg/kg : milligrams per kilogram = parts per million (ppm)

µg/L : micrograms per liter = parts per billion (ppb)

Table 12
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Remedial Investigation Groundwater Analytical Results
Volatile Organic Compounds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-MW-1-20171025 JC53007-54 1 µg/L	RI-MW-X-20171025 JC53007-55 1 µg/L	RI-MW-4-20171025 JC53007-53 1 µg/L
1,1,1-Trichloroethane	5	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	5	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	5 U	5 U	5 U
1,1,2-Trichloroethane	1	1 U	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U	1 U
1,1-Dichloroethene	5	1 U	1 U	1 U
1,2,3-Trichlorobenzene	5	1 U	1 U	1 U
1,2,4-Trichlorobenzene	5	1 U	1 U	1 U
1,2-Dibromo-3-Chloropropane	0.04	2 U	2 U	2 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	1 U	1 U	1 U
1,2-Dichlorobenzene	3	1 U	1 U	1 U
1,2-Dichloroethane	0.6	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U
1,3-Dichlorobenzene	3	1 U	1 U	1 U
1,4-Dichlorobenzene	3	1 U	1 U	1 U
1,4-Dioxane (P-Dioxane)	NS	1.1 U	1.2 U	1 U
2-Hexanone	50	5 U	5 U	5 U
Acetone	50	10 U	10 U	10 U
Benzene	1	0.5 U	0.5 U	0.5 U
Bromochloromethane	5	1 U	1 U	1 U
Bromodichloromethane	50	1 U	1 U	1 U
Bromoform	50	1 U	1 U	1 U
Bromomethane	5	2 U	2 U	2 U
Carbon Disulfide	60	2 U	2 U	2 U
Carbon Tetrachloride	5	1 U	1 U	1 U
Chlorobenzene	5	1 U	1 U	1 U
Chloroethane	5	1 U	1 U	1 U
Chloroform	7	0.32 J	0.3 J	0.56 J
Chloromethane	5	1 U	1 U	1 U
Cis-1,2-Dichloroethylene	5	1 U	1 U	1 U
Cis-1,3-Dichloropropene	0.4 TS	1 U	1 U	1 U
Cyclohexane	NS	5 U	5 U	5 U
Dibromochloromethane	50	1 U	1 U	1 U
Dichlorodifluoromethane	5	2 U	2 U	2 U
Ethylbenzene	5	1 U	1 U	1 U
Isopropylbenzene (Cumene)	5	1 U	1 U	1 U
m,p-Xylene	5	1 U	1 U	1 U
Methyl Acetate	NS	5 U	5 U	5 U
Methyl Ethyl Ketone (2-Butanone)	50	10 U	10 U	10 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	5 U	5 U	5 U
Methylcyclohexane	NS	5 U	5 U	5 U
Methylene Chloride	5	2 U	2 U	2 U
O-Xylene (1,2-Dimethylbenzene)	5	1 U	1 U	1 U
Styrene	5	1 U	1 U	1 U
Tert-Butyl Methyl Ether	10	1 U	1 U	1 U
Tetrachloroethylene (PCE)	5	1 U	1 U	1
Toluene	5	1 U	1 U	1 U
Trans-1,2-Dichloroethene	5	1 U	1 U	1 U
Trans-1,3-Dichloropropene	0.4 TS	1 U	1 U	1 U
Trichloroethylene (TCE)	5	1 U	1 U	0.51 J
Trichlorofluoromethane	5	2 U	2 U	2 U
Vinyl Chloride	2	1 U	1 U	1 U
Xylenes, Total	NS	1 U	1 U	1 U

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Volatile Organic Compounds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-MW-5-20171025 JC53007-56 1 µg/L	RI-MW-8-20171025 JC53007-52 1 µg/L	RI-MW-9-20171025 JC53007-51 1 µg/L
1,1,1-Trichloroethane	5	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	5	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	5 U	5 U	5 U
1,1,2-Trichloroethane	1	1 U	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U	1 U
1,1-Dichloroethene	5	1 U	1 U	1 U
1,2,3-Trichlorobenzene	5	1 U	1 U	1 U
1,2,4-Trichlorobenzene	5	1 U	1 U	1 U
1,2-Dibromo-3-Chloropropane	0.04	2 U	2 U	2 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	1 U	1 U	1 U
1,2-Dichlorobenzene	3	1 U	1 U	1 U
1,2-Dichloroethane	0.6	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U
1,3-Dichlorobenzene	3	1 U	1 U	1 U
1,4-Dichlorobenzene	3	1 U	1 U	1 U
1,4-Dioxane (P-Dioxane)	NS	1 U	1 U	1 U
2-Hexanone	50	5 U	5 U	5 U
Acetone	50	10 U	10 U	10 U
Benzene	1	0.5 U	0.5 U	0.5 U
Bromochloromethane	5	1 U	1 U	1 U
Bromodichloromethane	50	1 U	1 U	1 U
Bromoform	50	1 U	1 U	1 U
Bromomethane	5	2 U	2 U	2 U
Carbon Disulfide	60	2 U	2 U	2 U
Carbon Tetrachloride	5	1 U	1 U	1 U
Chlorobenzene	5	1 U	1 U	1 U
Chloroethane	5	1 U	1 U	1 U
Chloroform	7	0.61 J	1.4	1
Chloromethane	5	1 U	1 U	1 U
Cis-1,2-Dichloroethylene	5	1 U	1 U	1 U
Cis-1,3-Dichloropropene	0.4 TS	1 U	1 U	1 U
Cyclohexane	NS	5 U	5 U	5 U
Dibromochloromethane	50	1 U	1 U	1 U
Dichlorodifluoromethane	5	2 U	2 U	2 U
Ethylbenzene	5	1 U	1 U	1 U
Isopropylbenzene (Cumene)	5	1 U	1 U	1 U
m,p-Xylene	5	1 U	1 U	1 U
Methyl Acetate	NS	5 U	5 U	5 U
Methyl Ethyl Ketone (2-Butanone)	50	10 U	10 U	10 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	5 U	5 U	5 U
Methylcyclohexane	NS	5 U	5 U	5 U
Methylene Chloride	5	2 U	2 U	2 U
O-Xylene (1,2-Dimethylbenzene)	5	1 U	1 U	1 U
Styrene	5	1 U	1 U	1 U
Tert-Butyl Methyl Ether	10	1 U	1 U	1 U
Tetrachloroethylene (PCE)	5	1.2	0.63 J	0.6 J
Toluene	5	1 U	1 U	1 U
Trans-1,2-Dichloroethene	5	1 U	1 U	1 U
Trans-1,3-Dichloropropene	0.4 TS	1 U	1 U	1 U
Trichloroethylene (TCE)	5	0.38 J	1 U	0.39 J
Trichlorofluoromethane	5	2 U	2 U	2 U
Vinyl Chloride	2	1 U	1 U	1 U
Xylenes, Total	NS	1 U	1 U	1 U

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Remedial Investigation Groundwater Analytical Results
Volatile Organic Compounds (VOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-TB-4-20171025 JC53007-58 1 µg/L	RI-FB-4-20171025 JC53007-57 1 µg/L
1,1,1-Trichloroethane	5	1 U	1 U
1,1,2,2-Tetrachloroethane	5	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	5 U	5 U
1,1,2-Trichloroethane	1	1 U	1 U
1,1-Dichloroethane	5	1 U	1 U
1,1-Dichloroethene	5	1 U	1 U
1,2,3-Trichlorobenzene	5	1 U	1 U
1,2,4-Trichlorobenzene	5	1 U	1 U
1,2-Dibromo-3-Chloropropane	0.04	2 U	2 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	1 U	1 U
1,2-Dichlorobenzene	3	1 U	1 U
1,2-Dichloroethane	0.6	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U
1,3-Dichlorobenzene	3	1 U	1 U
1,4-Dichlorobenzene	3	1 U	1 U
1,4-Dioxane (P-Dioxane)	NS	NA	NA
2-Hexanone	50	5 U	5 U
Acetone	50	10 U	10 U
Benzene	1	0.5 U	0.5 U
Bromochloromethane	5	1 U	1 U
Bromodichloromethane	50	1 U	1 U
Bromoform	50	1 U	1 U
Bromomethane	5	2 U	2 U
Carbon Disulfide	60	2 U	2 U
Carbon Tetrachloride	5	1 U	1 U
Chlorobenzene	5	1 U	1 U
Chloroethane	5	1 U	1 U
Chloroform	7	1 U	1 U
Chloromethane	5	1 U	1 U
Cis-1,2-Dichloroethylene	5	1 U	1 U
Cis-1,3-Dichloropropene	0.4 TS	1 U	1 U
Cyclohexane	NS	5 U	5 U
Dibromochloromethane	50	1 U	1 U
Dichlorodifluoromethane	5	2 U	2 U
Ethylbenzene	5	1 U	1 U
Isopropylbenzene (Cumene)	5	1 U	1 U
m,p-Xylene	5	1 U	1 U
Methyl Acetate	NS	5 U	5 U
Methyl Ethyl Ketone (2-Butanone)	50	10 U	10 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	5 U	5 U
Methylcyclohexane	NS	5 U	5 U
Methylene Chloride	5	2 U	2 U
O-Xylene (1,2-Dimethylbenzene)	5	1 U	1 U
Styrene	5	1 U	1 U
Tert-Butyl Methyl Ether	10	1 U	1 U
Tetrachloroethylene (PCE)	5	1.0 U	1.0 U
Toluene	5	1 U	1 U
Trans-1,2-Dichloroethene	5	1 U	1 U
Trans-1,3-Dichloropropene	0.4 TS	1 U	1 U
Trichloroethylene (TCE)	5	1 U	1 U
Trichlorofluoromethane	5	2 U	2 U
Vinyl Chloride	2	1 U	1 U
Xylenes, Total	NS	1 U	1 U

Table 13
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Remedial Investigation Groundwater Analytical Results
Semivolatile Organic Compounds (SVOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-MW-1-20171025 JC53007-54 1 µg/L	RI-MW-X-20171025 JC53007-55 1 µg/L	RI-MW-4-20171025 JC53007-53 1 µg/L	RI-MW-5-20171025 JC53007-56 1 µg/L
1,2,4,5-Tetrachlorobenzene	5	2.2 U	2.3 U	2 U	2 U
2,3,4,6-Tetrachlorophenol	NS	5.6 U	5.8 U	5 U	5 U
2,4,5-Trichlorophenol	NS	5.6 U	5.8 U	5 U	5 U
2,4,6-Trichlorophenol	NS	5.6 U	5.8 U	5 U	5 U
2,4-Dichlorophenol	5	2.2 U	2.3 U	2 U	2 U
2,4-Dimethylphenol	50	5.6 U	5.8 U	5 U	5 U
2,4-Dinitrophenol	10	11 U	12 U	10 U	10 U
2,4-Dinitrotoluene	5	1.1 U	1.2 U	1 U	1 U
2,6-Dinitrotoluene	5	1.1 U	1.2 U	1 U	1 U
2-Chloronaphthalene	10	2.2 U	2.3 U	2 U	2 U
2-Chlorophenol	NS	5.6 U	5.8 U	5 U	5 U
2-Methylnaphthalene	NS	1.1 U	1.2 U	1 U	1 U
2-Methylphenol (O-Cresol)	NS	2.2 U	2.3 U	2 U	2 U
2-Nitroaniline	5	5.6 U	5.8 U	5 U	5 U
2-Nitrophenol	NS	5.6 U	5.8 U	5 U	5 U
4-Methylphenol	NS	2.2 U	2.3 U	2 U	2 U
3,3'-Dichlorobenzidine	5	2.2 U	2.3 U	2 U	2 U
3-Nitroaniline	5	5.6 U	5.8 U	5 U	5 U
4,6-Dinitro-2-Methylphenol	NS	5.6 U	5.8 U	5 U	5 U
4-Bromophenyl Phenyl Ether	NS	2.2 U	2.3 U	2 U	2 U
4-Chloro-3-Methylphenol	NS	5.6 U	5.8 U	5 U	5 U
4-Chloroaniline	5	5.6 U	5.8 U	5 U	5 U
4-Chlorophenyl Phenyl Ether	NS	2.2 U	2.3 U	2 U	2 U
4-Nitroaniline	5	5.6 U	5.8 U	5 U	5 U
4-Nitrophenol	NS	11 U	12 U	10 U	10 U
Acenaphthene	20	1.1 U	1.2 U	1 U	1 U
Acenaphthylene	NS	1.1 U	1.2 U	1 U	1 U
Acetophenone	NS	2.2 U	2.3 U	2 U	2 U
Anthracene	50	1.1 U	1.2 U	1 U	1 U
Atrazine	7.5	2.2 U	2.3 U	2 U	2 U
Benzaldehyde	NS	5.6 U	5.8 U	5 U	5 U
Benzo(A)Anthracene	0.002	1.1 U	1.2 U	1 U	1 U
Benzo(A)Pyrene	ND	1.1 U	1.2 U	1 U	1 U
Benzo(B)Fluoranthene	0.002	1.1 U	1.2 U	1 U	1 U
Benzo(G,H,I)Perylene	NS	1.1 U	1.2 U	1 U	1 U
Benzo(K)Fluoranthene	0.002	1.1 U	1.2 U	1 U	1 U
Benzyl Butyl Phthalate	50	2.2 U	2.3 U	2 U	2 U
Biphenyl (Diphenyl)	5	1.1 U	1.2 U	1 U	1 U
Bis(2-Chloroethoxy) Methane	5	2.2 U	2.3 U	2 U	2 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	1	2.2 U	2.3 U	2 U	2 U
Bis(2-Chloroisopropyl) Ether	5	2.2 U	2.3 U	2 U	2 U
Bis(2-Ethylhexyl) Phthalate	5	2.2 U	2.3 U	2 U	2 U
Caprolactam	NS	2.2 U	2.3 U	2 U	2 U
Carbazole	NS	1.1 U	1.2 U	1 U	1 U
Chrysene	0.002	1.1 U	1.2 U	1 U	1 U
Dibenz(A,H)Anthracene	NS	1.1 U	1.2 U	1 U	1 U
Dibenzofuran	NS	5.6 U	5.8 U	5 U	5 U
Diethyl Phthalate	50	2.2 U	2.3 U	2 U	2 U
Dimethyl Phthalate	50	2.2 U	2.3 U	2 U	2 U
Di-N-Butyl Phthalate	50	2.2 U	2.3 U	1.2 J	2 U
Di-N-Octylphthalate	50	2.2 U	2.3 U	2 U	2 U
Fluoranthene	50	1.1 U	1.2 U	1 U	1 U
Fluorene	50	1.1 U	1.2 U	1 U	1 U
Hexachlorobenzene	0.04	1.1 U	1.2 U	1 U	1 U
Hexachlorobutadiene	0.50	1.1 U	1.2 U	1 U	1 U
Hexachlorocyclopentadiene	5	11 U	12 U	10 U	10 U
Hexachloroethane	5	2.2 U	2.3 U	2 U	2 U
Indeno(1,2,3-C,D)Pyrene	0.002	1.1 U	1.2 U	1 U	1 U
Isophorone	50	2.2 U	2.3 U	2 U	2 U
Naphthalene	NS	1.1 U	1.2 U	1 U	1 U
Nitrobenzene	0.4	2.2 U	2.3 U	2 U	2 U
N-Nitrosodi-N-Propylamine	NS	2.2 U	2.3 U	2 U	2 U
N-Nitrosodiphenylamine	50	5.6 U	5.8 U	5 U	5 U
Pentachlorophenol	NS	4.4 U	4.7 U	4 U	4 U
Phenanthrene	50	1.1 U	1.2 U	1 U	1 U
Phenol	1	2.2 U	2.3 U	2 U	2 U
Pyrene	50	1.1 U	1.2 U	1 U	1 U

Table 13
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Semivolatile Organic Compounds (SVOCs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-MW-8-20171025 JC53007-52 1 µg/L	RI-MW-9-20171025 JC53007-51 1 µg/L	RI-FB-4-20171025 JC53007-57 1 µg/L
1,2,4,5-Tetrachlorobenzene	5	2 U	2 U	2.1 U
2,3,4,6-Tetrachlorophenol	NS	5 U	5 U	5.3 U
2,4,5-Trichlorophenol	NS	5 U	5 U	5.3 U
2,4,6-Trichlorophenol	NS	5 U	5 U	5.3 U
2,4-Dichlorophenol	5	2 U	2 U	2.1 U
2,4-Dimethylphenol	50	5 U	5 U	5.3 U
2,4-Dinitrophenol	10	10 U	10 U	11 U
2,4-Dinitrotoluene	5	1 U	1 U	1.1 U
2,6-Dinitrotoluene	5	1 U	1 U	1.1 U
2-Chloronaphthalene	10	2 U	2 U	2.1 U
2-Chlorophenol	NS	5 U	5 U	5.3 U
2-Methylnaphthalene	NS	1 U	1 U	1.1 U
2-Methylphenol (O-Cresol)	NS	2 U	2 U	2.1 U
2-Nitroaniline	5	5 U	5 U	5.3 U
2-Nitrophenol	NS	5 U	5 U	5.3 U
4-Methylphenol	NS	2 U	2 U	2.1 U
3,3'-Dichlorobenzidine	5	2 U	2 U	2.1 U
3-Nitroaniline	5	5 U	5 U	5.3 U
4,6-Dinitro-2-Methylphenol	NS	5 U	5 U	5.3 U
4-Bromophenyl Phenyl Ether	NS	2 U	2 U	2.1 U
4-Chloro-3-Methylphenol	NS	5 U	5 U	5.3 U
4-Chloroaniline	5	5 U	5 U	5.3 U
4-Chlorophenyl Phenyl Ether	NS	2 U	2 U	2.1 U
4-Nitroaniline	5	5 U	5 U	5.3 U
4-Nitrophenol	NS	10 U	10 U	11 U
Acenaphthene	20	1 U	1 U	1.1 U
Acenaphthylene	NS	1 U	1 U	1.1 U
Acetophenone	NS	2 U	2 U	2.1 U
Anthracene	50	1 U	1 U	1.1 U
Atrazine	7.5	2 U	2 U	2.1 U
Benzaldehyde	NS	5 U	5 U	5.3 U
Benzo(A)Anthracene	0.002	1 U	1 U	1.1 U
Benzo(A)Pyrene	ND	1 U	1 U	1.1 U
Benzo(B)Fluoranthene	0.002	1 U	1 U	1.1 U
Benzo(G,H,I)Perylene	NS	1 U	1 U	1.1 U
Benzo(K)Fluoranthene	0.002	1 U	1 U	1.1 U
Benzyl Butyl Phthalate	50	2 U	2 U	2.1 U
Biphenyl (Diphenyl)	5	1 U	1 U	1.1 U
Bis(2-Chloroethoxy) Methane	5	2 U	2 U	2.1 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	1	2 U	2 U	2.1 U
Bis(2-Chloroisopropyl) Ether	5	2 U	2 U	2.1 U
Bis(2-Ethylhexyl) Phthalate	5	2 U	2 U	2.1 U
Caprolactam	NS	2 U	2 U	2.1 U
Carbazole	NS	1 U	1 U	1.1 U
Chrysene	0.002	1 U	1 U	1.1 U
Dibenz(A,H)Anthracene	NS	1 U	1 U	1.1 U
Dibenzofuran	NS	5 U	5 U	5.3 U
Diethyl Phthalate	50	2 U	2 U	2.1 U
Dimethyl Phthalate	50	2 U	2 U	2.1 U
Di-N-Butyl Phthalate	50	2 U	2 U	2.1 U
Di-N-Octylphthalate	50	2 U	2 U	2.1 U
Fluoranthene	50	1 U	1 U	1.1 U
Fluorene	50	1 U	1 U	1.1 U
Hexachlorobenzene	0.04	1 U	1 U	1.1 U
Hexachlorobutadiene	0.50	1 U	1 U	1.1 U
Hexachlorocyclopentadiene	5	10 U	10 U	11 U
Hexachloroethane	5	2 U	2 U	2.1 U
Indeno(1,2,3-C,D)Pyrene	0.002	1 U	1 U	1.1 U
Isophorone	50	2 U	2 U	2.1 U
Naphthalene	NS	1 U	1 U	1.1 U
Nitrobenzene	0.4	2 U	2 U	2.1 U
N-Nitrosodi-N-Propylamine	NS	2 U	2 U	2.1 U
N-Nitrosodiphenylamine	50	5 U	5 U	5.3 U
Pentachlorophenol	NS	4 U	4 U	4.2 U
Phenanthrene	50	1 U	1 U	1.1 U
Phenol	1	2 U	2 U	2.1 U
Pyrene	50	1 U	1 U	1.1 U

Table 14
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Remedial Investigation Groundwater Analytical Results
Polychlorinated Biphenyls (PCBs)

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-MW-1-20171025 JC53007-54 1 µg/L	RI-MW-X-20171025 JC53007-55 1 µg/L	RI-MW-4-20171025 JC53007-53 1 µg/L	RI-MW-5-20171025 JC53007-56 1 µg/L	RI-MW-8-20171025 JC53007-52 1 µg/L	RI-MW-9-20171025 JC53007-51 1 µg/L	RI-FB-4-20171025 JC53007-57 1 µg/L
PCB-1016 (Aroclor 1016)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1221 (Aroclor 1221)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1232 (Aroclor 1232)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1242 (Aroclor 1242)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1248 (Aroclor 1248)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1254 (Aroclor 1254)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1260 (Aroclor 1260)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1262 (Aroclor 1262)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
PCB-1268 (Aroclor 1268)	**NS**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U
Total PCBs	**0.9**	0.063 U	0.071 U	0.05 U	0.05 U	0.056 U	0.053 U	0.053 U

Table 15
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Remedial Investigation Groundwater Analytical Results
Pesticides

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-MW-1-20171025 JC53007-54 1 µg/L	RI-MW-X-20171025 JC53007-55 1 µg/L	RI-MW-4-20171025 JC53007-53 1 µg/L	RI-MW-5-20171025 JC53007-56 1 µg/L	RI-MW-8-20171025 JC53007-52 1 µg/L	RI-MW-9-20171025 JC53007-51 1 µg/L	RI-FB-4-20171025 JC53007-57 1 µg/L
4,4'-DDD	**0.3**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
4,4'-DDE	**0.2**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
4,4'-DDT	**0.2**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Aldrin	**ND**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	**0.01**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Alpha Endosulfan	**NS**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.00067 J	0.0011 U	0.0011 U
alpha-Chlordane	**NS**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Beta Bhc (Beta Hexachlorocyclohexane)	**0.04**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Beta Endosulfan	**NS**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Delta BHC (Delta Hexachlorocyclohexane)	**0.04**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Dieldrin	**0.004**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Endosulfan Sulfate	**NS**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Endrin	**ND**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Endrin Aldehyde	**5**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0058	0.0011 U	0.0011 U
Endrin Ketone	**5**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Gamma Bhc (Lindane)	**0.05**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
gamma-Chlordane	**NS**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Heptachlor	**0.04**	0.0013 U	0.0014 U	0.001 U	0.001 U	0.0011 U	0.0011 U	0.0011 U
Heptachlor Epoxide	**0.03**	0.0013 U	0.0014 U	0.0033	0.001 U	0.0025	0.0011 U	0.0011 U
Methoxychlor	**35**	0.0025 U	0.0029 U	0.002 U	0.002 U	0.0022 U	0.0021 U	0.0021 U
Toxaphene	**0.06**	0.031 U	0.036 U	0.025 U	0.025 U	0.028 U	0.026 U	0.026 U

Table 16
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Queens, NY
Remedial Investigation Groundwater Analytical Results
TAL Metals

Sample ID Lab Sample ID Dilution Factor Unit	NYSDEC Class GA AWQS µg/L	RI-MW-1-20171025 JC53007-54 1 µg/L	RI-MW-X-20171025 JC53007-55 1 µg/L	RI-MW-4-20171025 JC53007-53 1 µg/L	RI-MW-5-20171025 JC53007-56 1 µg/L	RI-MW-8-20171025 JC53007-52 1 µg/L	RI-MW-9-20171025 JC53007-51 1 µg/L	RI-FB-4-20171025 JC53007-57 1 µg/L
Total Metals								
Aluminum	**NS**	1,560	1,640	200 U	200 U	2,070	200 U	200 U
Antimony	**3**	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Arsenic	**25**	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Barium	**1,000**	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Beryllium	**3**	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	**5**	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Calcium	**NS**	40,900	42,100	47,900	51,900	40,300	36,900	5,000 U
Chromium	**50**	10.3	10.4	10 U	10 U	10.1	10 U	10 U
Cobalt	**NS**	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Copper	**200**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Iron	**300**	**3,180**	**3,270**	197	235	**4,270**	100 U	100 U
Lead	**25**	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	**35,000**	10,200	10,400	14,800	17,300	10,500	10,100	5,000 U
Manganese	**300**	**931**	**994**	134	168	256	65.2	15 U
Mercury	**0.7**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	**100**	11.6	12.3	10 U	10 U	10 U	10 U	10 U
Potassium	**NS**	10,000 U	10,000 U	10,000 U	10,000 U	10,000 U	10,000 U	10,000 U
Selenium	**10**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Silver	**50**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Sodium	**20,000**	**54,400**	**55,700**	**86,900**	**82,300**	**94,100**	**111,000**	10,000 U
Thallium	**0.5**	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vanadium	**NS**	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Zinc	**2,000**	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Dissolved Metals								
Aluminum	**NS**	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Antimony	**3**	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Arsenic	**25**	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Barium	**1,000**	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Beryllium	**3**	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	**5**	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Calcium	**NS**	40,300	40,100	48,600	49,900	39,900	36,800	5,000 U
Chromium	**50**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cobalt	**NS**	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Copper	**200**	16	10 U	10 U	10 U	10 U	10 U	10 U
Iron	**300**	126	130	100 U	114	100 U	100 U	100 U
Lead	**25**	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	**35,000**	9,630	9,630	15,100	16,600	9,940	10,100	5,000 U
Manganese	**300**	**801**	**796**	122	155	70.2	63.7	15 U
Mercury	**0.7**	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	**100**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Potassium	**NS**	10,000 U	10,000 U	10,000 U	10,000 U	10,000 U	10,000 U	10,000 U
Selenium	**10**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Silver	**50**	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Sodium	**20,000**	**53,300**	**53,400**	**87,900**	**79,400**	**93,300**	**111,000**	10,000 U
Thallium	**0.5**	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vanadium	**NS**	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Zinc	**2,000**	20 U	20 U	20 U	20 U	20 U	20 U	20 U

Tables 12-16
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Remedial Investigation Groundwater Analytical Results
Notes

NYSDEC Class GA Ambient Water Quality Standards (AWQS):
New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) (1.1.1): Class GA AWQS

Exceedances of the AWQS are in bold font.

RI-MW-X-20171025 is a blind duplicate sample of RI-MW-1-20171025

J : The analyte was positively identified; the associated numerical value is approximate and may be inaccurate or imprecise.

U : The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

ND : Not detected.

NS : A standard has not been established for the analyte.

TS : Value represents a sum total standard.

μg/L : micrograms per liter = parts per billion (ppb)

Table 17
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Remedial Investigation Soil VaporAnalytical Results
Volatile Organic Compounds (VOCs)

Sample ID Lab Sample ID Sample Date Unit	NYSDOH AGVs µg/m^3	NYSDOH Matrix µg/m^3	RI-SV-1-20171017 JC53320-7 10/17/2017 µg/m^3	RI-SV-2-20171017 JC53320-2 10/17/2017 µg/m^3	RI-SV-3-20171017 JC53320-6 10/17/2017 µg/m^3
1,1,1-Trichloroethane	NS	1,000	3.8 J	5	4.4 U
1,1,2,2-Tetrachloroethane	NS	NS	5.5 U	5.5 U	5.5 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	NS	NS	6.1 U	6.1 U	6.1 U
1,1,2-Trichloroethane	NS	NS	4.4 U	4.4 U	4.4 U
1,1-Dichloroethane	NS	NS	3.2 U	3.2 U	3.2 U
1,1-Dichloroethene	NS	60	3.2 U	3.2 U	3.2 U
1,2,4-Trichlorobenzene	NS	NS	1.1 U	1.1 U	1.1 U
1,2,4-Trimethylbenzene	NS	NS	4	8.4	2.4 J
1,2-Dibromoethane (Ethylene Dibromide)	NS	NS	6.1 U	6.1 U	6.1 U
1,2-Dichloroethane	NS	NS	3.2 U	3.2 U	3.2 U
1,2-Dichloropropane	NS	NS	3.7 U	3.7 U	3.7 U
1,2-Dichlorotetrafluoroethane	NS	NS	5.6 U	5.6 U	5.6 U
1,3,5-Trimethylbenzene (Mesitylene)	NS	NS	3.9 U	2.8 J	3.9 U
1,3-Butadiene	NS	NS	1.8 U	1.8 U	1.8 U
1,4-Dioxane (P-Dioxane)	NS	NS	2.9 U	2.9 U	2.9 U
2,2,4-Trimethylpentane	NS	NS	3.7 U	3.6 J	3.7 U
2-Chlorotoluene	NS	NS	4.1 U	4.1 U	4.1 U
2-Hexanone	NS	NS	3.3 U	3.3 U	2.8 J
4-Ethyltoluene	NS	NS	3.9 U	2.1 J	3.9 U
Acetone	NS	NS	37.8	67.2	23
Allyl Chloride (3-Chloropropene)	NS	NS	2.5 U	2.5 U	2.5 U
Benzene	NS	NS	2.6 U	1.9 J	2.6 U
Benzyl Chloride	NS	NS	4.1 U	4.1 U	4.1 U
Bromodichloromethane	NS	NS	5.4 U	5.4 U	5.4 U
Bromoform	NS	NS	8.3 U	8.3 U	8.3 U
Bromomethane	NS	NS	3.1 U	3.1 U	3.1 U
Carbon Disulfide	NS	NS	6.9	6.5	3
Carbon Tetrachloride	NS	60	5 U	5 U	5 U
Chlorobenzene	NS	NS	3.7 U	3.7 U	3.7 U
Chloroethane	NS	NS	2.1 U	2.1 U	2.1 U
Chloroform	NS	NS	3.9 U	29	3.9 U
Chloromethane	NS	NS	1.7 U	1.7 U	1.7 U
Cis-1,2-Dichloroethylene	NS	60	3.2 U	3.2 U	3.2 U
Cis-1,3-Dichloropropene	NS	NS	3.6 U	3.6 U	3.6 U
Cyclohexane	NS	NS	2.8 U	3.2	2.8 U
Dibromochloromethane	NS	NS	6.8 U	6.8 U	6.8 U
Dichlorodifluoromethane	NS	NS	57.9	4 U	14
Ethanol	NS	NS	3.8 U	15	3.8 U
Ethyl Acetate	NS	NS	2.9 U	2.9 U	2.9 U
Ethylbenzene	NS	NS	3.5 U	9.6	3.5 U
Hexachlorobutadiene	NS	NS	1 U	1 U	1 U
Isopropanol	NS	NS	2 U	2 U	2 U
Methyl Ethyl Ketone (2-Butanone)	NS	NS	12	6.2	6.2
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	NS	3.3 U	3.3 U	3.3 U
Methylene Chloride	60	1,000	2.8 U	2.8 U	2.8 U
m-Dichlorobenzene	NS	NS	0.72 U	0.72 U	0.72 U
Methylmethacrylate	NS	NS	0.74 U	0.74 U	0.74 U
N-Heptane	NS	NS	3.3 U	2 J	3.3 U
N-Hexane	NS	NS	2.8 U	25	2.8 U
o-Dichlorobenzene	NS	NS	0.66 U	0.66 U	0.66 U
O-Xylene (1,2-Dimethylbenzene)	NS	NS	2.3 J	4.3	3.5 U
p-Dichlorobenzene	NS	NS	0.72 U	0.72 U	0.72 U
Styrene	NS	NS	3.4 U	3.4 U	3.4 U
Tert-Butyl Alcohol	NS	NS	3.3	3.6	2.4 U
Tert-Butyl Methyl Ether	NS	NS	2.9 U	2.9 U	2.9 U
Tetrachloroethylene (PCE)	30	1,000	257	33	24
Tetrahydrofuran	NS	NS	2.4 U	2.4 U	2.4 U
Toluene	NS	NS	23	31	14
Trans-1,2-Dichloroethene	NS	NS	3.2 U	3.2 U	3.2 U
Trans-1,3-Dichloropropene	NS	NS	3.6 U	3.6 U	3.6 U
Trichloroethylene (TCE)	2	60	1	0.86 U	0.86 U
Trichlorofluoromethane	NS	NS	402	641	247
Vinyl Acetate	NS	NS	2.8 U	2.8 U	2.8 U
Vinyl Bromide	NS	NS	3.5 U	3.5 U	3.5 U
Vinyl Chloride	NS	60	2 U	2 U	2 U
Xylenes, Total	NS	NS	6.1	15	2.6 J

Table 17
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Volatile Organic Compounds (VOCs)

Sample ID Lab Sample ID Sample Date Unit	NYSDOH AGVs µg/m³	NYSDOH Matrix µg/m³	RI-SV-4-20171017 JC53320-1 10/17/2017 µg/m³	RI-SV-5-20171017 JC53320-4 10/17/2017 µg/m³	RI-SV-6-20171017 JC53320-3 10/17/2017 µg/m³
1,1,1-Trichloroethane	NS	1,000	22 U	22 U	4.4
1,1,2,2-Tetrachloroethane	NS	NS	27 U	27 U	5.5 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	NS	NS	31 U	31 U	6.1 U
1,1,2-Trichloroethane	NS	NS	22 U	22 U	4.4 U
1,1-Dichloroethane	NS	NS	16 U	16 U	3.2 U
1,1-Dichloroethene	NS	60	16 U	16 U	3.2 U
1,2,4-Trichlorobenzene	NS	NS	5.7 U	5.7 U	1.1 U
1,2,4-Trimethylbenzene	NS	NS	20 U	20 U	6.4
1,2-Dibromoethane (Ethylene Dibromide)	NS	NS	31 U	31 U	6.1 U
1,2-Dichloroethane	NS	NS	8.9 J	16 U	3.2 U
1,2-Dichloropropane	NS	NS	18 U	18 U	3.7 U
1,2-Dichlorotetrafluoroethane	NS	NS	28 U	28 U	5.6 U
1,3,5-Trimethylbenzene (Mesitylene)	NS	NS	20 U	20 U	2.3 J
1,3-Butadiene	NS	NS	8.8 U	8.8 U	1.8 U
1,4-Dioxane (P-Dioxane)	NS	NS	14 U	14 U	2.9 U
2,2,4-Trimethylpentane	NS	NS	19 U	19 U	3.7 U
2-Chlorotoluene	NS	NS	21 U	21 U	4.1 U
2-Hexanone	NS	NS	16 U	16 U	3.3 U
4-Ethyltoluene	NS	NS	20 U	20 U	2.3 J
Acetone	NS	NS	99.5	247	16
Allyl Chloride (3-Chloropropene)	NS	NS	13 U	13 U	2.5 U
Benzene	NS	NS	80.5	25	1.6 J
Benzyl Chloride	NS	NS	21 U	21 U	4.1 U
Bromodichloromethane	NS	NS	27 U	27 U	5.4 U
Bromoform	NS	NS	41 U	41 U	8.3 U
Bromomethane	NS	NS	16 U	16 U	3.1 U
Carbon Disulfide	NS	NS	12 U	19	2.5 U
Carbon Tetrachloride	NS	60	25 U	25 U	5 U
Chlorobenzene	NS	NS	18 U	18 U	3.7 U
Chloroethane	NS	NS	11 U	11 U	2.1 U
Chloroform	NS	NS	11 J	20 U	3.9 U
Chloromethane	NS	NS	8.3 U	8.3 U	1.7 U
Cis-1,2-Dichloroethylene	NS	60	16 U	16 U	3.2 U
Cis-1,3-Dichloropropene	NS	NS	18 U	18 U	3.6 U
Cyclohexane	NS	NS	14 U	14 U	2.8 U
Dibromochloromethane	NS	NS	34 U	34 U	6.8 U
Dichlorodifluoromethane	NS	NS	20 U	48	231
Ethanol	NS	NS	19 U	19 U	3.8 U
Ethyl Acetate	NS	NS	14 U	14 U	2.9 U
Ethylbenzene	NS	NS	17 U	2130	8.3
Hexachlorobutadiene	NS	NS	1 U	5.1 U	1 U
Isopropanol	NS	NS	9.8 U	9.8 U	2 U
Methyl Ethyl Ketone (2-Butanone)	NS	NS	12 U	12 U	4.4
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	NS	16 U	16 U	3.3 U
Methylene Chloride	60	1,000	14 U	14 U	2.8 U
m-Dichlorobenzene	NS	NS	3.5 U	3.5 U	0.72 U
Methylmethacrylate	NS	NS	3.6 U	3.6 U	0.74 U
N-Heptane	NS	NS	16 U	7.8 J	3.3 U
N-Hexane	NS	NS	14 U	29	2.8 U
o-Dichlorobenzene	NS	NS	3.3 U	3.3 U	0.66 U
O-Xylene (1,2-Dimethylbenzene)	NS	NS	17 U	42	2.3 J
p-Dichlorobenzene	NS	NS	3.5 U	3.5 U	0.72 U
Styrene	NS	NS	16 J	17 U	3.4 U
Tert-Butyl Alcohol	NS	NS	63.1	315	1.7 J
Tert-Butyl Methyl Ether	NS	NS	14 U	14 U	2.9 U
Tetrachloroethylene (PCE)	30	1,000	5.4 U	5.4 U	5.1
Tetrahydrofuran	NS	NS	12 U	13	3.5
Toluene	NS	NS	38.4	73.1	30
Trans-1,2-Dichloroethene	NS	NS	16 U	16 U	3.2 U
Trans-1,3-Dichloropropene	NS	NS	18 U	18 U	3.6 U
Trichloroethylene (TCE)	2	60	4.3 U	4.3 U	0.86 U
Trichlorofluoromethane	NS	NS	2,970	31	188
Vinyl Acetate	NS	NS	14 U	14 U	2.8 U
Vinyl Bromide	NS	NS	17 U	17 U	3.5 U
Vinyl Chloride	NS	60	10 U	10 U	2 U
Xylenes, Total	NS	NS	17 U	102	6.5

Table 17
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Remedial Investigation Soil VaporAnalytical Results
Volatile Organic Compounds (VOCs)

Sample ID Lab Sample ID Sample Date Unit	NYSDOH AGVs $\mu g/m^3$	NYSDOH Matrix $\mu g/m^3$	RI-SV-7-20171017 JC53320-5 10/17/2017 $\mu g/m^3$
1,1,1-Trichloroethane	NS	1,000	5.3
1,1,2,2-Tetrachloroethane	NS	NS	5.5 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	NS	NS	6.1 U
1,1,2-Trichloroethane	NS	NS	4.4 U
1,1-Dichloroethane	NS	NS	3.2 U
1,1-Dichloroethene	NS	60	3.2 U
1,2,4-Trichlorobenzene	NS	NS	1.1 U
1,2,4-Trimethylbenzene	NS	NS	5.4
1,2-Dibromoethane (Ethylene Dibromide)	NS	NS	6.1 U
1,2-Dichloroethane	NS	NS	3.2 U
1,2-Dichloropropane	NS	NS	3.7 U
1,2-Dichlorotetrafluoroethane	NS	NS	5.6 U
1,3,5-Trimethylbenzene (Mesitylene)	NS	NS	2 J
1,3-Butadiene	NS	NS	1.8 U
1,4-Dioxane (P-Dioxane)	NS	NS	2.9 U
2,2,4-Trimethylpentane	NS	NS	3.7 U
2-Chlorotoluene	NS	NS	4.1 U
2-Hexanone	NS	NS	3.3 U
4-Ethyltoluene	NS	NS	3.9 U
Acetone	NS	NS	12
Allyl Chloride (3-Chloropropene)	NS	NS	2.5 U
Benzene	NS	NS	1.8 J
Benzyl Chloride	NS	NS	4.1 U
Bromodichloromethane	NS	NS	5.4 U
Bromoform	NS	NS	8.3 U
Bromomethane	NS	NS	3.1 U
Carbon Disulfide	NS	NS	2.5 U
Carbon Tetrachloride	NS	60	5 U
Chlorobenzene	NS	NS	3.7 U
Chloroethane	NS	NS	2.1 U
Chloroform	NS	NS	6.8
Chloromethane	NS	NS	1.7 U
Cis-1,2-Dichloroethylene	NS	60	3.2 U
Cis-1,3-Dichloropropene	NS	NS	3.6 U
Cyclohexane	NS	NS	2.8 U
Dibromochloromethane	NS	NS	6.8 U
Dichlorodifluoromethane	NS	NS	276
Ethanol	NS	NS	8.9
Ethyl Acetate	NS	NS	2.9 U
Ethylbenzene	NS	NS	8.3
Hexachlorobutadiene	NS	NS	1 U
Isopropanol	NS	NS	2 U
Methyl Ethyl Ketone (2-Butanone)	NS	NS	1.7 J
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	NS	3.3 U
Methylene Chloride	60	1,000	2.8 U
m-Dichlorobenzene	NS	NS	0.72 U
Methylmethacrylate	NS	NS	0.74 U
N-Heptane	NS	NS	3.3 U
N-Hexane	NS	NS	2.8 U
o-Dichlorobenzene	NS	NS	0.66 U
O-Xylene (1,2-Dimethylbenzene)	NS	NS	3.5 U
p-Dichlorobenzene	NS	NS	0.72 U
Styrene	NS	NS	3.4 U
Tert-Butyl Alcohol	NS	NS	2.4 U
Tert-Butyl Methyl Ether	NS	NS	2.9 U
Tetrachloroethylene (PCE)	30	1,000	199
Tetrahydrofuran	NS	NS	2.9
Toluene	NS	NS	37.7
Trans-1,2-Dichloroethene	NS	NS	3.2 U
Trans-1,3-Dichloropropene	NS	NS	3.6 U
Trichloroethylene (TCE)	2	60	5.9
Trichlorofluoromethane	NS	NS	121
Vinyl Acetate	NS	NS	2.8 U
Vinyl Bromide	NS	NS	3.5 U
Vinyl Chloride	NS	60	2 U
Xylenes, Total	NS	NS	2.7 J

Table 17
147-07 94th Avenue
Queens, NY
Remedial Investigation Soil VaporAnalytical Results
Notes

NYSDOH Soil Vapor Intrusion Air Guidance Values (AGVs) and Matrix Values:
New York State Department of Health (NYSDOH) AGVs presented in the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006, updated September 2013 for the tetrachloroethylene (PCE) AGV, August 2015 for the trichloroethylene (TCE) AGV, and May 2017 NYSDOH Matrices A, B, and C for PCE, TCE, c1,2-DCE, 1,1-DCE, carbon tetrachloride, 1,1,1-TCA, methylene chlroide, and vinyl chloride. The matrix values listed are the soil vapor concentrations where mitigation is recommended regardless of the indoor air concentration.

Exceedances of NYSDOH AGVs are highlighted in gray.

J : The analyte was positively identified; the associated numerical value is approximate and may be inaccurate or imprecise.

U : The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NS : A standard has not been established for the analyte.

$\mu g/m^3$: micrograms per cubic meter

Table 18
147-07 94th Avenue
Queens, NY
Track 4 Site-Specific Soil Cleanup Objectives (SSSCOs)

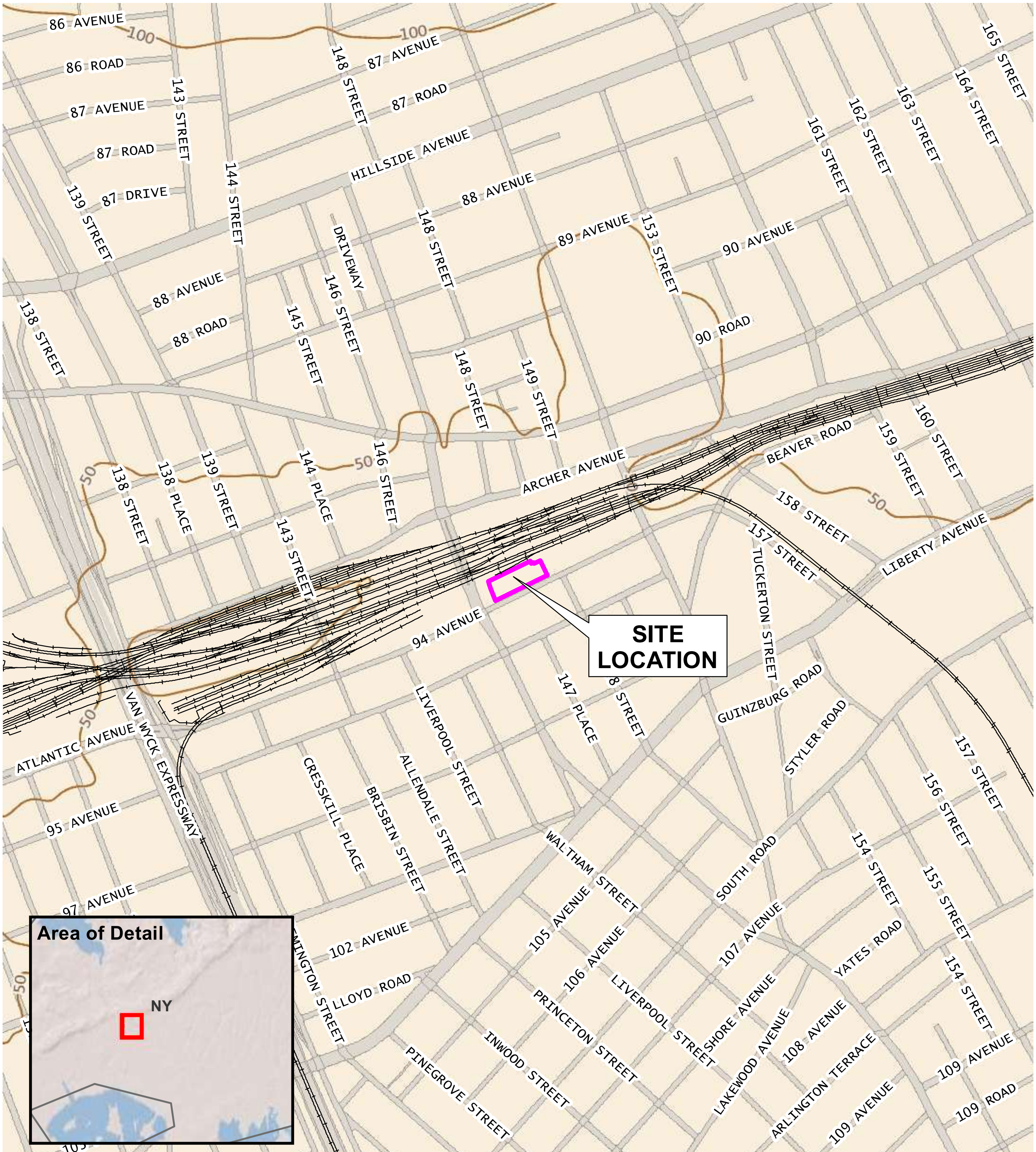
Analyte/Compound	SSSCO (ppm)
Total Polycyclic Aromatic Hydrocarbons (PAHs)	200
Lead	2,000
Manganese	5,000
Note: ppm = parts per million	

Table 19
147-07 94th Avenue
Queens, NY
List of Anticipated Agency Approvals

Permit	Agency	Agency Phone Number
New Building Permit	NYCDOB	(718) 579-6906
Fencing/Sidewalk Closure Permit	NYCDOT	(212) 442-6770
Asbestos/Demolition Permit	NYCDOB	(718) 579-6906
Site Connections	NYCDEP	(718) 579-6988
DOT Signoff	NYCDOT	(212) 442-2772
FDNY Signoff	FDNY	(718) 999-1955
Certificate of Occupancy	NYCDOB	(718) 579-6923

Notes:
NYCDOT = New York City Department of Transportation
NYCDEP = New York City Department of Environmental Protection
FDNY = Fire Department of the City of New York
NYCDOB = New York City Department of Buildings

FIGURES



Map Source: USGS Topo base map service from The National Map

0 800 1,600

SCALE IN FEET

AKRF

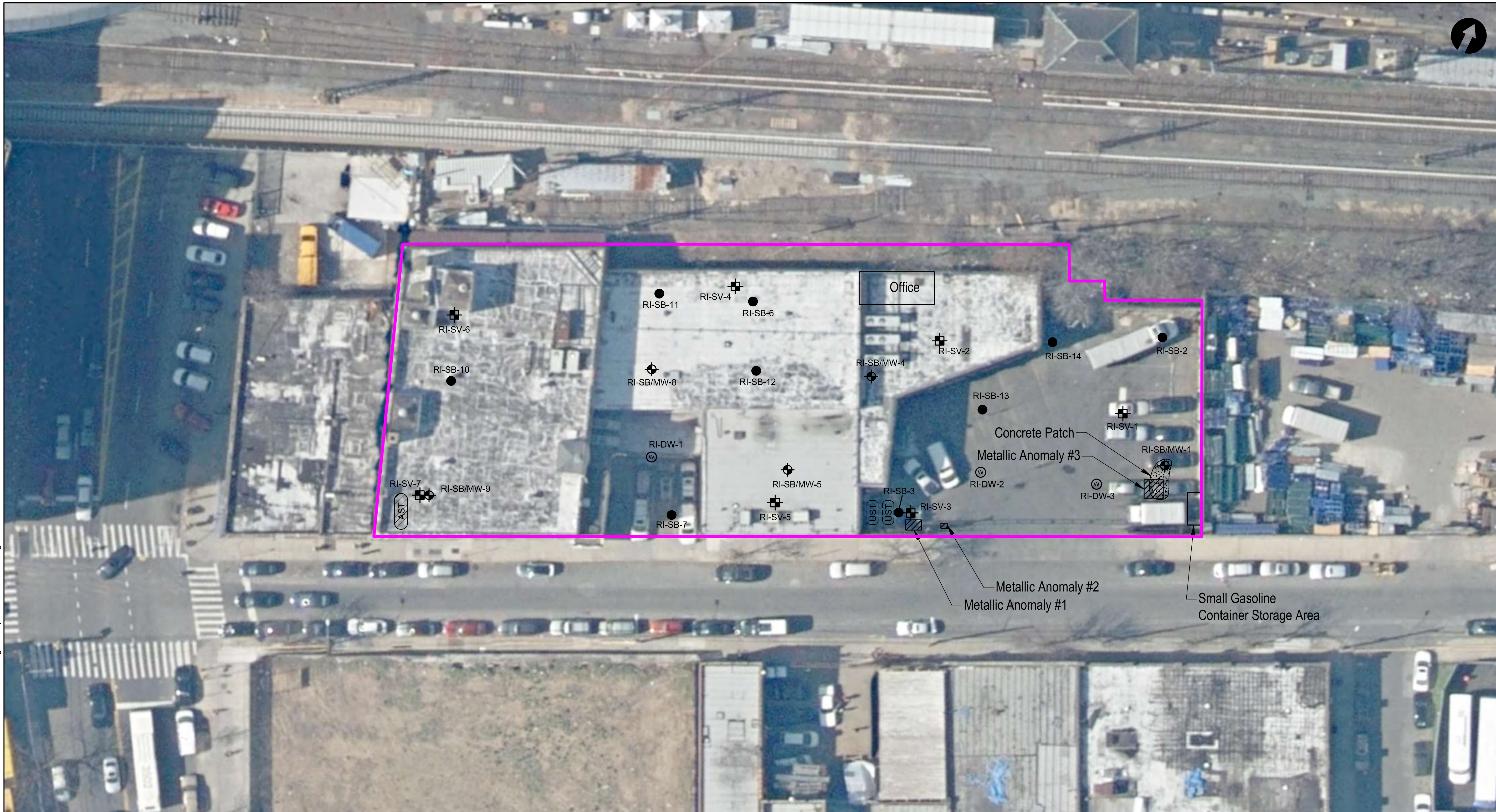
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue

Queens, New York

SITE LOCATION

DATE	PROJECT NO.	FIGURE
9/21/2017	170340	1



LEGEND

PROJECT SITE BOUNDARY	SOIL BORING/GROUNDWATER MONITORING WELL LOCATION
UST — APPROXIMATE LOCATION OF ABANDONED IN-PLACE 550-GALLON #2 FUEL OIL UNDERGROUND STORAGE TANK	SOIL BORING LOCATION
	DRY WELL LOCATION
AST — APPROXIMATE LOCATION OF ABANDONED IN-PLACE 2,000-GALLON #2 FUEL OIL ABOVEGROUND STORAGE TANK	SOIL VAPOR SAMPLE LOCATION

0 20 40 80

SCALE IN FEET

Aerial Source:
2016 New York Statewide Digital Orthoimagery.

AKRF
440 Park Avenue South, New York, NY 10016

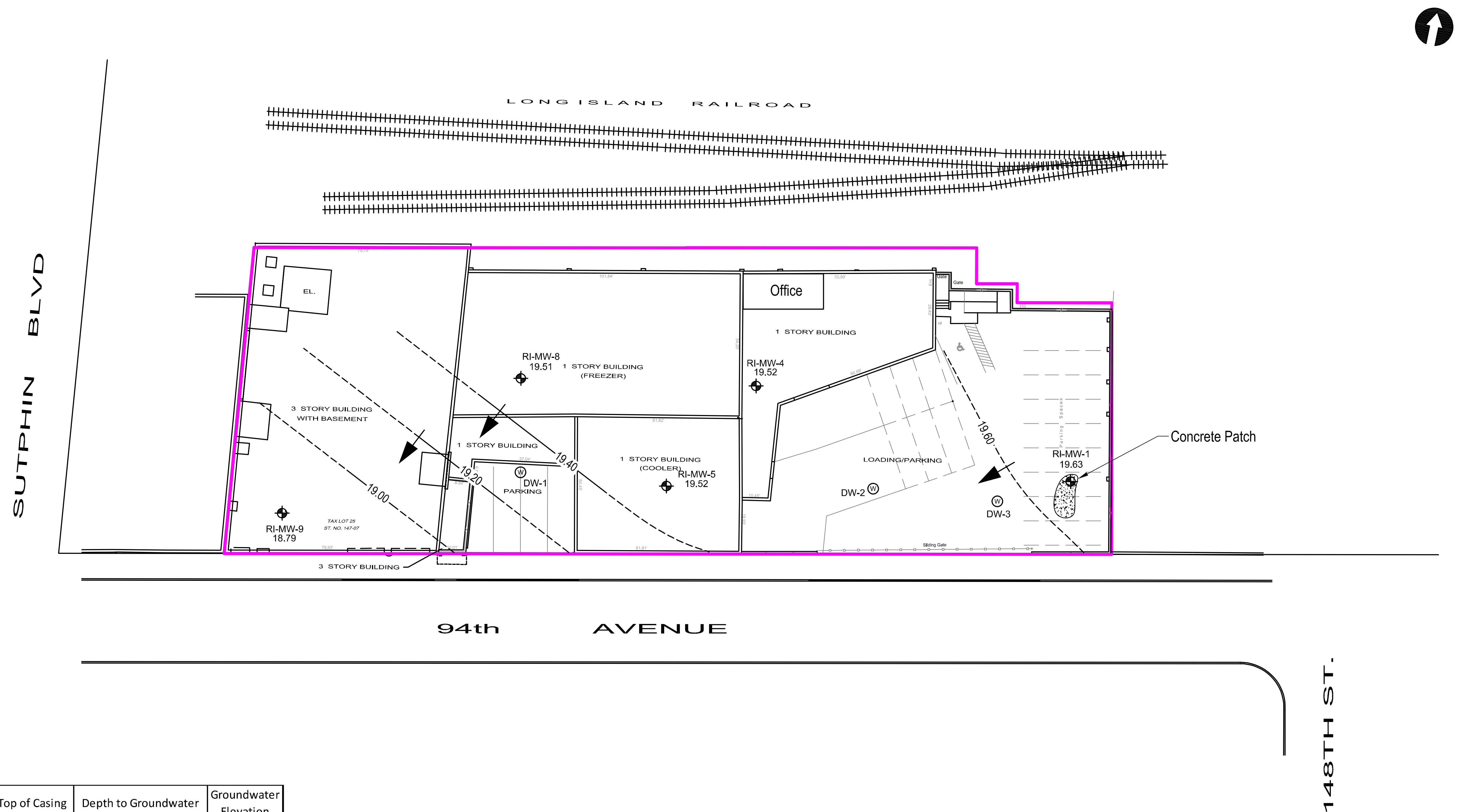
147-25 94th Avenue
Queens, New York

SITE PLAN WITH SAMPLE LOCATIONS

DATE
6/11/2018

PROJECT NO.
170340

FIGURE
2



Well ID	Top of Casing (feet)	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)
RI-MW-1	39.98	20.35	19.63
RI-MW-4	44.40	24.88	19.52
RI-MW-5	44.15	24.63	19.52
RI-MW-8	44.36	24.85	19.51
RI-MW-9	34.43	15.64	18.79

Notes:

All elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

TOC - Top of Casing

LEGEND

PROJECT SITE BOUNDARY

GROUNDWATER MONITORING WELL LOCATION

DRY WELL LOCATION

18.79 WATER TABLE ELEVATION IN FEET

—19.20— GROUNDWATER CONTOUR LINE (INTERVAL 0.2 FEET) (DASHED WHERE INFERRED)

GROUNDWATER FLOW DIRECTION

0 20 40 80

SCALE IN FEET

Source:
Montrose Surveying Co., LLP. "City of New York County Queens Tax Block 9998 Tax Lot 25" Dated 12-12-16.

AKRF
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

GROUNDWATER CONTOUR MAP - OCTOBER 25, 2017

DATE
11/29/2017

PROJECT NO.
170340

FIGURE
3

Sample ID	NYSDEC	NYSDEC	RI-SB-11(0-2) 20171016
Date Sampled	UUSCOs	RRSCOs	10/16/2017
Pesticides	mg/kg	mg/kg	mg/kg
P,P'-DDE	0.0033	8.9	0.0125
Metals	mg/kg	mg/kg	mg/kg
Chromium, Hexavalent	1	110	1.3
Lead	63	400	977

Sample ID	NYSDEC	NYSDEC	RI-SB-6(0-2) 20171016
Date Sampled	UUSCOs	RRSCOs	10/16/2017
SVOCs	mg/kg	mg/kg	mg/kg
Benzo(a)anthracene	1	1	1.12
Benzo(a)pyrene	1	1	1.08
Benzo(b)fluoranthene	1	1	1.56
Chrysene	1	3.9	1.19
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.709
Metals	mg/kg	mg/kg	mg/kg
Lead	63	400	73.9

Sample ID	NYSDEC	NYSDEC	RI-SB-13(0-2) 20171012	RI-SB-13(3-5) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017	10/12/2017
VOCs	mg/kg	mg/kg	mg/kg	mg/kg
Acetone	0.05	100	0.283	0.058 J
Metals	mg/kg	mg/kg	mg/kg	mg/kg
Copper	50	270	60.8	NE
Lead	63	400	235	84.2
Nickel	30	310	NE	68.7
Zinc	109	10,000	960	NE

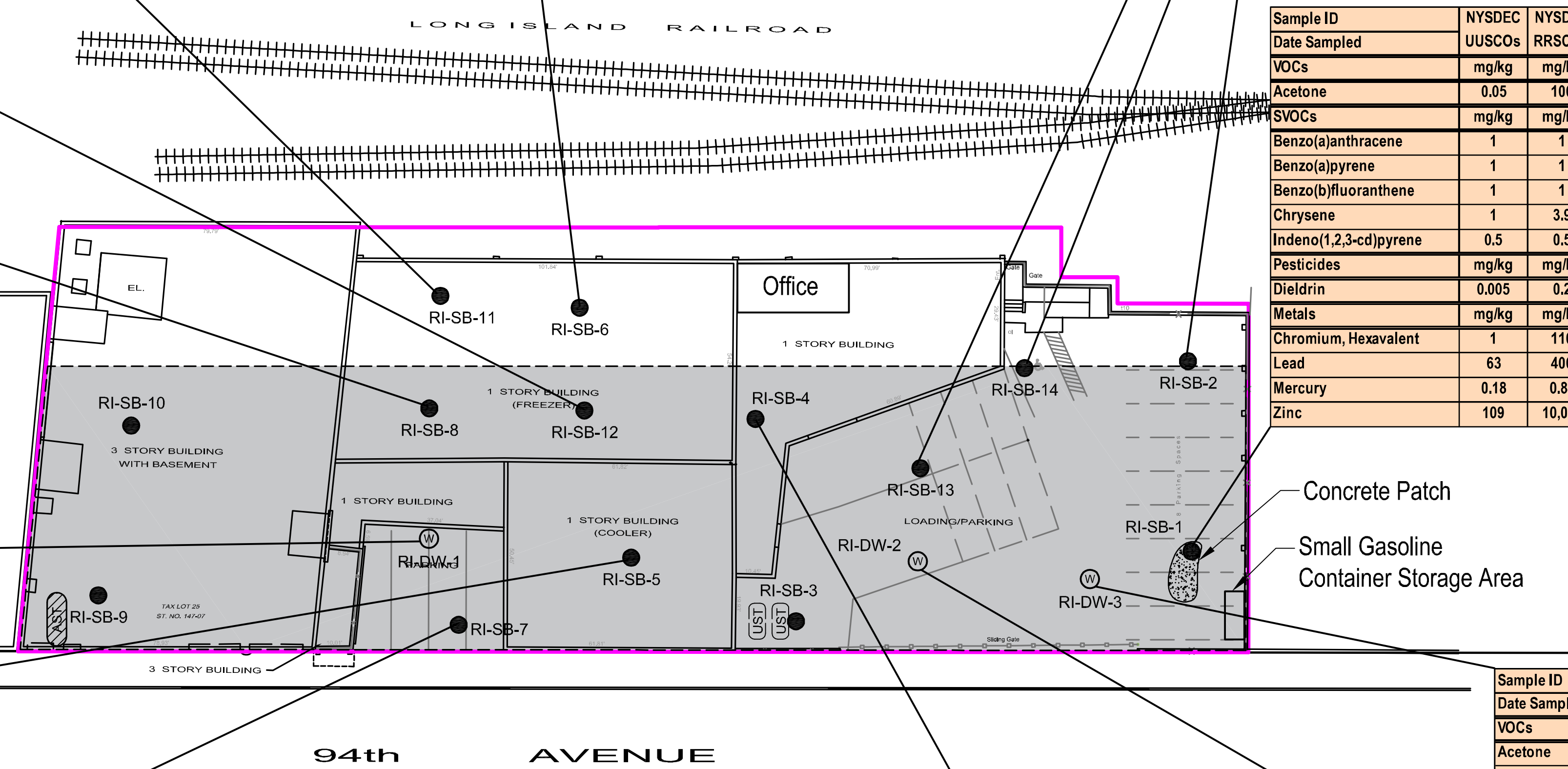
Sample ID	NYSDEC	NYSDEC	RI-SB-14(0-2) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017
Metals	mg/kg	mg/kg	mg/kg
Lead	63	400	215
Mercury	0.18	0.81	0.22
Zinc	109	10,000	114

Sample ID	NYSDEC	NYSDEC	RI-SB-2(0-2) 20171012	RI-SB-2(3-5) 20171012	RI-SB-X(3-5) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017	10/12/2017	10/12/2017
Pesticides	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Dieldrin	0.005	0.2	0.0055	NE	NE
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Chromium, Hexavalent	1	110	NE	NE	1.3
Lead	63	400	98.4	NE	NE
Zinc	109	10,000	119	NE	NE

Sample ID	NYSDEC	NYSDEC	RI-SB-12(0-2) 20171016
Date Sampled	UUSCOs	RRSCOs	10/16/2017
Metals	mg/kg	mg/kg	mg/kg
Copper	50	270	81.6

Sample ID	NYSDEC	NYSDEC	RI-SB-1(0-2) 20171012	RI-SB-1(13-15) 20171012	RI-SB-1(16-18) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017	10/12/2017	10/12/2017
VOCs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Acetone	0.05	100	0.0503	0.153	0.0701
SVOCs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Benzo(a)anthracene	1	1	NE	1.53	NE
Benzo(a)pyrene	1	1	NE	1.26	NE
Benzo(b)fluoranthene	1	1	NE	1.53	NE
Chrysene	1	3.9	NE	1.66	NE
Indeno(1,2,3-cd)pyrene	0.5	0.5	NE	0.822	NE
Pesticides	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Dieldrin	0.005	0.2	0.0813	0.0134	NE
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Chromium, Hexavalent	1	110	NE	1.6	NE
Lead	63	400	123	1,960	NE
Mercury	0.18	0.81	0.19	NE	NE
Zinc	109	10,000	NE	143	NE

Sample ID	NYSDEC	NYSDEC	RI-SB-8(0-2) 20171016
Date Sampled	UUSCOs	RRSCOs	10/16/2017
SVOCs	mg/kg	mg/kg	mg/kg
Benzo(a)anthracene	1	1	1.44
Benzo(a)pyrene	1	1	1.47
Benzo(b)fluoranthene	1	1	2.18
Chrysene	1	3.9	1.7
Dibenzo(a,h)anthracene	0.330	0.330	0.333
Indeno(1,2,3-cd)pyrene	0.5	0.5	1.04
Metals	mg/kg	mg/kg	mg/kg
Chromium, Hexavalent	1	110	5.2
Lead	63	400	1,640
Mercury	0.18	0.81	0.64
Zinc	109	10,000	404



Sample ID	NYSDEC	NYSDEC	RI-DW-1(3-4) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017
VOCs	mg/kg	mg/kg	mg/kg
Toluene	0.7	100	2.59

Sample ID	NYSDEC	NYSDEC	RI-DW-3 (11-12) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017
VOCs	mg/kg	mg/kg	mg/kg
Acetone	0.05	100	0.155
Toluene	0.7	100	2.63 E

Sample ID	NYSDEC	NYSDEC	RI-SB-5(0-2) 20171013	RI-SB-5(7-9) 20171013
Date Sampled	UUSCOs	RRSCOs	10/13/2017	10/13/2017
SVOCs	mg/kg	mg/kg	mg/kg	mg/kg
Benzo(b)fluoranthene	1	1	1.08	NE
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.512	NE
Metals	mg/kg	mg/kg	mg/kg	mg/kg
Lead	63	400	178	128

Sample ID	NYSDEC	NYSDEC	RI-DW-2(12-13) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017
VOCs	mg/kg	mg/kg	mg/kg
Acetone	0.05	100	0.14
Metals	mg/kg	mg/kg	mg/kg
Copper	50	270	87.6
Nickel	8	190	190
Zinc	109	10,000	239

Sample ID	NYSDEC	NYSDEC	RI-SB-7(0-2) 20171012	RI-SB-7(2-4) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017	10/12/2017
Metals	mg/kg	mg/kg	mg/kg	mg/kg
Chromium, Hexavalent	1	110	1.2	NE
Manganese	1,600	2,000	NE	4,520
Silver	2	180	NE	3.5

Sample ID	NYSDEC	NYSDEC	RI-SB-4(0-2) 20171013	RI-SB-4(3-5) 20171013	RI-SB-4(17-19) 20171013
Date Sampled	UUSCOs	RRSCOs	10/13/2017	10/13/2017	10/13/2017
VOCs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Acetone	0.05	100	0.0652	0.0733	0.114
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Chromium, Hexavalent	1	110	NE	NE	1.2
Lead	63	400	179	NE	NE

LEGEND

PROJECT SITE BOUNDARY

PROPOSED CELLAR

SOIL BORING LOCATION

W DRY WELL LOCATION

UST APPROXIMATE LOCATION OF ABANDONED IN-PLACE 550-GALLON #2 FUEL OIL UNDERGROUND STORAGE TANK

AST APPROXIMATE LOCATION OF ABANDONED IN-PLACE 2,000-GALLON #2 FUEL OIL ABOVEGROUND STORAGE TANK

SOIL

Part 375 Soil Cleanup Objectives (SCOs):
SCOs listed in the New York State Department of Environmental Conservation (NYSDEC) Part 375 Regulations (6 NYCRR Part 375).

Exceedances of Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) are shown in bold font.
Exceedances of Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs) are highlighted in gray.

J: The reported concentration is an estimated value.

E: The detected concentration exceeds the calibration range.

NE: The Analyte was not detected at a concentrations exceeding UUSCOs or RRSCOs.

mg/kg: milligrams per kilogram = parts per million (ppm)

Sample ID	NYSDEC	NYSDEC	RI-DW-3 (11-12) 20171012
Date Sampled	UUSCOs	RRSCOs	10/12/2017
VOCs	mg/kg	mg/kg	mg/kg
Acetone	0.05	100	0.155
Toluene	0.7	100	2.63 E

Sample ID
Sample Date
Concentration in Soil
Analyte/Compound in Soil

0 25 50 100
SCALE IN FEET

Source:
Montrose Surveying Co., LLP. "City of New York County Queens Tax Block 9998 Tax Lot 25" Dated 12-12-16.

AKRF
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

SOIL AND SEDIMENT SAMPLE CONCENTRATIONS ABOVE NYSDEC UUSCOS AND/OR RRSCOS

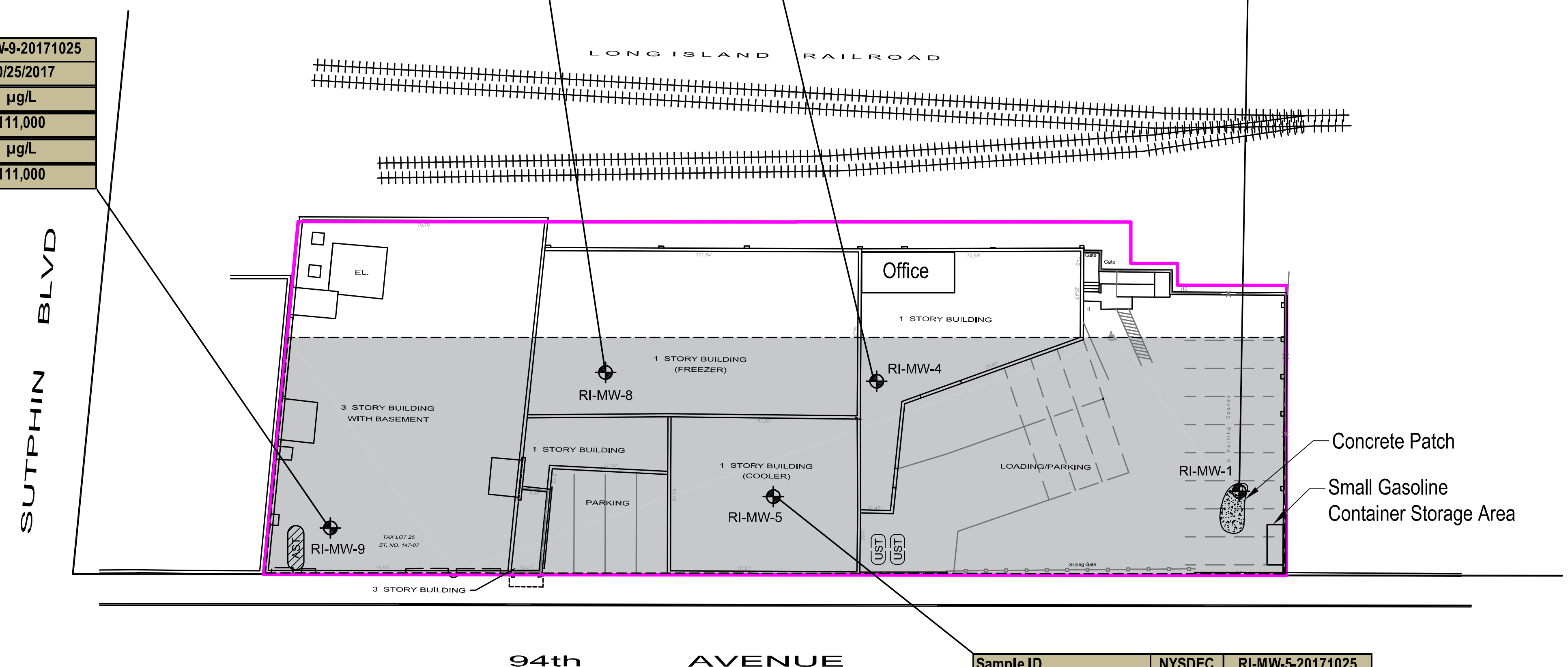
DATE
11/29/2017
PROJECT NO.
170340
FIGURE
4

Sample ID	NYSDEC	RI-MW-8-20171025
Date Sampled	AWQS	10/25/2017
Total Metals	µg/L	µg/L
Iron	300	**4,270**
Sodium	20,000	**94,100**
Dissolved Metals	µg/L	µg/L
Sodium	20,000	**93,300**

Sample ID	NYSDEC	RI-MW-4-20171025
Date Sampled	AWQS	10/25/2017
Total Metals	µg/L	µg/L
Sodium	20,000	**86,900**
Dissolved Metals	µg/L	µg/L
Sodium	20,000	**87,900**

Sample ID	NYSDEC	RI-MW-1-20171025	RI-MW-X-20171025
Date Sampled	AWQS	10/25/2017	10/25/2017
Total Metals	µg/L	µg/L	µg/L
Iron	300	**3,180**	**3,270**
Manganese	300	**931**	**994**
Sodium	20,000	**54,400**	**55,700**
Dissolved Metals	µg/L	µg/L	µg/L
Manganese	300	**801**	**796**
Sodium	20,000	**53,300**	**53,400**

Sample ID	NYSDEC	RI-MW-9-20171025
Date Sampled	AWQS	10/25/2017
Total Metals	µg/L	µg/L
Sodium	20,000	**111,000**
Dissolved Metals	µg/L	µg/L
Sodium	20,000	**111,000**



Sample ID	NYSDEC	RI-MW-5-20171025
Date Sampled	AWQS	10/25/2017
Total Metals	µg/L	µg/L
Sodium	20,000	**82,300**
Dissolved Metals	µg/L	µg/L
Sodium	20,000	**79,400**

LEGEND

PROJECT SITE BOUNDARY

PROPOSED CELLAR

GROUNDWATER SAMPLE LOCATION

UST — APPROXIMATE LOCATION OF ABANDONED IN-PLACE 550-GALLON #2 FUEL OIL UNDERGROUND STORAGE TANK

AST — APPROXIMATE LOCATION OF ABANDONED IN-PLACE 2,000-GALLON #2 FUEL OIL ABOVEGROUND STORAGE TANK

GROUNDWATER

NYSDEC Class GA Ambient Water Quality Standard (AWQS):
New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) (1.1.1): Class GA AWQS.

Sample RI-MW-X-20171025 is a blind duplicate sample of sample RI-MW-1-20171025.
Exceedances of the AWQS are shown in bold font.

(µg/L): micrograms per Liter = parts per billion (ppb)

Sample ID	NYSDEC	RI-MW-4-20171025
Date Sampled	AWQS	10/25/2017
Total Metals	µg/L	µg/L
Sodium	20,000	86,900
Dissolved Metals	µg/L	µg/L
Sodium	20,000	87,900

Sample ID
Sample Date
Concentration in Water
Analyte in Groundwater

0 25 50 100
SCALE IN FEET

Source:
Montrose Surveying Co., LLP. "City of New York County Queens Tax Block 9998 Tax Lot 25" Dated 12-12-16.

AKRF
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

GROUNDWATER SAMPLE CONCENTRATIONS ABOVE AWQSS

DATE
11/29/2017
PROJECT NO.
170340
FIGURE
5

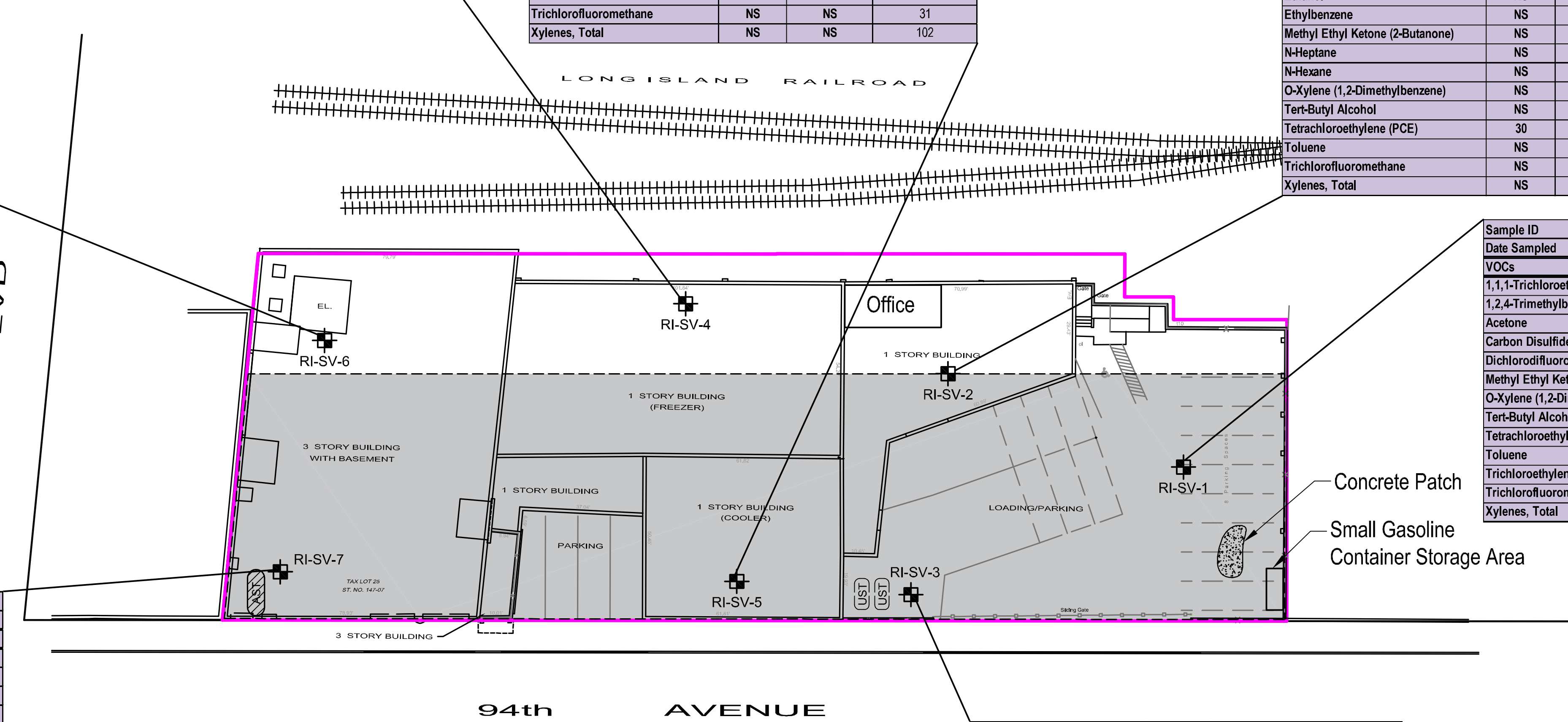
Sample ID	NYSDOH AGV	NYSDOH MATRIX VALUE	RI-SV-6-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
1,1,1-Trichloroethane	NS	1,000	4.4
1,2,4-Trimethylbenzene	NS	NS	6.4
1,3,5-Trimethylbenzene (Mesitylene)	NS	NS	2.3 J
4-Ethyltoluene	NS	NS	2.3 J
Acetone	NS	NS	16
Benzene	NS	NS	1.6 J
Dichlorodifluoromethane	NS	NS	231
Ethylbenzene	NS	NS	8.3
Methyl Ethyl Ketone (2-Butanone)	NS	NS	4.4
O-Xylene (1,2-Dimethylbenzene)	NS	NS	2.3 J
Tert-Butyl Alcohol	NS	NS	1.7 J
Tetrachloroethylene (PCE)	30	1,000	5.1
Tetrahydrofuran	NS	NS	3.5
Toluene	NS	NS	30
Trichlorofluoromethane	NS	NS	188
Xylenes, Total	NS	NS	6.5

Sample ID	NYSDOH AGV	NYSDOH MATRIX	RI-SV-4-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
1,2-Dichloroethane	NS	NS	8.9 J
Acetone	NS	NS	99.5
Benzene	NS	NS	80.5
Chloroform	NS	NS	11 J
Styrene	NS	NS	16 J
Tert-Butyl Alcohol	NS	NS	63.1
Toluene	NS	NS	38.4
Trichlorofluoromethane	NS	NS	2,970

Sample ID	NYSDOH AGV	NYSDOH MATRIX VALUE	RI-SV-5-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
Acetone	NS	NS	247
Benzene	NS	NS	25
Carbon Disulfide	NS	NS	19
Dichlorodifluoromethane	NS	NS	48
Ethylbenzene	NS	NS	2,130
N-Heptane	NS	NS	7.8 J
N-Hexane	NS	NS	29
O-Xylene (1,2-Dimethylbenzene)	NS	NS	42
Tert-Butyl Alcohol	NS	NS	315
Tetrahydrofuran	NS	NS	13
Toluene	NS	NS	73.1
Trichlorofluoromethane	NS	NS	31
Xylenes, Total	NS	NS	102

Sample ID	NYSDOH AGV	NYSDOH MATRIX VALUE	RI-SV-2-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
1,1,1-Trichloroethane	NS	1,000	5
1,2,4-Trimethylbenzene	NS	NS	8.4
1,3,5-Trimethylbenzene (Mesitylene)	NS	NS	2.8 J
2,2,4-Trimethylpentane	NS	NS	3.6 J
4-Ethyltoluene	NS	NS	2.1 J
Acetone	NS	NS	67.2
Benzene	NS	NS	1.9 J
Carbon Disulfide	NS	NS	6.5
Chloroform	NS	NS	29
Cyclohexane	NS	NS	3.2
Ethanol	NS	NS	15
Ethylbenzene	NS	NS	9.6
Methyl Ethyl Ketone (2-Butanone)	NS	NS	6.2
N-Heptane	NS	NS	2 J
N-Hexane	NS	NS	25
O-Xylene (1,2-Dimethylbenzene)	NS	NS	4.3
Tert-Butyl Alcohol	NS	NS	3.6
Tetrachloroethylene (PCE)	30	1,000	33
Toluene	NS	NS	31
Trichlorofluoromethane	NS	NS	641
Xylenes, Total	NS	NS	15

Sample ID	NYSDOH AGV	NYSDOH MATRIX VALUE	RI-SV-1-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
1,1,1-Trichloroethane	NS	1,000	3.8 J
1,2,4-Trimethylbenzene	NS	NS	4
Acetone	NS	NS	37.8
Carbon Disulfide	NS	NS	6.9
Dichlorodifluoromethane	NS	NS	57.9
Methyl Ethyl Ketone (2-Butanone)	NS	NS	12
O-Xylene (1,2-Dimethylbenzene)	NS	NS	2.3 J
Tert-Butyl Alcohol	NS	NS	3.3
Tetrachloroethylene (PCE)	30	1,000	257
Toluene	NS	NS	23
Trichloroethylene (TCE)	2	60	1
Trichlorofluoromethane	NS	NS	402
Xylenes, Total	NS	NS	6.1



Sample ID	NYSDOH AGV	NYSDOH MATRIX VALUE	RI-SV-7-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
1,1,1-Trichloroethane	NS	1,000	5.3
1,2,4-Trimethylbenzene	NS	NS	5.4
1,3,5-Trimethylbenzene (Mesitylene)	NS	NS	2 J
Acetone	NS	NS	12
Benzene	NS	NS	1.8 J
Chloroform	NS	NS	6.8
Dichlorodifluoromethane	NS	NS	276
Ethanol	NS	NS	8.9
Ethylbenzene	NS	NS	8.3
Methyl Ethyl Ketone (2-Butanone)	NS	NS	1.7 J
Tetrachloroethylene (PCE)	30	1,000	199
Tetrahydrofuran	NS	NS	2.9
Toluene	NS	NS	37.7
Trichloroethylene (TCE)	2	60	5.9
Trichlorofluoromethane	NS	NS	121
Xylenes, Total	NS	NS	2.7 J

Sample ID	NYSDOH AGV	NYSDOH MATRIX VALUE	RI-SV-3-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
1,2,4-Trimethylbenzene	NS	NS	2.4 J
2-Hexanone	NS	NS	2.8 J
Acetone	NS	NS	23
Carbon Disulfide	NS	NS	3
Dichlorodifluoromethane	NS	NS	14
Methyl Ethyl Ketone (2-Butanone)	NS	NS	6.2
Tetrachloroethylene (PCE)	30	1,000	24
Toluene	NS	NS	14
Trichlorofluoromethane	NS	NS	247
Xylenes, Total	NS	NS	2.6 J

LEGEND

PROJECT SITE BOUNDARY

PROPOSED CELLAR

SOIL VAPOR SAMPLE LOCATION

UST — APPROXIMATE LOCATION OF ABANDONED IN-PLACE 550-GALLON #2 FUEL OIL UNDERGROUND STORAGE TANK

AST — APPROXIMATE LOCATION OF ABANDONED IN-PLACE 2,000-GALLON #2 FUEL OIL ABOVEGROUND STORAGE TANK

SOIL VAPOR

NYSDOH Soil Vapor Intrusion Air Guidance Value (AGVs) and Matrix Values:
New York State Department of Health (NYSDOH) AGVs presented in the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006, updated September 2013 for the tetrachloroethylene (PCE) AGV, August 2015 for the trichloroethylene (TCE) AGV, and May 2017 NYSDOH Matrices A, B, and C for PCE, TCE, c1,2-DCE, 1,1-DCE, carbon tetrachloride, 1,1,1-TCA, methylene chloride, and vinyl chloride. The matrix values listed are the soil vapor concentrations where mitigation is recommended regardless of the indoor air concentration.

Exceedances of NYSDOH AGVs are highlighted in gray.

J: The reported concentration is an estimated value.

NS: A standard has not been established for the analyte.

µg/m^3: micrograms per cubic meter

Sample ID	NYSDOH AGV	NYSDOH MATRIX	RI-SV-4-20171017
Date Sampled			10/17/2017
VOCs	µg/m^3	µg/m^3	µg/m^3
1,2-Dichloroethane	NS	NS	8.9 J
Acetone	NS	NS	99.5

Sample ID
Sample Date
Concentration in Soil Vapor
Analyte/Compound in Soil Vapor

0 25 50 100
SCALE IN FEET

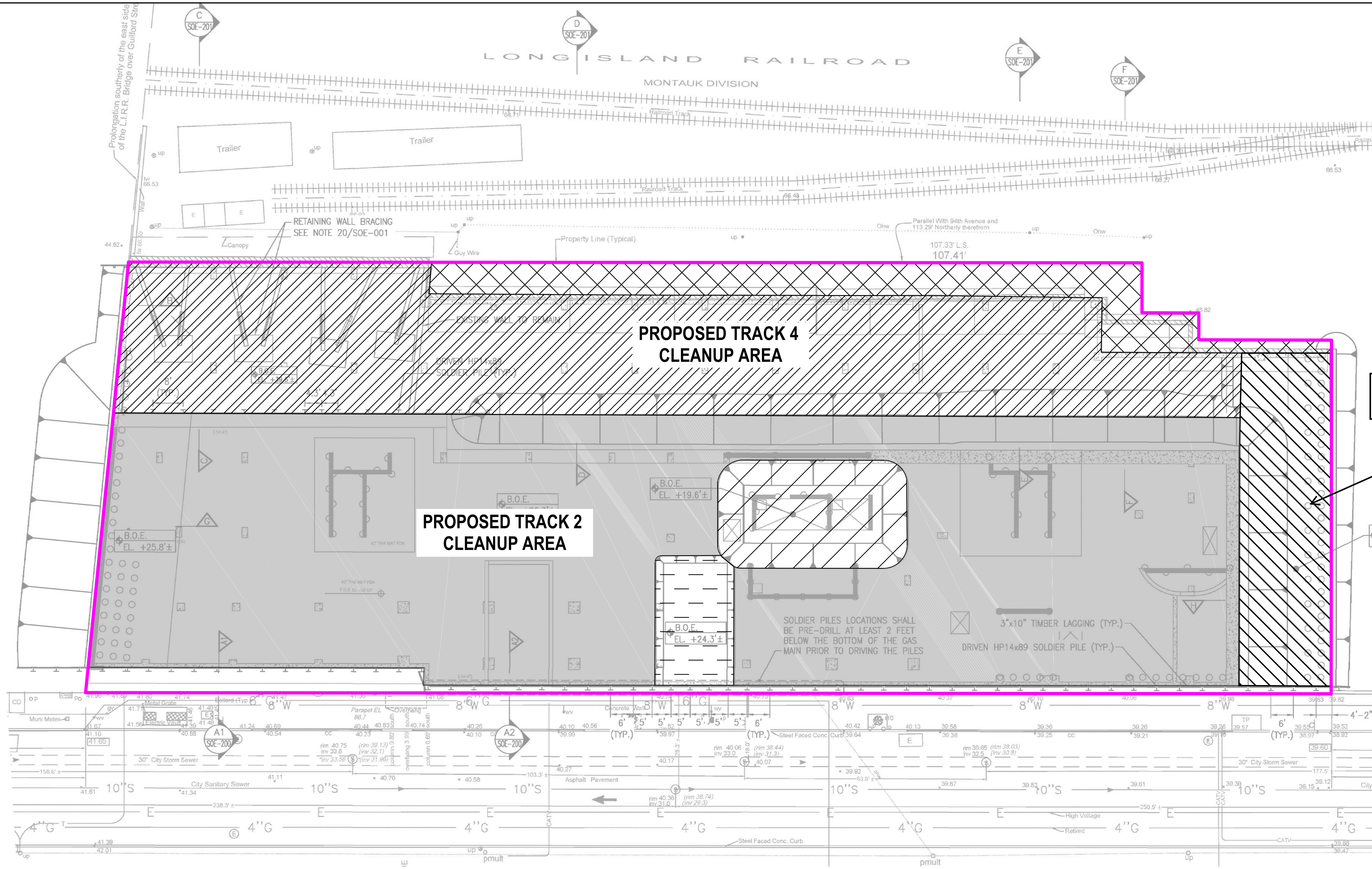
Source:
Montrose Surveying Co., LLP. "City of New York County Queens Tax Block 9998 Tax Lot 25" Dated 12-12-16.

AKRF
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

SOIL VAPOR SAMPLE CONCENTRATIONS

DATE
11/29/2017
PROJECT NO.
170340
FIGURE
6



LEGEND

- PROJECT SITE BOUNDARY
- PROPOSED EXCAVATION TO 3 FEET BELOW GRADE
- PROPOSED EXCAVATION TO 14 FEET BELOW GRADE
- PROPOSED EXCAVATION TO 16 FEET BELOW GRADE
- PROPOSED EXCAVATION TO 20 FEET BELOW GRADE
- NO EXCAVATION
- MINOR SLOPING AND GRADING AROUND EXISTING RETAINING WALL AND FOOTING

0 15 30 60
SCALE IN FEET

Source:
GF55 Partners "Support of Excavation Plan" Jamaica 2 147-07 94th Avenue, Drawing No: SOE-100.00, 50% Construction Date 05-04-2018.

AKRF
440 Park Avenue South, New York, NY 10016

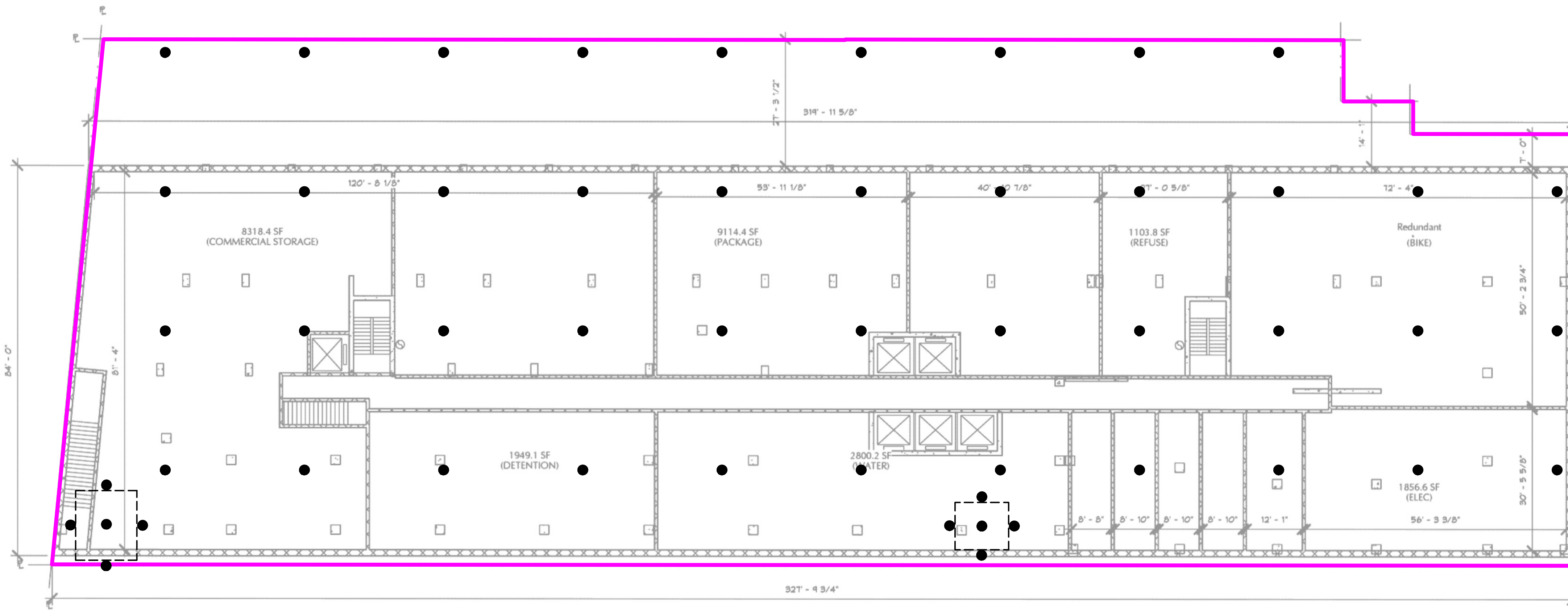
147-25 94th Avenue
Queens, New York

PROPOSED REMEDIAL EXCAVATION PLAN

DATE
6/12/2018

PROJECT NO.
170340

FIGURE
7



LEGEND

PROJECT SITE BOUNDARY

PROPOSED ENDPOINT SAMPLE LOCATION

APPROXIMATE EXTENT OF TANK EXCAVATION

0 15 30 60

SCALE IN FEET

Source:
GF55 Partners "Cellar & 1st Floor Plans" Jamaica 2 147-07 94th Avenue, Drawing No: A-111.00, Dated 09-08-2017.

AKRF
440 Park Avenue South, New York, NY 10016

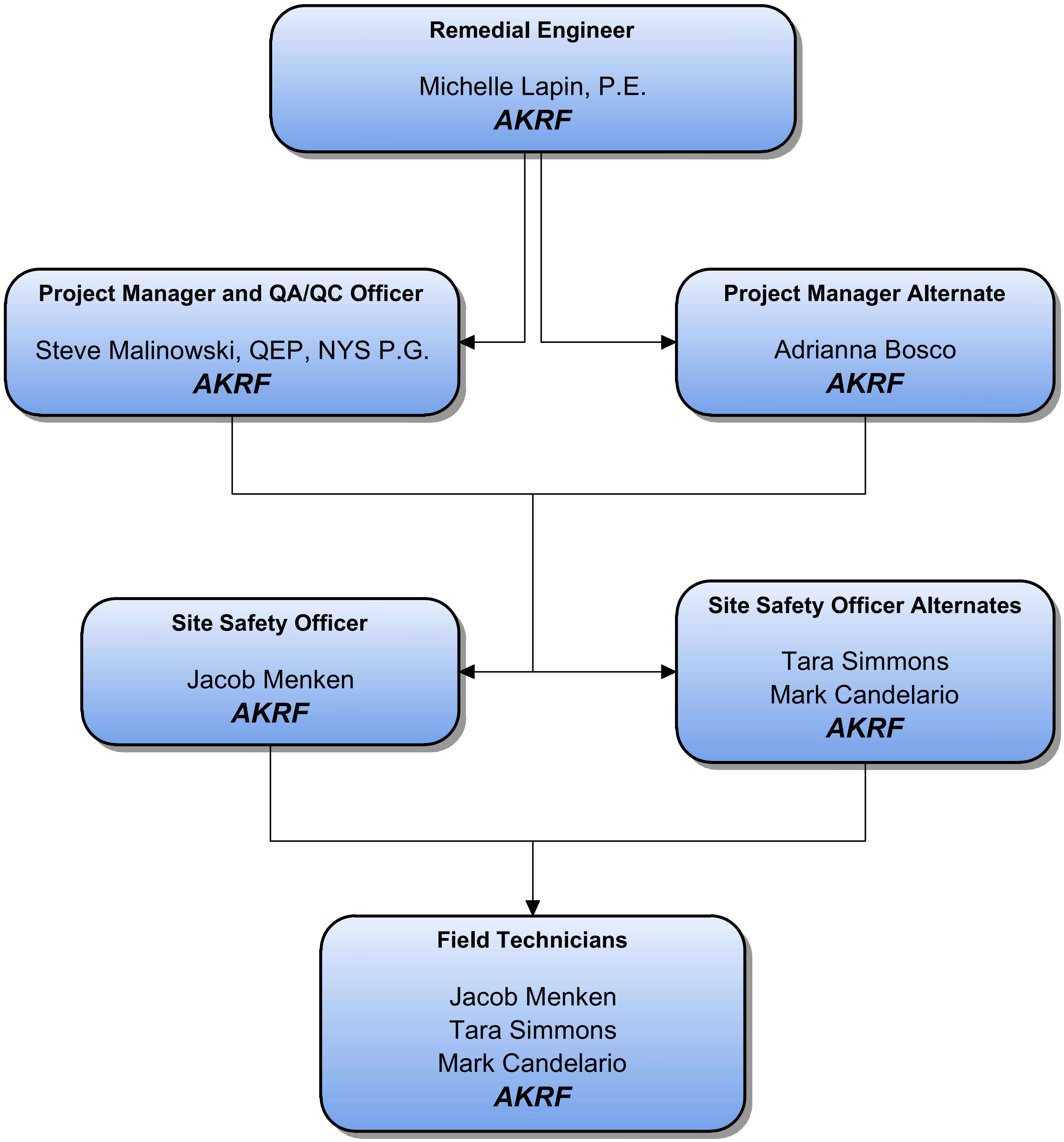
147-25 94th Avenue
Queens, New York

PROPOSED ENDPOINT SAMPLING PLAN

DATE
12/18/2017

PROJECT NO.
170340

FIGURE
8

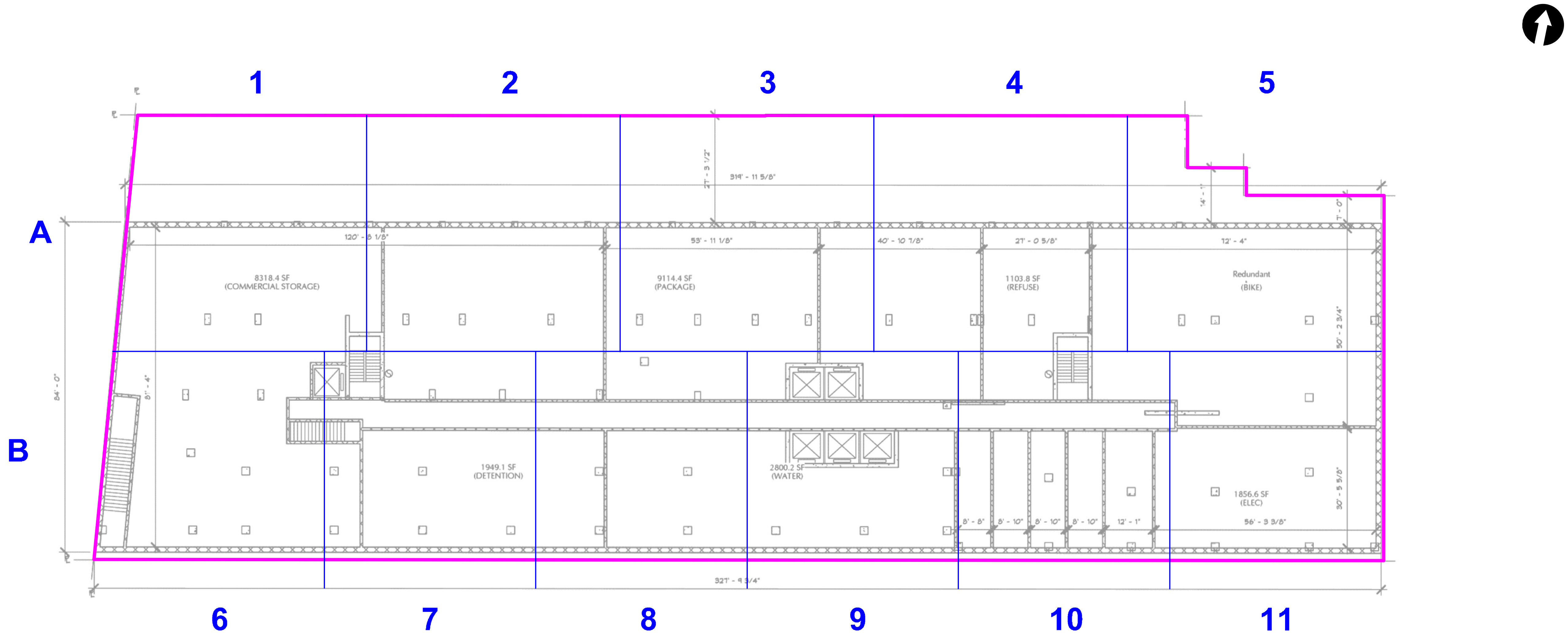


AKRF
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

PROJECT ORGANIZATION CHART

DATE	**12/18/2017**
PROJECT NO.	**170340**
FIGURE	**9**



LEGEND

PROJECT SITE BOUNDARY

ALPHANUMERIC GRID

0 15 30 60

SCALE IN FEET

Source:
GF55 Partners "Cellar & 1st Floor Plans" Jamaica 2 147-07 94th Avenue, Drawing No: A-111.00, Dated 09-08-2017.

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440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

ALPHANUMERIC GRID

DATE
12/18/2017

PROJECT NO.
170340

FIGURE
10

LEGEND

PROJECT SITE BOUNDARY

ENTRANCE TRUCK ROUTE FROM I-678

EXIT TRUCK ROUTE TO I-678

0 500 1,000

SCALE IN FEET

AKRF

440 Park Avenue South, New York, NY 10016

147-25 94th Avenue

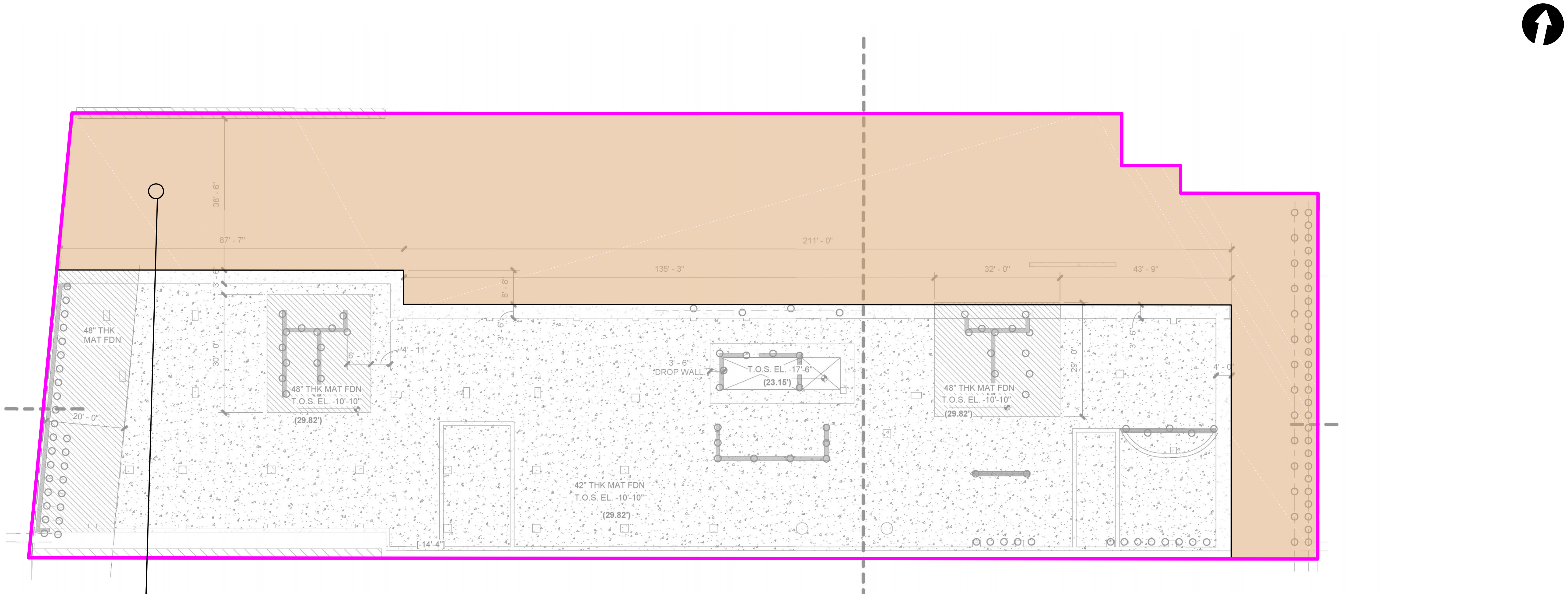
Queens, New York

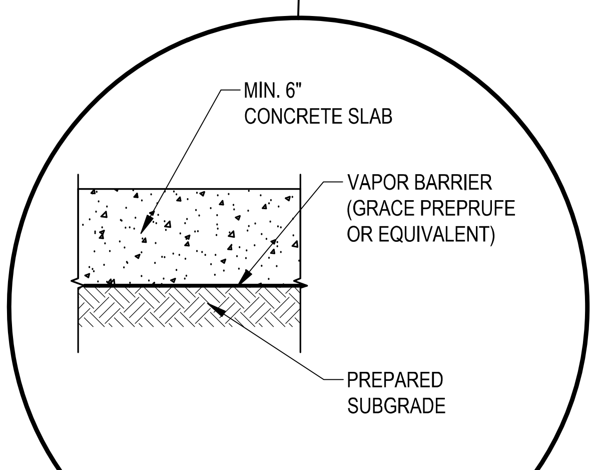
TRUCK ROUTE MAP

DATE **12/18/2017**

PROJECT NO. **170340**

FIGURE **11**





PROPOSED BUILDING SLAB
Not To Scale

LEGEND

PROJECT SITE BOUNDARY

PROPOSED COVER SYSTEM

0 15 30 60
SCALE IN FEET

Source:
GF55 Partners "Foundation Thickness Key Plan" Jamaica 2 147-07 94th Avenue, Drawing No: FO-201.00, Dated 02-13-2018 (LIRR Filing).

AKRF
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

COMPOSITE COVER SYSTEM PLAN

DATE
6/12/2018

PROJECT NO.
170340

FIGURE
12

APPENDIX A

PROPOSED REDEVELOPMENT PLANS

147-07 94TH AVENUE
New York, NY 11435

Sheet List 100% SD		
Sheet Number	Sheet Name	100% SD
ARCHITECTURAL		
T-001.00	TITLE SHEET	■
ARCHITECTURAL		
Z-001.00	ZONING ANALYSIS	■
ARCHITECTURAL		
A-100A.00	CELLAR PLAN WEST	■
A-100B.00	CELLAR PLAN EAST	■
A-101.00	1ST FLOOR PLAN	■
A-101A.00	1ST FL PLAN WEST	■
A-101B.00	1ST FL PLAN EAST	■
A-102.00	MEZZANINE PLAN	■
A-102A.00	MEZZANINE PLAN WEST	■
A-102B.00	MEZZANINE PLAN EAST	■
A-103.00	2ND FLOOR PLAN	■
A-103A.00	2ND FL PLAN WEST	■
A-103B.00	2ND FL PLAN EAST	■
A-104.00	3RD FLOOR PLAN	■
A-104A.00	3RD FL PLAN WEST	■
A-104B.00	3RD FL PLAN EAST	■
A-105.00	4TH FLOOR PLAN	■
A-105A.00	4TH FL PLAN WEST	■
A-105B.00	4TH FL PLAN EAST	■
A-106.00	5TH-7TH FLOOR PLAN	■
A-106A.00	5TH-7TH FL PLAN WEST	■
A-106B.00	5TH-7TH FL PLAN EAST	■
A-108.00	21ST FLOOR PLAN	■
A-108A.00	21ST FL PLAN WEST	■
A-108B.00	21ST FL PLAN EAST	■
A-109.00	22ND-23RD FLOOR PLAN	■
A-109A.00	22ND-23RD FLOOR WEST	■
A-109B.00	22ND-23RD FLOOR EAST	■
A-110.00	ROOF PLAN	■
A-110A.00	ROOF PLAN WEST	■
A-110B.00	ROOF PLAN EAST	■
A-200.00	BUILDING SECTION	■
A-201.00	BUILDING SECTIONS	■
A-203.00	SOUTH ELEVATION	■
A-205.00	EAST ELEVATION	■
A-206.00	NORTH ELEVATION	■

OWNER:

316 W 118th Street
New York, NY 10026
PH 212-996-5100

ARCHITECTS:

GF55 PARTNERS, LLP

19 West 21st Street
New York, NY 10010
PH212 352 3099

MEP ENGINEERS:

RODKIN CARDINALE
CONSULTING ENGINEERS, PC

224 West 29th Street
New York, NY 10001
PH212 239 1892

STRUCTURAL ENGINEERS:

ENGINEERING GROUP ASSOCIATES,
PC

19 W 21st Street, Suite 1103
New York, NY 10010
PH 212-982-1410

11/21/2017 5:46:14 PM C:\Users\chris\Documents\Jamaica2_200_1_AR_chris.rvt

GF55
PARTNERS
19 W. 21 ST STREET
NEW YORK, NY 10010
212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
TITLE SHEET

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
T-001.00

PRELIMINARY ZONING ANALYSIS
Address - 147-07 94th Avenue, Queens NY 11435
Map #: 14d
Block: 9998 **Lots:** 25
Zoning: C6-4 (R10 Residential Equivalent District)
Special District: (DJ) Special Downtown Jamaica District
* Property is NOT in a landmark district

TOPIC		PERMITED / REQUIRED		PROPOSED	CODE/ SECTION
SITE AREA					
Lot # 25	**35,646.00**				
Corner Lot Area	0.00				
Interior / Through Lot Area	35,646.00				
TOTAL BUILDABLE		FAR	SF		
Max. allowed SF for Residential (Equivalent R10)		9.00	320,814		115-211 (b)
Max. allowed for Residential with Inclusionary.		12.00	427,752		115-21 (b), 23-90, 23-932, 23-154
Max allowed for Commercial/Comm. Facility		12.00	427,752		115-21
Inclusionary Housing: The FAR may be increased to Maximum of 12.0 if the developer provides lower income housing as per ZR 23-95. (for off-site or on-site new construction or rehabilitation).					23-92
	105,000 SF (30% Bonus for IH) / 1.25 = 84,000 SF Must be developed as Inclusionary Housing				
	105,000 SF - 84,000 SF = 21,000 SF can be developed as Free Market				
Maximum Number of Units		Residential FAR / 680 = 629			23-22
LOT COVERAGE					
Maximum Lot Coverage on Corner Lot		100%	0.00		115-21 (c)
Maximum Lot Coverage on Interior / Through Lot		70%	24,952.20	20,911.0	115-21 (c)
Total Lot Coverage			24,952	20,911.0	
YARDS					
Front Yards	None Required				
Side Yards	None Required. Minimum of 8'-0" if provided.				23-462
Rear Yards	30' Rear yard Required for Residential. No rear yard shall be required for non-residential uses along a rear yard line which coincides with a railroad right of way.			30'	115-22
	No Rear Yard shall be required within 100ft of point of intersection of two street lines intersecting at an angle of 135 degrees or less.				23-541
HEIGHTS AND SETBACKS	* All heights shalll be measured from the Base Plane				115-23
Base Plane Calculation					
Minimum Street Wall Height		40'-0"			115-233
Maximum Street Wall Height		60'-0"			115-233
Maximum Building Height		290'-0"			115-234
Setbacks	On a Wide Street		None Required		115-233
	On a Narrow Street		None Required		115-233
	For Zoning Lots subject to the sidewalk widening requirements of section 115-31, the boundary of the sidewalk widening furthest from the street line shall be considered the Street Line for the purpose of applying all heights and setback regulations.				115-23
Street Wall Location	Shall be located on the street line and extend along at least 70% of the street frontage of the zoning lot. No Street Wall location rules shall apply to the remaining portion of the street frontage of the zoning lot. All required Street Walls shall rise without setback to at least the minimum base height or the height of the building, whichever is less.				115-232 (a)
	In the locations indicated on Map 4 where no maximum street wall height or setback is required, street walls required pursuant to Section 115-232 shall rise without setback to a minimum height of 40 feet or the height of the building, whichever is less. Above a height of 40 feet, no setbacks are required for any portion of such street wall.				151-233 Appendix A, Map 4
Sidewalk Widening	A sidewalk widening of 2ft required along 94th Avenue street line (as shown on Map 6). It shall be measured perpendicular to the street line. It must provide lighting in accordance to 37-743		2'	2'	115-31
Refuse Storage, Recreation Space and Planting Area	All buildings containing residences shall provide refuse storage space, recreation space and planting areas as per 28-12 & 28-22, whether or not they are Quality Housing.				115-32
Street Trees	One street tree, pre-existing or newly planted, for every 25 feet of street frontage of the zoning lot.				26-41
QUALITY HOUSING					
Refuse	Refuse / Disposal Room must be provided on each floor.				28-12
Recreation	Recreation space must be provided, equaling 2.8% of residential floor area, which is deducted from the calculation of Zoning Floor Area.		11494 total required	9200 interior 2294 exterior	28-21, 28-22
Dryer		1 per 40 units			28-13
Washer		1 per 20 units			28-13
Corridor	50% of corridors floor area can be deducted if it is serving maximum 8 per floor and another 50% of corridor floor area can be deducted if there is a window with a clear, non-tinted glazed area of minimum 20 SF provided in the corridor.				28-14 & 28-31

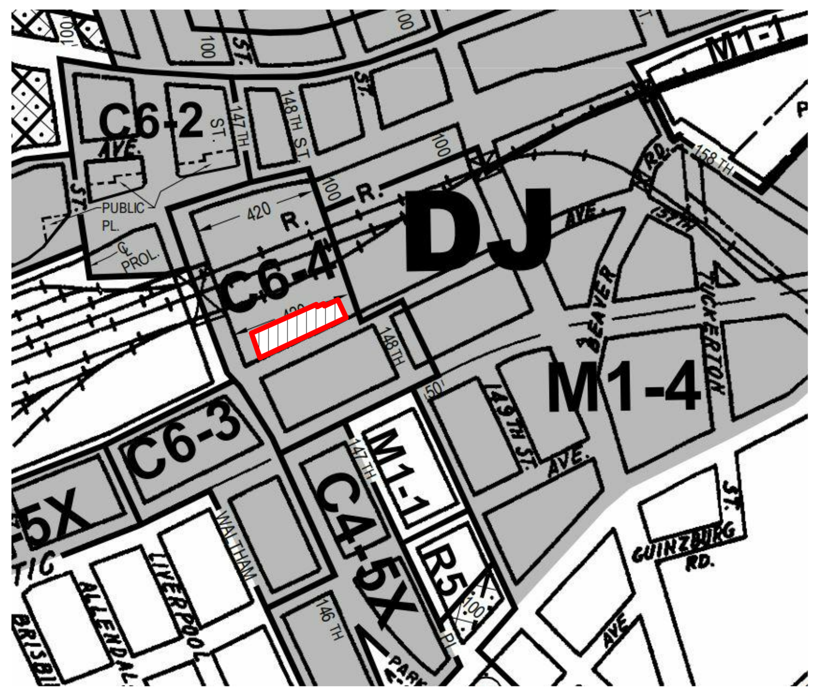
PARKING:					
Residential	For income restricted housing units, none is required in the Transit Zone. Site is within Transit Zone - See Appendix 1 Map 8.				25-251
	Market Rate residential units - 40% of dwelling units.				25-23
	15 accessory spaces waived maximum. 300 accessory spaces permitted max.				115-51
	Accessory Offsite Spaces for residences must be located in a Commercial or Manufacturing district and provided on a zoning lot that is no more than 1,500 feet from the nearest boundary of the zoning lot occupied by the residences to which they are accessory.				36-42, 36-421, 115-51 (b)(5)
	Such spaces shall be designed and operated primarily for the long-term storage of the private passenger motor vehicles used by the occupants of such residences. However, such spaces may be: (a) rented for periods of not less than one week and not more than one month to persons who are not occupants of the residences to which such spaces are accessory for the accommodation of the private passenger motor vehicles used by such non-residents, provided that such spaces are operated in accordance with the regulations promulgated by the Commissioner of Buildings, in a manner which will not adversely affect the residential character of the neighborhood; or (b) occupied by car sharing vehicles, provided that: (2) in R5, R6, R7, R8, R9 and R10 Districts, except R5A Districts, the number of spaces occupied by #car sharing vehicles# shall not exceed five spaces or 20 percent of all accessory off-street parking spaces, whichever is greater. Such spaces provided pursuant to paragraphs (a) and (b) of this Section shall be made available to the occupants of the #residences# to which they are accessory within 30 days after written request is made to the landlord.				25-412
Accessory Commercial	Retail - PRC B	1 per 1,000 sf (C4-4 District regulations apply in the Special Downtown Jamaica District)			36-21, 36-12, 115-51
	Offices - PRC B1	1 per 2,000 sf			
	Hotel - PRC H	1 per 4 guest rooms (C4-4 District regulations apply in the Special Downtown Jamaica District)			
		Floor area used for meeting halls, auditoriums, eating or drinking places, wedding chapels or banquet halls, or radio or television studios, 1 per 25 persons rated capacity (C4-4 District regulations apply in the Special Downtown Jamaica District)			
	Theaters - PRC D	1 per 25 persons rated capacity			
	15 accessory spaces waived maximum. 300 accessory spaces permitted max.				115-51
	Permitted or required offstreet parking spaces accessory to commercial or community facility uses may be provided on a zoning lot other than the same zoning lot as such uses but within the same district or an adjoining Commercial District or Manufacturing District. However, all required spaces shall not be further than 600 feet from the nearest boundary of the zoning lot on which such uses are located.				36-43
	All permitted or required accessory off-street parking spaces, open or enclosed, shall be used primarily for the owners, occupants, employees, customers, residents or visitors of the use or uses to which such spaces are accessory.				36-46
Public Parking Garages	Public parking garages with a capacity of 150 or less are permitted as of right in the Special Downtown Jamaica District.				115-11
Loading Berths	Retail	First 25,000 sq. ft. of floor area – None Next 15,000 sq. ft. of floor area – 1 required berth Next 60,000 sq. ft. of floor area – 1 required berth Each additional 150,000 sq. ft. of floor area or fraction thereof – 1 required berth			36-62
	Hotels & Office	First 100,000 sq. ft. of floor area – None Next 200,000 sq. ft. of floor area – 1 required berth Each additional 300,000 sq. ft. of floor area or fraction thereof – 1 required berth			36-62
	If any building or zoning lot contains two or more uses having different requirements for loading berths and if: (a) the floor area of each separate use is less than the minimum floor area for which berths are required; and (b) the total floor area of all the uses for which berths are required is greater than the smallest amount of floor area for which berths are required for any of the #uses# individually; off-street loading berths shall be provided as if the total floor area of the uses for which berths are required were used for that use for which the most berths are required.				36-63
	Required Size - Commercial uses 33'x1'2x14' Vertical Clearance Hotels, offices or court houses 33'x12'x12' Vertical Clearance				36-681
BICYCLE PARKING					
	Use Group 2 (Residential): 1 Space / 2 dwelling units		300 spaces	300 spaces	25-81, 25-811
	Floor Area for enclosed bicycle parking is excluded from Floor Area calculations. 15 SF per bicycle parking space is required (may be reduced by up to 9 SF per bicycle if layout certified by the Commisioner of Buildings) 300*15 sf = 4500 sf req as of right.				25-85

FLOOR AREA SCHEDULE

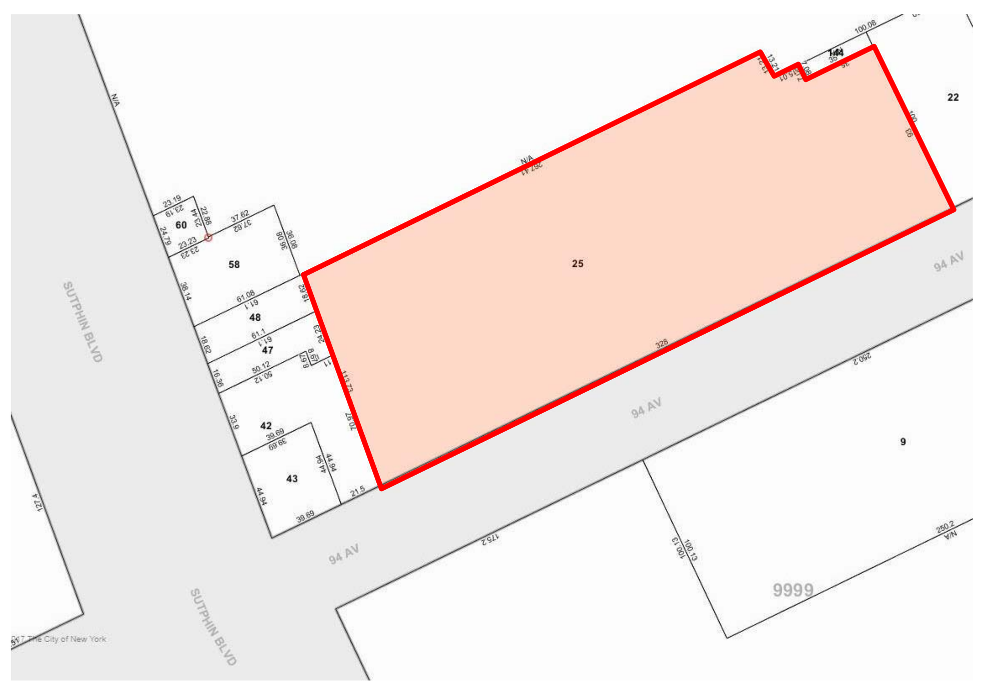
	GROSS SF				COMM. DED.	RESIDENTIAL DEDUCTIONS										ZONING FLOOR AREA		
Floor	Parking (Commercial)	Gross Commercial	Gross Residential	Gross Total	Mechanical	Bulkhead	Mechanical	Trash Chute Room	50% of Corridor	Stair	Bicycle Storage	Rec. Space 28-31	Laundry 28-24	Loading	Parking	Commercial	Residential	Total
Cellar		10,000.00	17,189.90	27,189.90												0.00	0.00	0.00
1	9,932.20	6,656.35	15,918.00	32,506.55	66.56		238.77	0.00	1,129.10	0.00				574.50	9,916.10	16,521.99	4,059.53	20,581.52
Parking Mezz.		0.00	23,969.10	23,969.10	0.00		0.00	0.00	0.00	24.00					20,001.60	0.00	3,943.50	3,943.50
2		0.00	32,586.00	32,586.00	0.00		1,400.00	12.00	0.00	24.00					17,365.60	0.00	13,784.40	13,784.40
3		0.00	13,579.20	13,579.20	0.00		244.43	12.00	0.00	24.00					0.00	0.00	13,298.77	13,298.77
4		0.00	20,905.35	20,905.35	0.00		376.30	12.00	947.75	24.00		7,003.40	1,446.90			0.00	11,095.00	11,095.00
5		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
6		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
7		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
8		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
9		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
10		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
11		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
12		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
13		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
14		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
15		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
16		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
17		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
18		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
19		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
20		0.00	20,905.35	20,905.35	0.00		376.30	12.00	998.20	24.00						0.00	19,494.85	19,494.85
21		0.00	18,498.10	18,498.10	0.00		332.97	12.00	888.15	24.00						0.00	17,240.98	17,240.98
22		0.00	18,498.10	18,498.10	0.00		332.97	12.00	888.15	24.00						0.00	17,240.98	17,240.98
23		0.00	18,498.10	18,498.10	0.00		332.97	12.00	888.15	24.00						0.00	17,240.98	17,240.98
Roof		0.00	4,781.90	4,781.90	0.00	441.30	2,082.30					1,593.50				0.00	664.80	664.80
Bulkhead																		
TOTAL		16,656.35	518,909.35	545,497.90	66.56	441.30	11,361.43	264.00	19,583.40	552.00	0.00	7,003.40	1,446.90		47,283.30	16,521.99	410,486.62	**427,008.61**
																SF STILL AVAILABLE:		743.39

UNIT BREAKDOWN
147-07 94th Avenue & 148th Street - Queens

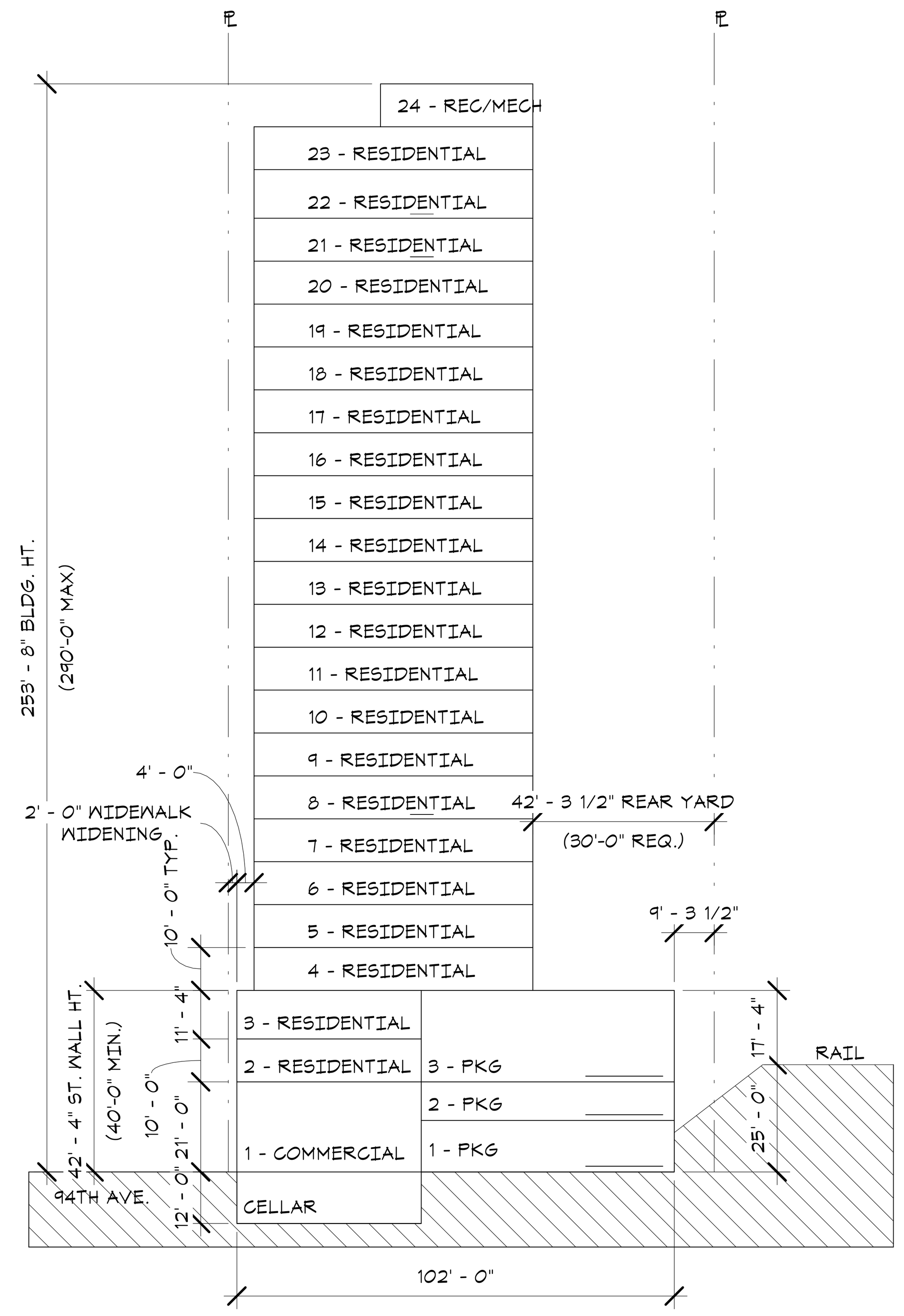
Proposed	Studio	1 Bedroom	2 Bedroom	Gross Total
1st Floor	0	0	0	0
2nd Fl.	5	6	3	14
3rd Fl.	5	6	3	14
4th Fl.	2	9	3	14
5th Fl.	9	13	5	27
6th Fl.	9	13	5	27
7th Fl.	9	13	5	27
8th Fl.	9	10	7	26
9th Fl.	9	10	7	26
10th Fl.	9	10	7	26
11th Fl.	9	10	7	26
12th Fl.	9	10	7	26
13th Fl.	9	10	7	26
14th Fl.	9	10	7	26
15th Fl.	9	10	7	26
16th Fl.	9	10	7	26
17th Fl.	9	10	7	26
18th Fl.	9	10	7	26
19th Fl.	9	10	7	26
20th Fl.	9	10	7	26
21th Fl.	3	9	8	20
22th Fl.	3	9	8	20
23th Fl.	3	9	8	20
GRAND TOTAL	**165**	**217**	**139**	**521**
Percentage Breakdown	**31.7%**	**41.7%**	**26.7%**	**100.00%**



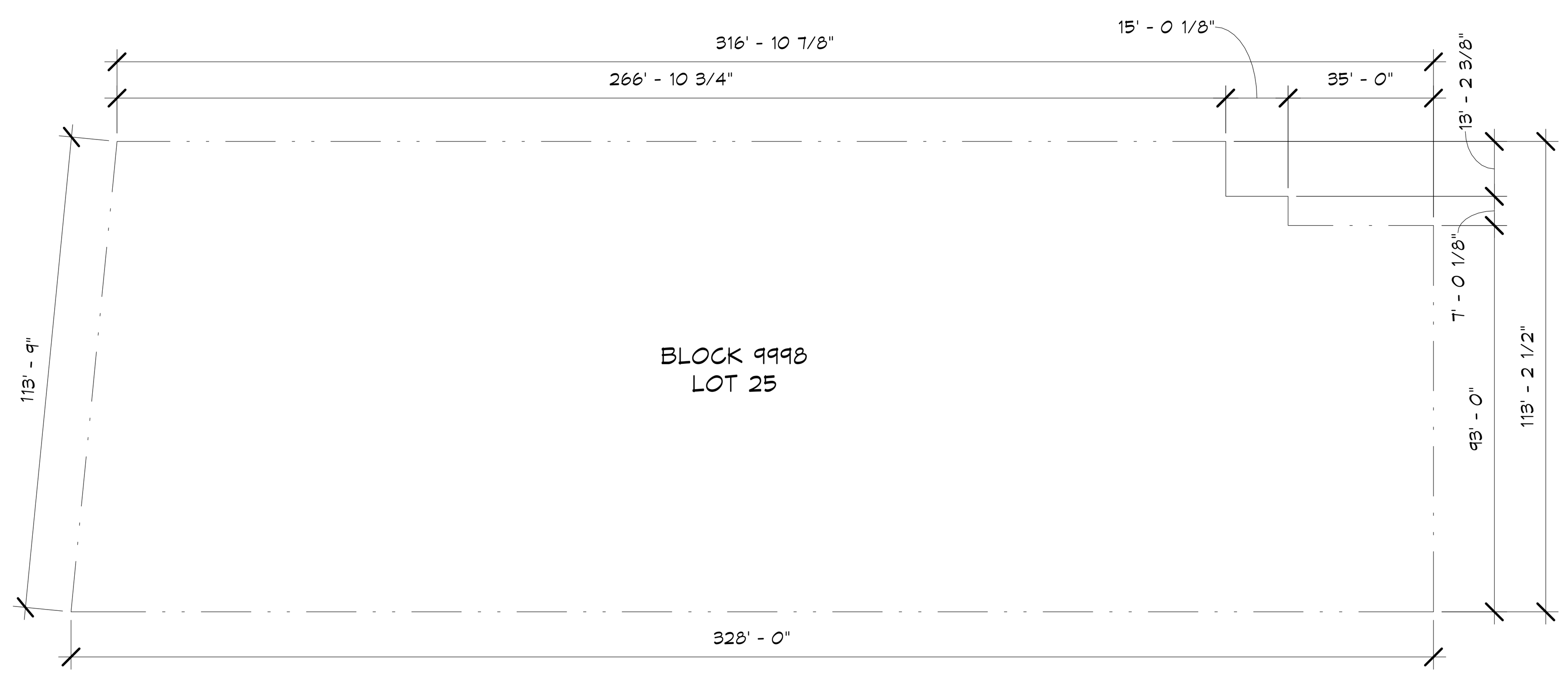
2 ZONING MAP
6" = 1'-0"



3 TAX MAP
6" = 1'-0"



1 ZONING SECTION
1/32" = 1'-0"



4 PLOT PLAN
1/32" = 1'-0"

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JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH: QUEENS
BLOCK: 9998 Lot: 25
PROJECT: 1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
As indicated

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
ZONING ANALYSIS

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
Z-001.00

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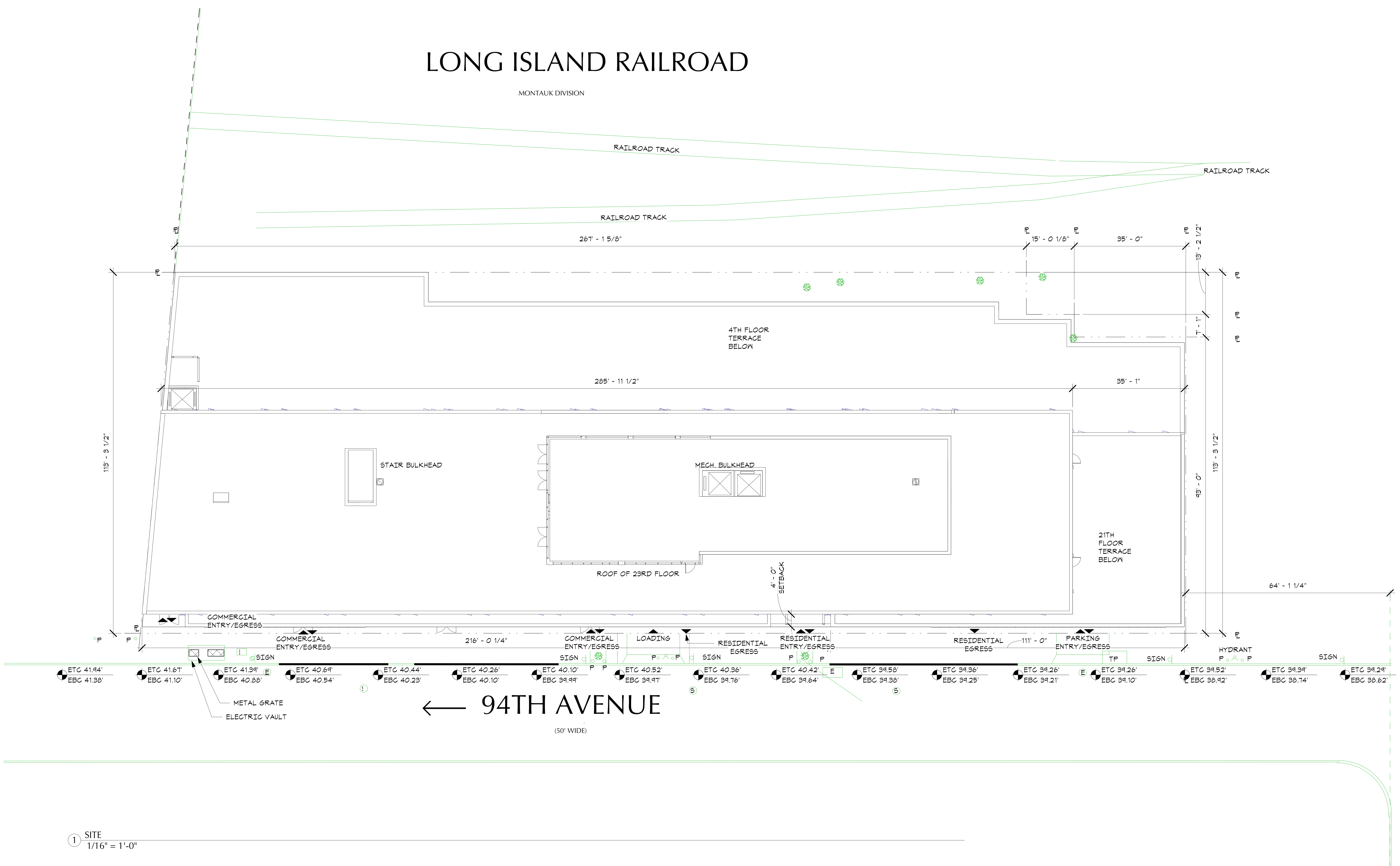

1 SITE
1/16" = 1'-0"

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JAMAICA 2
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11435

BOROUGH: QUEENS
BLOCK: 9998 Lot: 25
PROJECT: 1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
SITE PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-090.00

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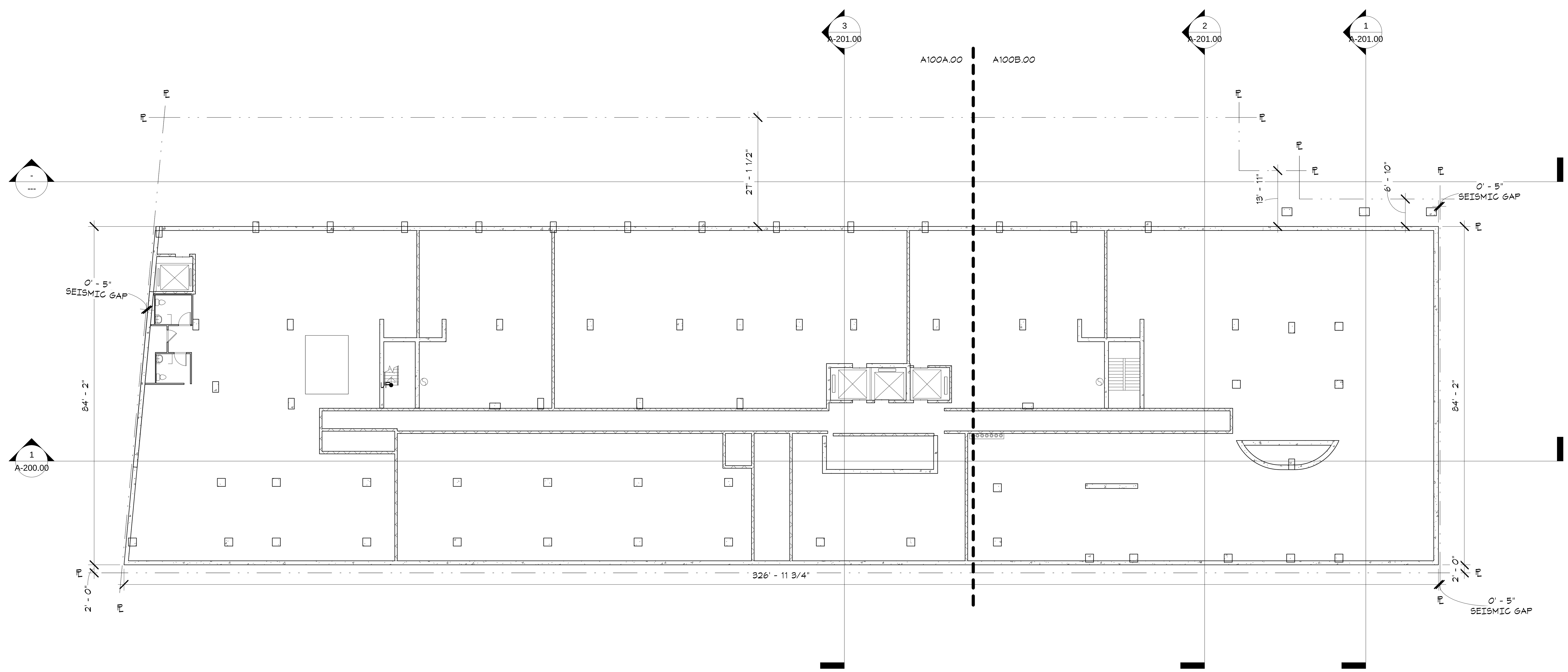

1 T.O.F. CELLAR - FULL PLAN
1/16" = 1'-0"

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11435

BLOCK:9998 Lot:25
PROJECT:1734.00

BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

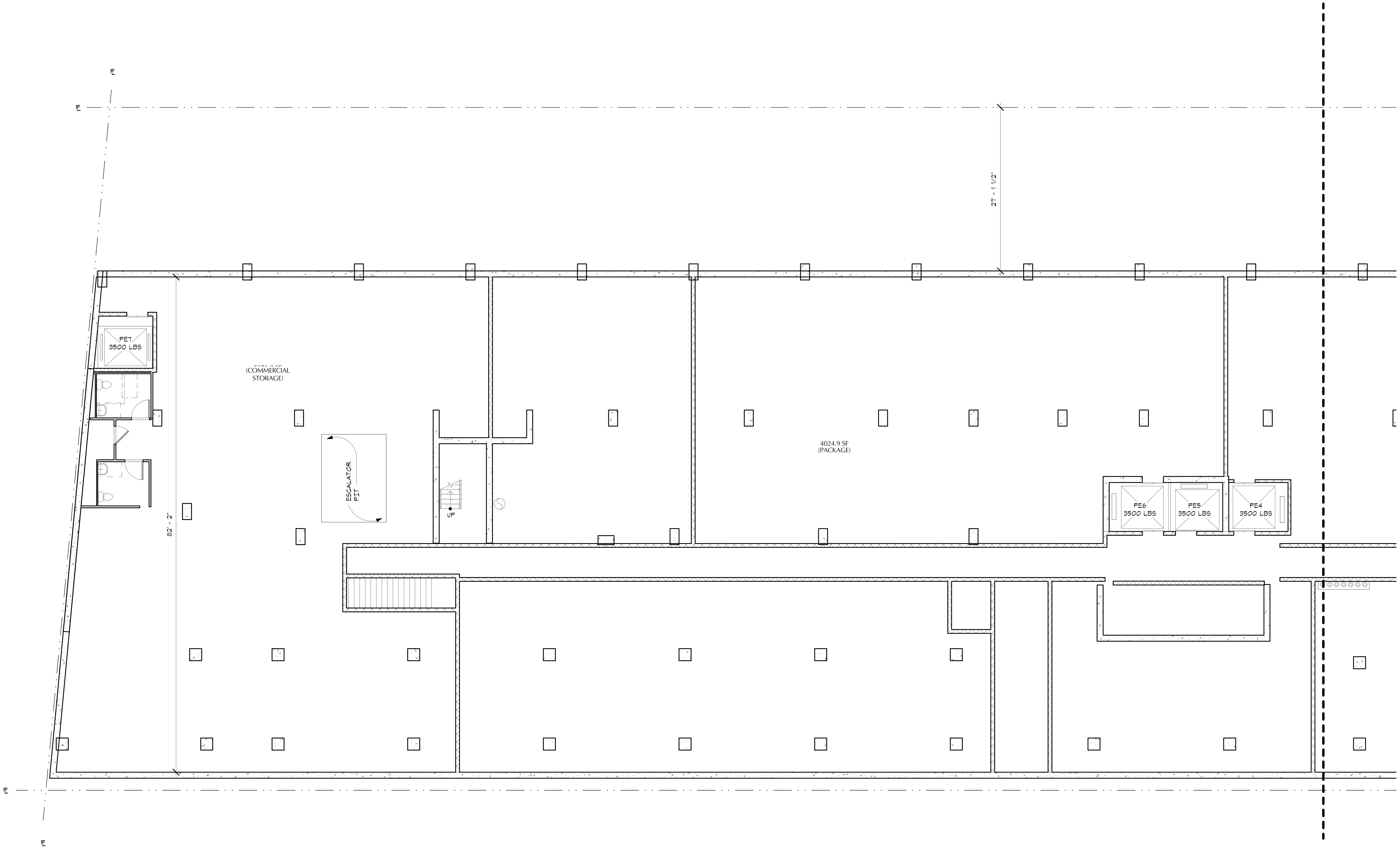
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
CELLAR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-100.00



1 T.O.F. CELLAR - WEST
1/8" = 1'-0"

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11435

BLOCK:9998 Lot:25
PROJECT:1734.00
BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

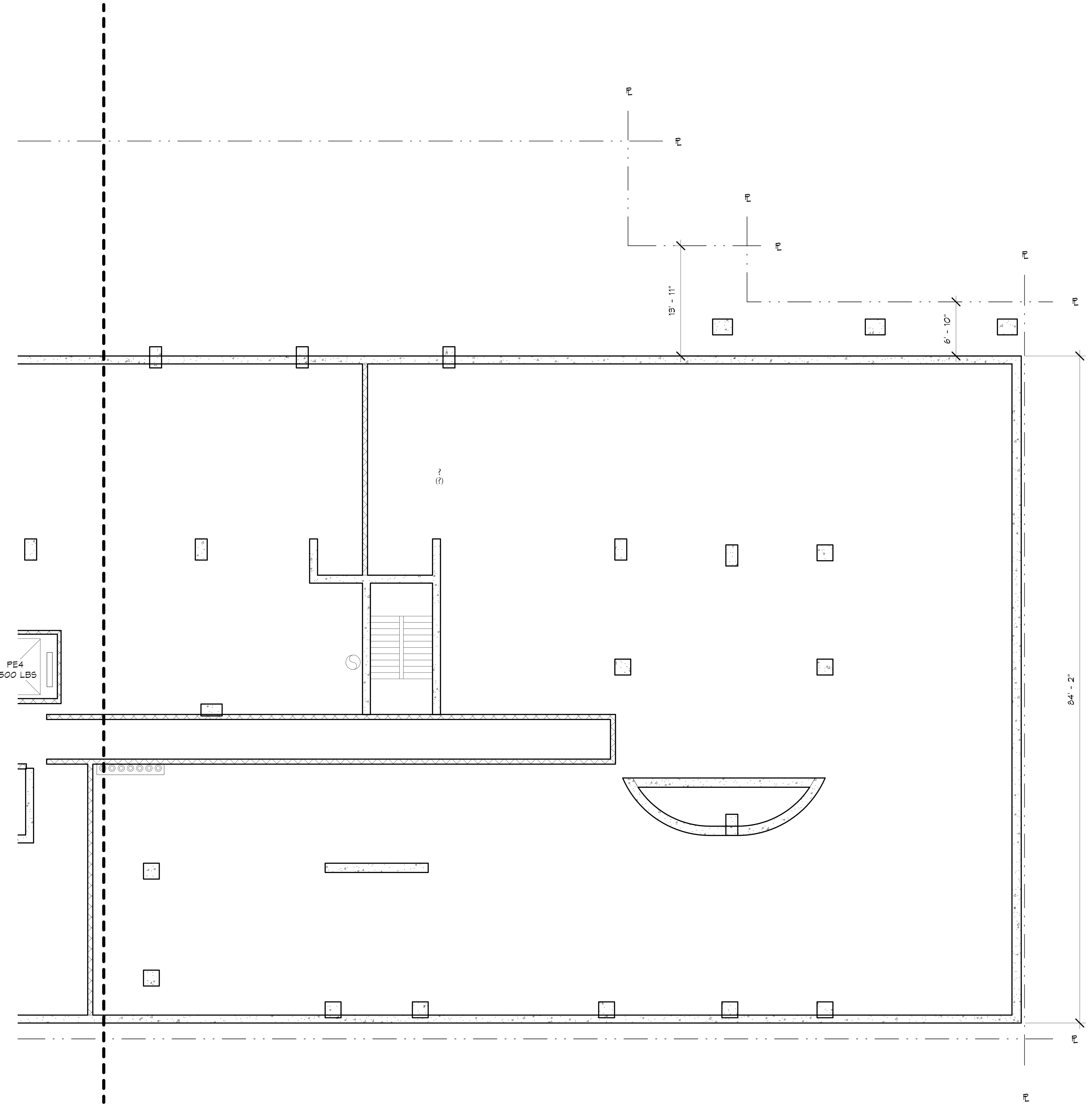
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
CELLAR PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-100A.00



① T.O.F. CELLAR - EAST
1/8" = 1'-0"

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11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

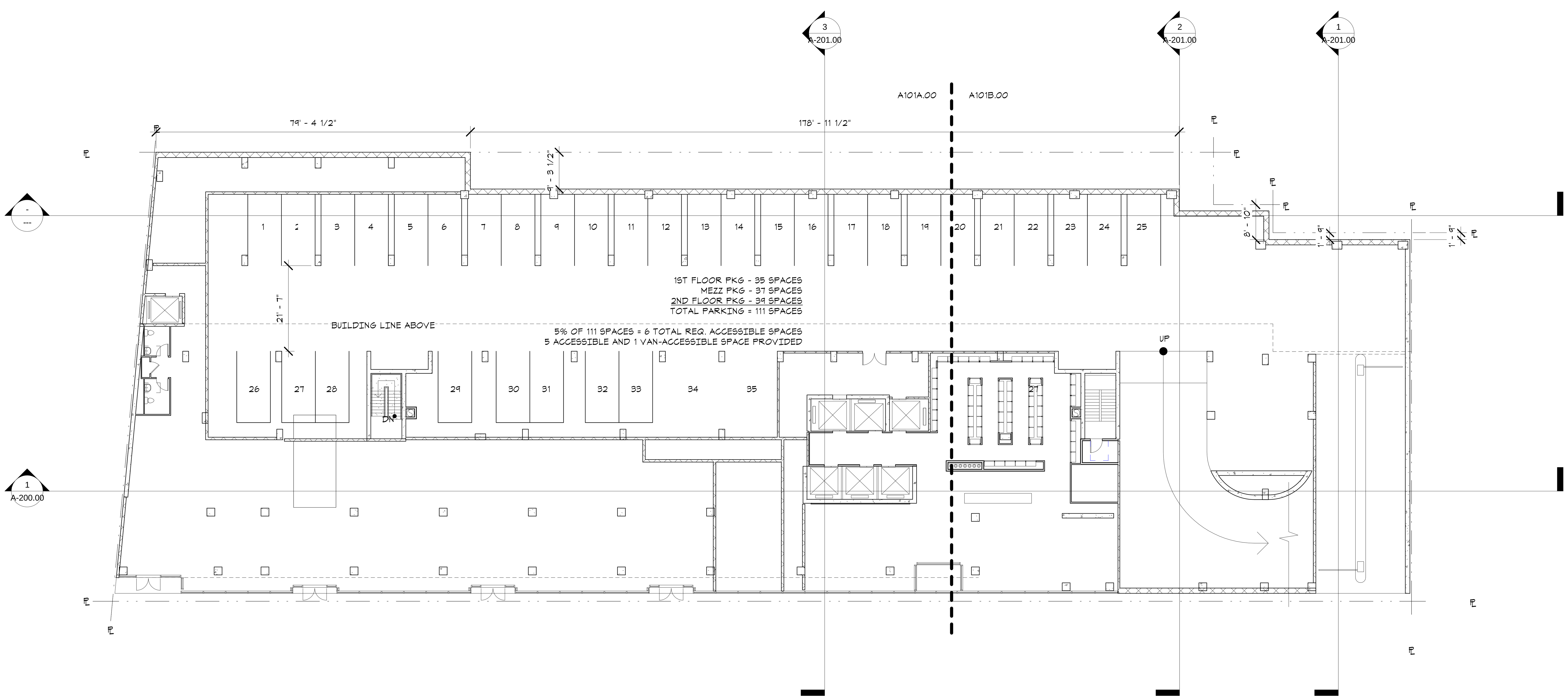
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
CELLAR PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-100B.00



1 T.O.F. 1ST FLOOR - FULL PLAN
1/16" = 1'-0"

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BLOCK: 9998 Lot: 25
PROJECT: 1734.00
BOROUGH: QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
1ST FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-101.00

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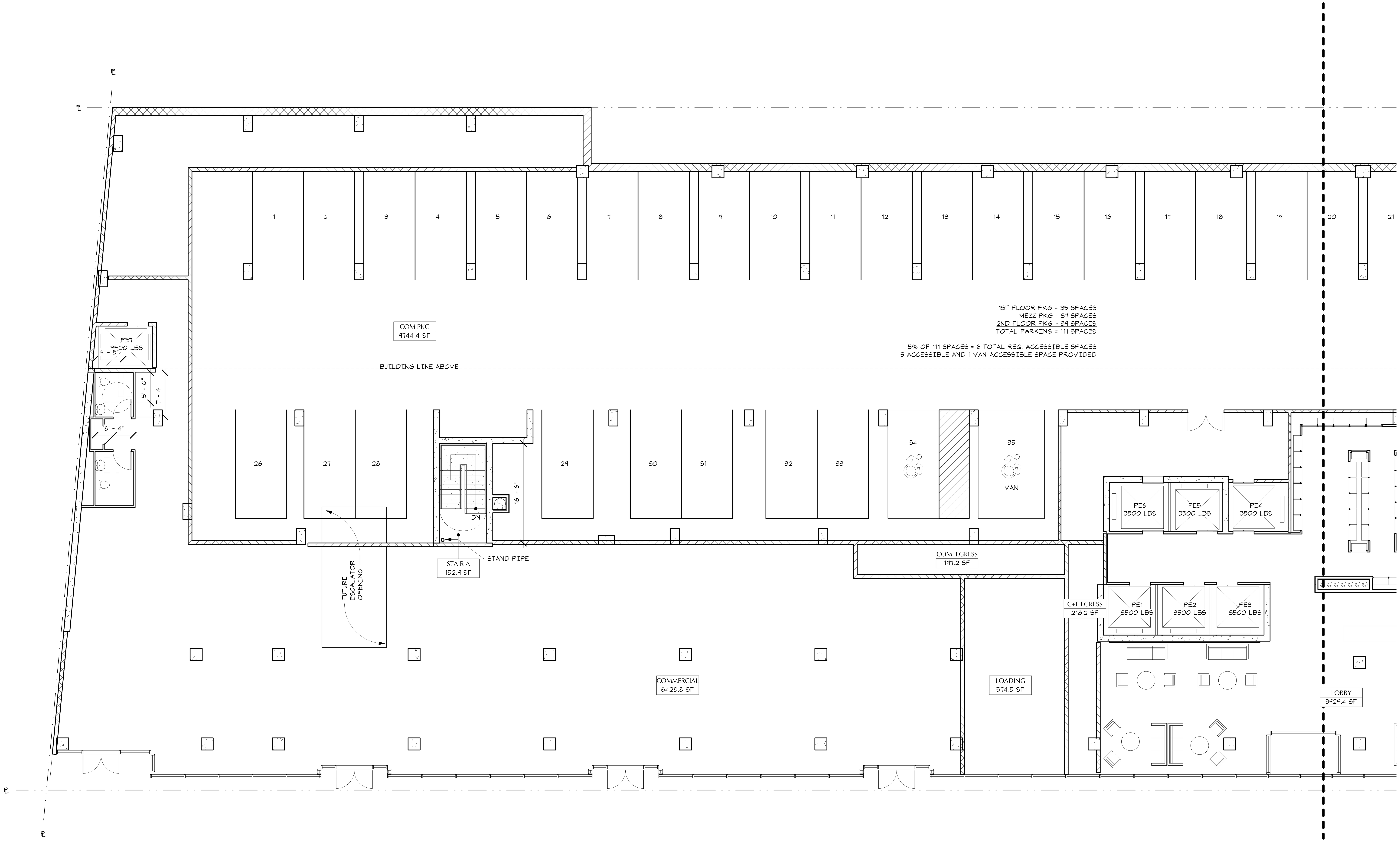

1 T.O.F. 1ST FLOOR - WEST
1/8" = 1'-0"

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11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

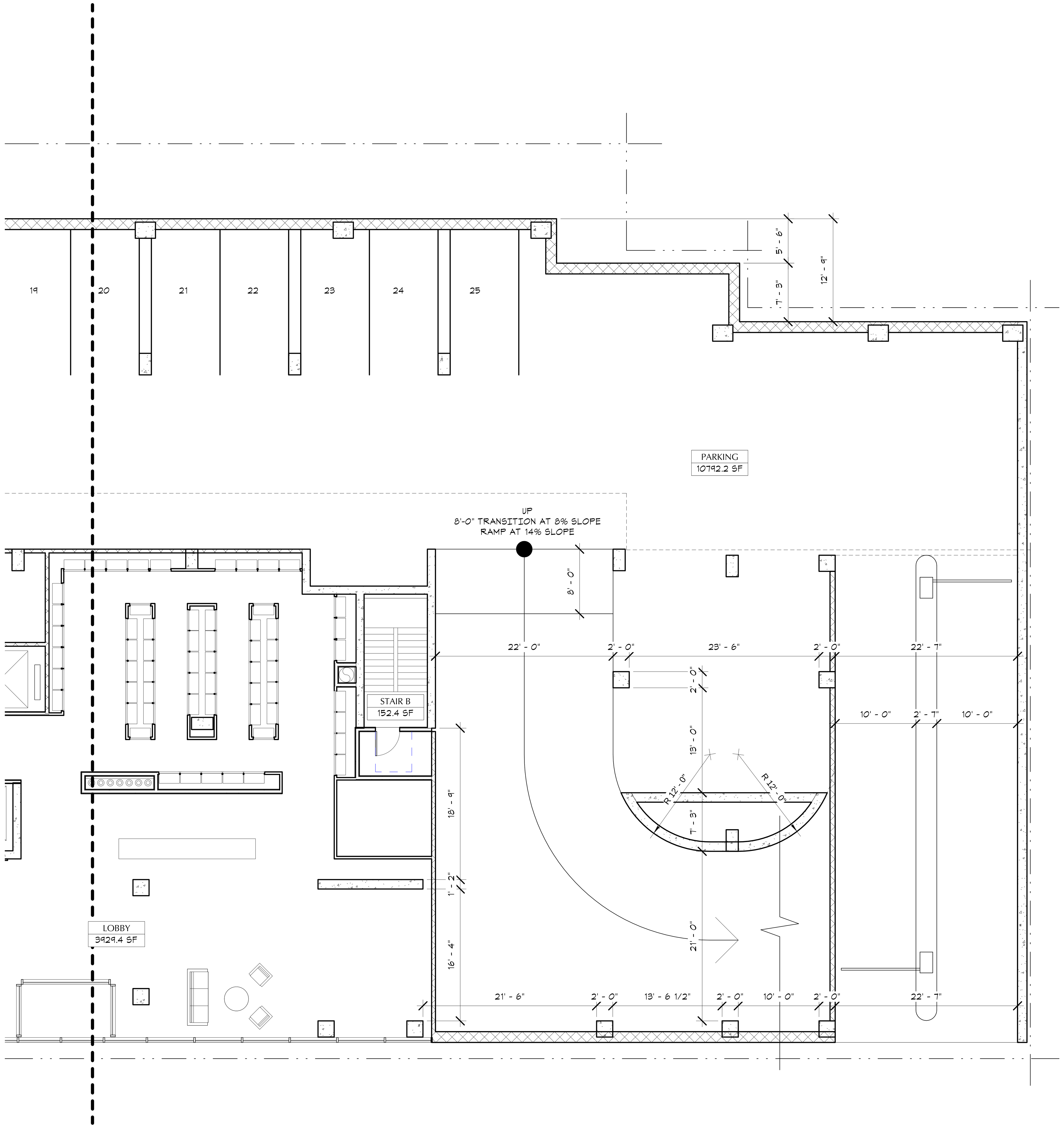
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
1ST FL PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-101A.00



1 T.O.F. 1ST FLOOR - EAST
1/8" = 1'-0"

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JAMAICA 2
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New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
1ST FL PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-101B.00

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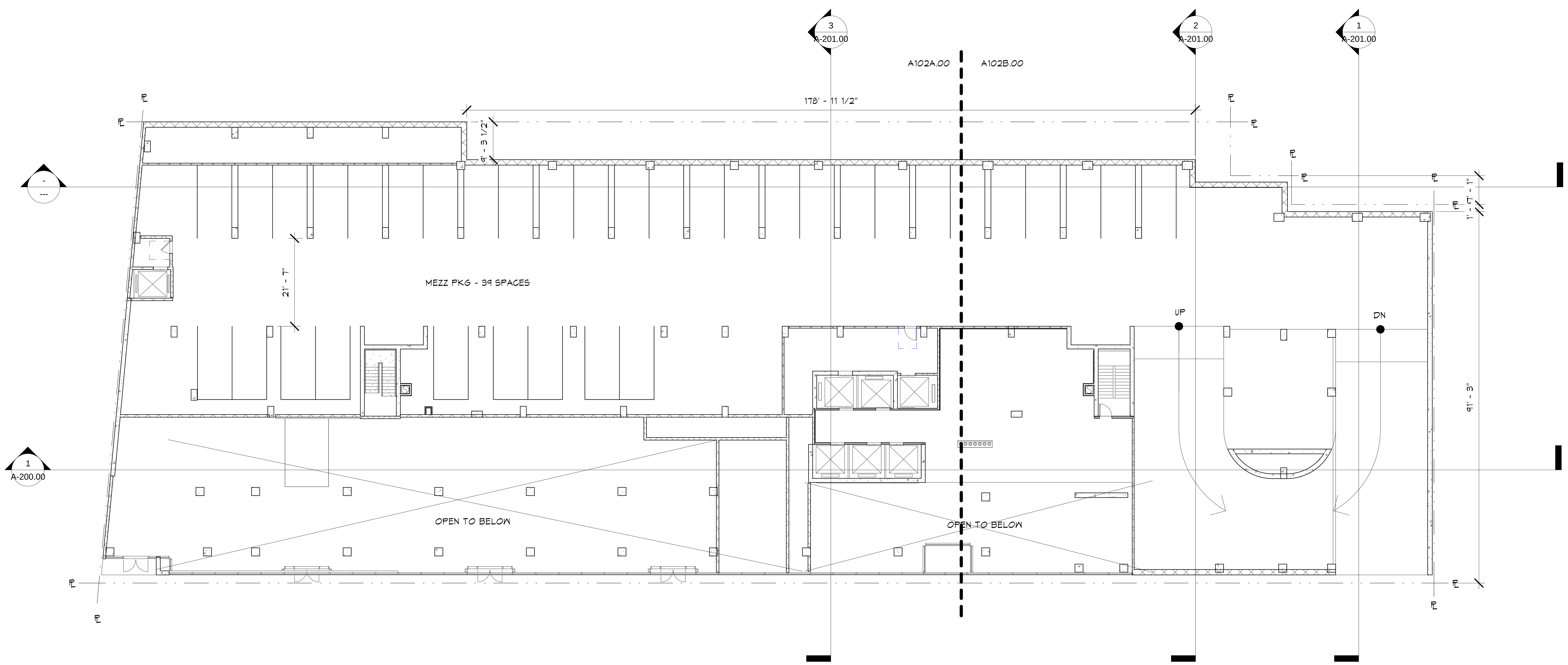

(1) T.O.F. PARKING MEZZ. - FULL PLAN
1/16" = 1'-0"

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BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
MEZZANINE PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-102.00

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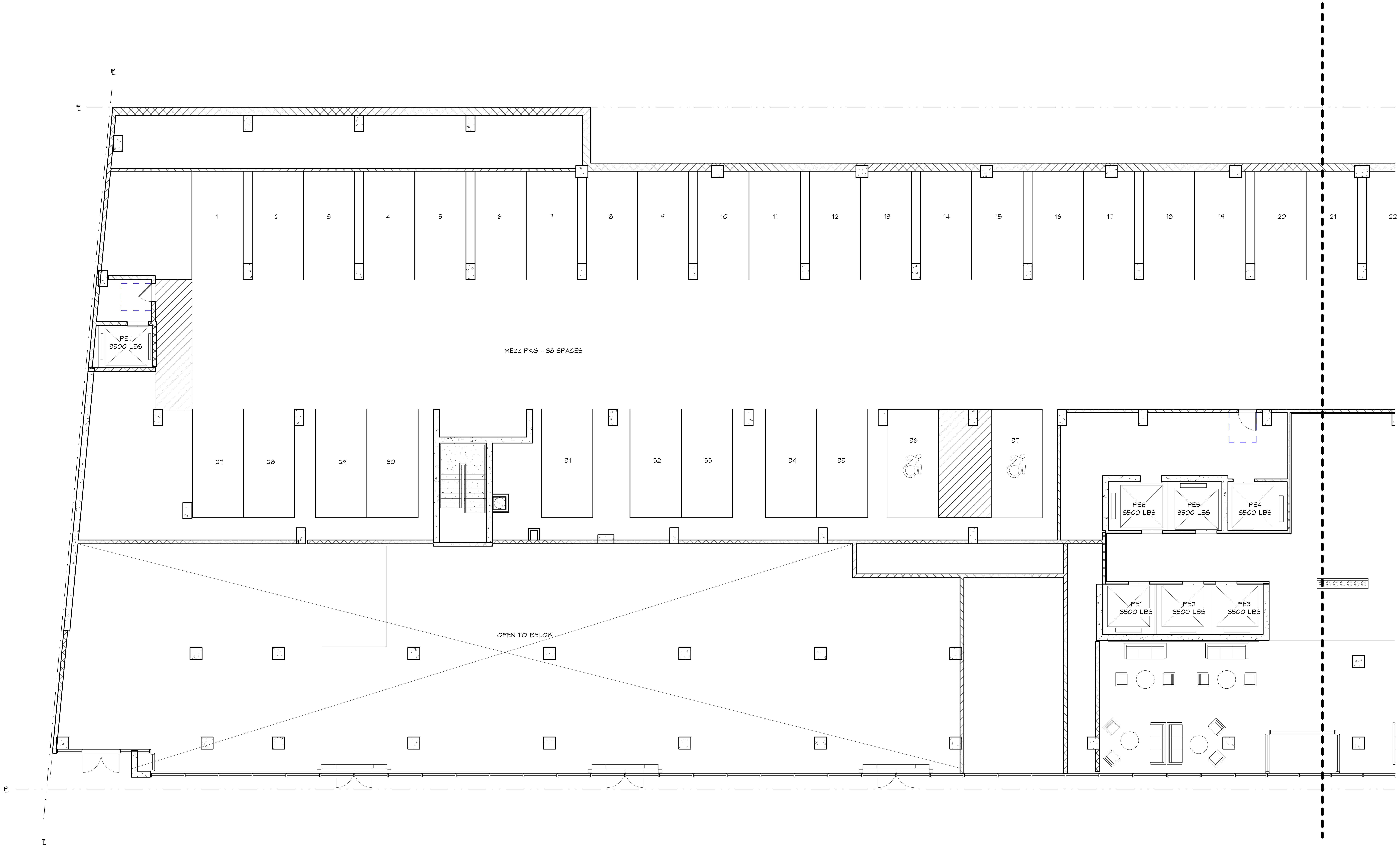

1 T.O.F. PARKING MEZZ. - WEST
1/8" = 1'-0"

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New York, NY
11435

BLOCK:9998 Lot:25
PROJECT:1734.00
BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

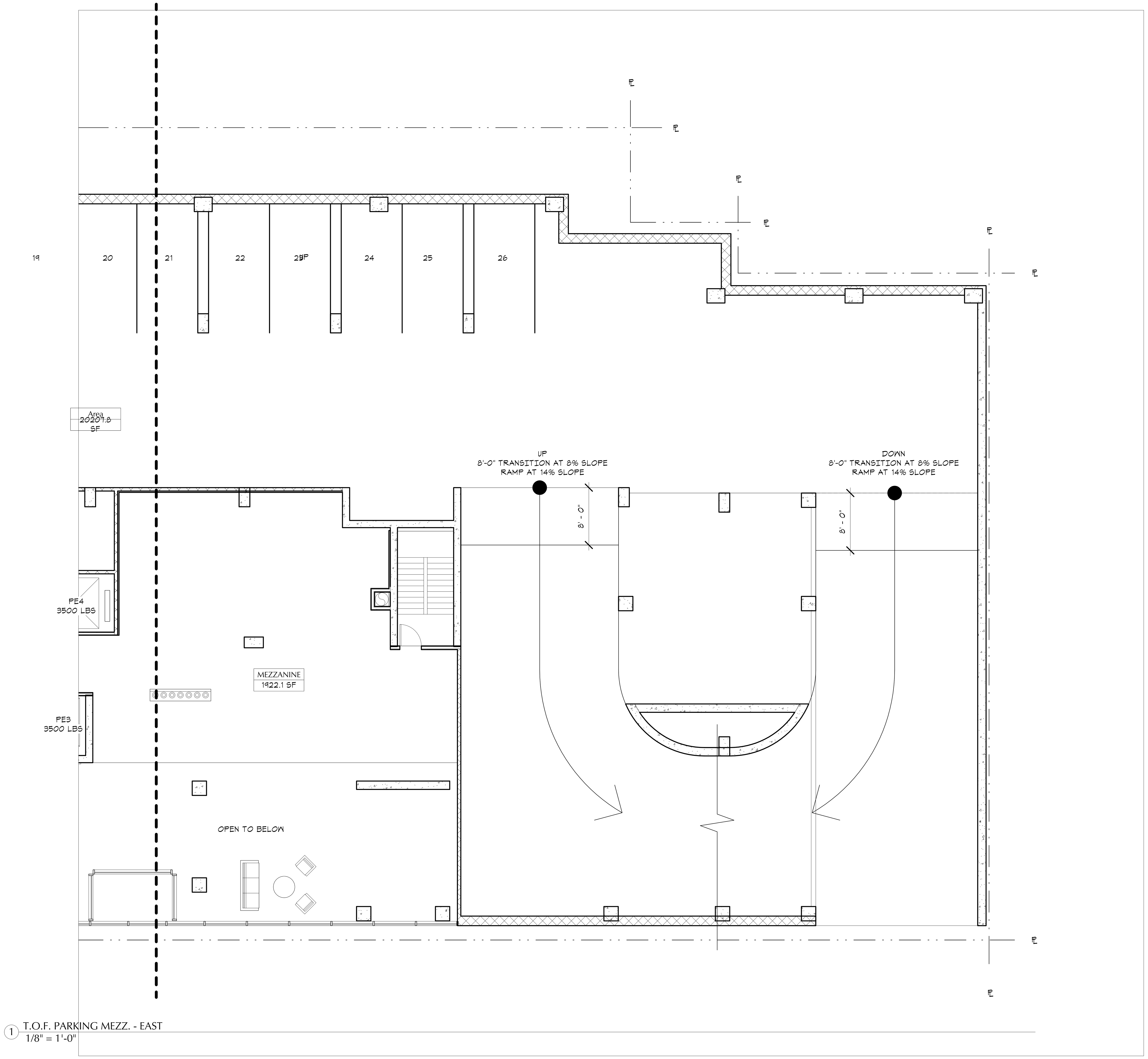
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
MEZZANINE PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-102A.00



1 T.O.F. PARKING MEZZ. - EAST
1/8" = 1'-0"

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BOROUGH:QUEENS

BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

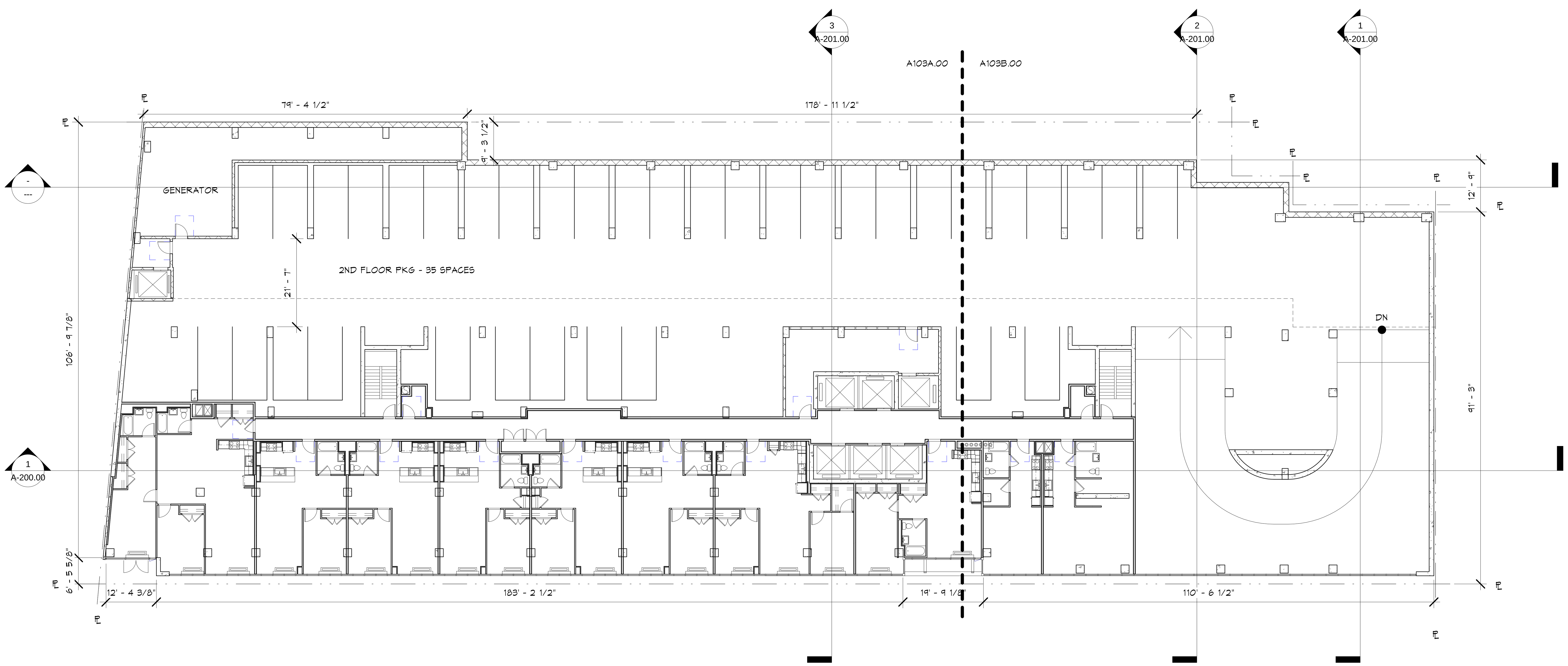
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
MEZZANINE PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-102B.00



T.O.F. 2ND FLOOR - FULL PLAN
1/16" = 1'-0"

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New York, NY
11435

BLOCK:9998 Lot:25
PROJECT:1734.00
BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
2ND FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-103.00

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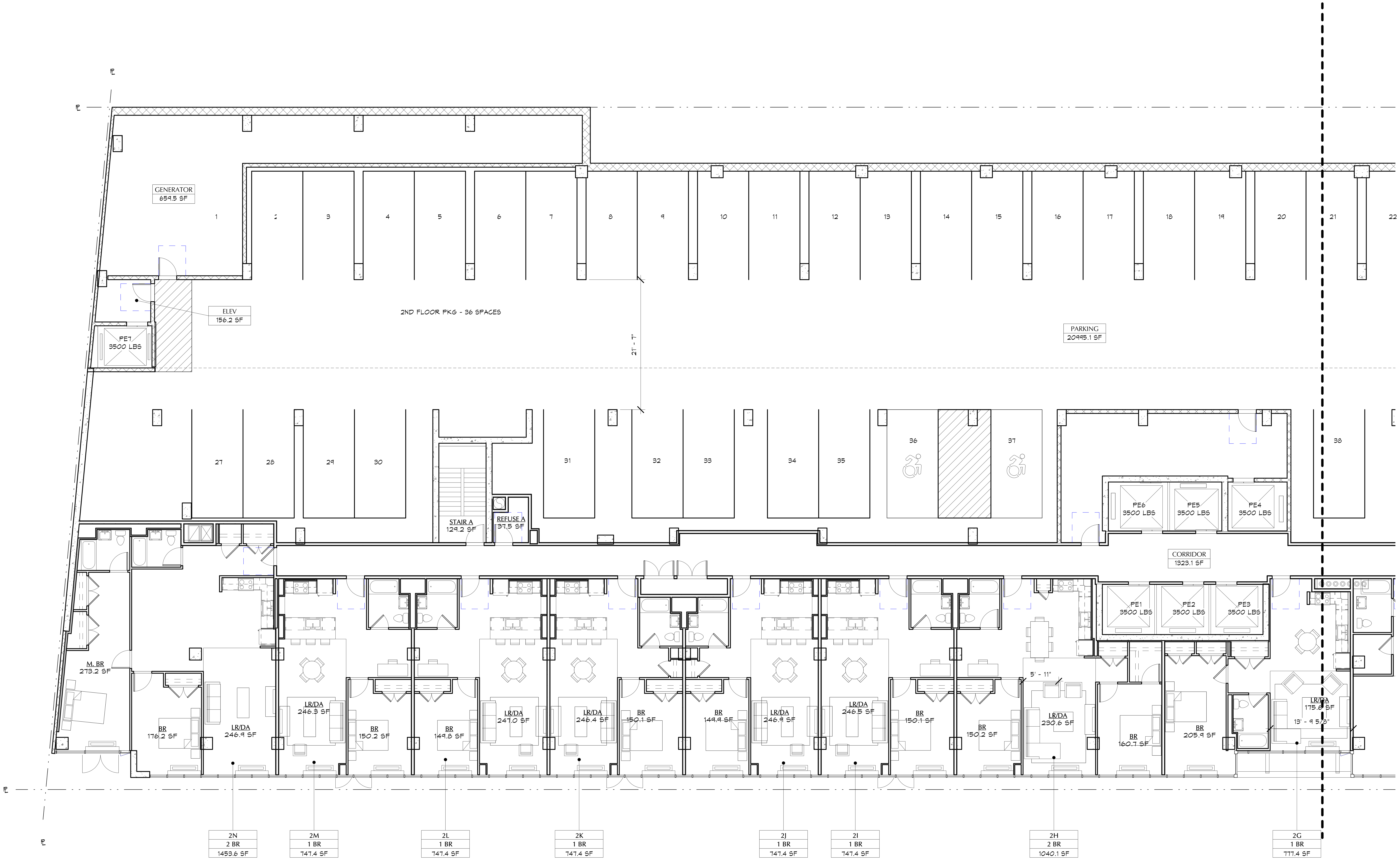

1 2ND-3RD FLOOR
1/8" = 1'-0"

11/21/2017 5:43:48 PM C:\Users\chris\Documents\Jamaica2_200_1_AR_chris.rvt

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19 W. 21 ST STREET
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212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

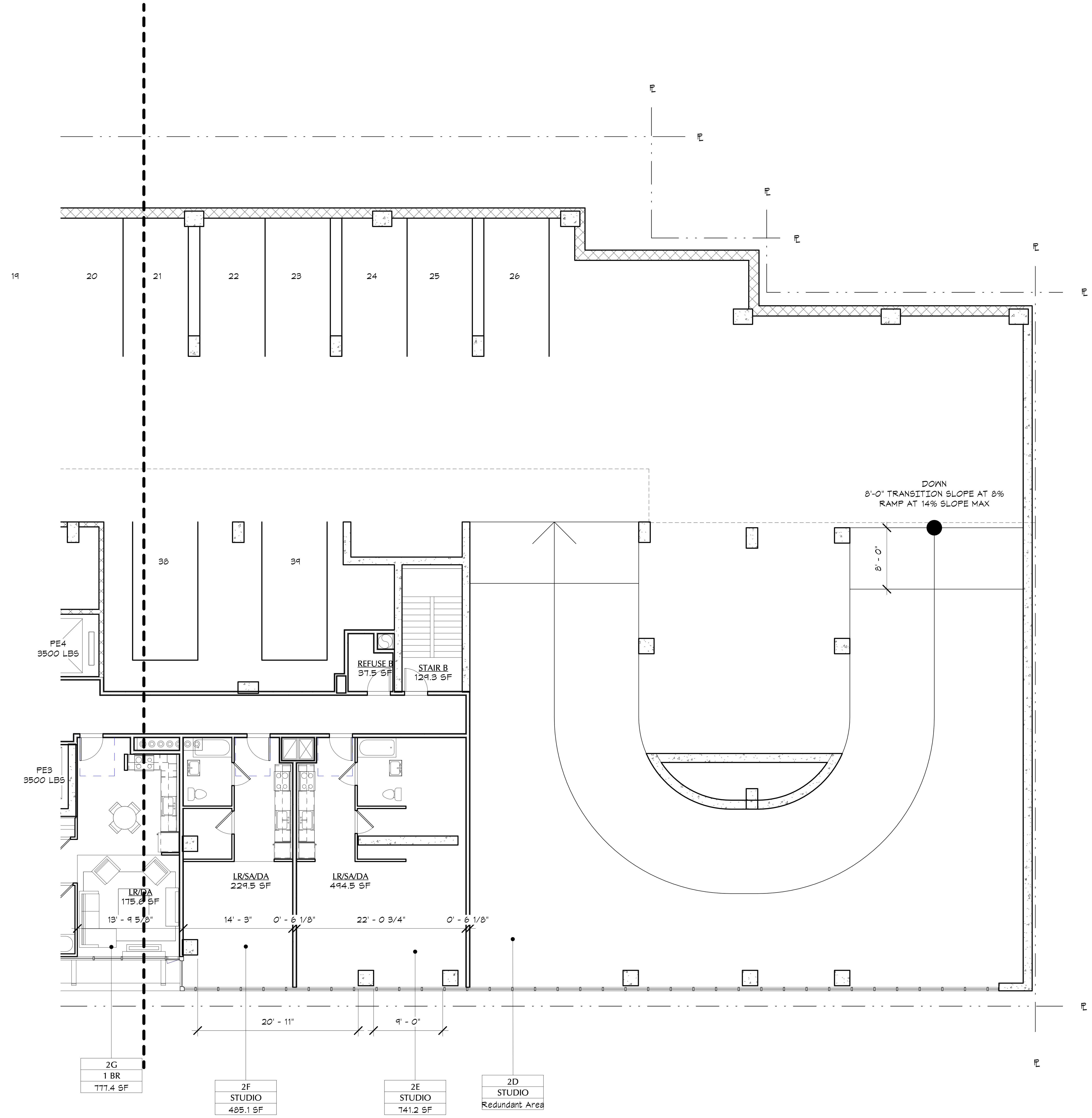
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
2ND FL PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-103A.00



1 2ND-3RD FLOOR
1/8" = 1'-0"

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JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS

BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

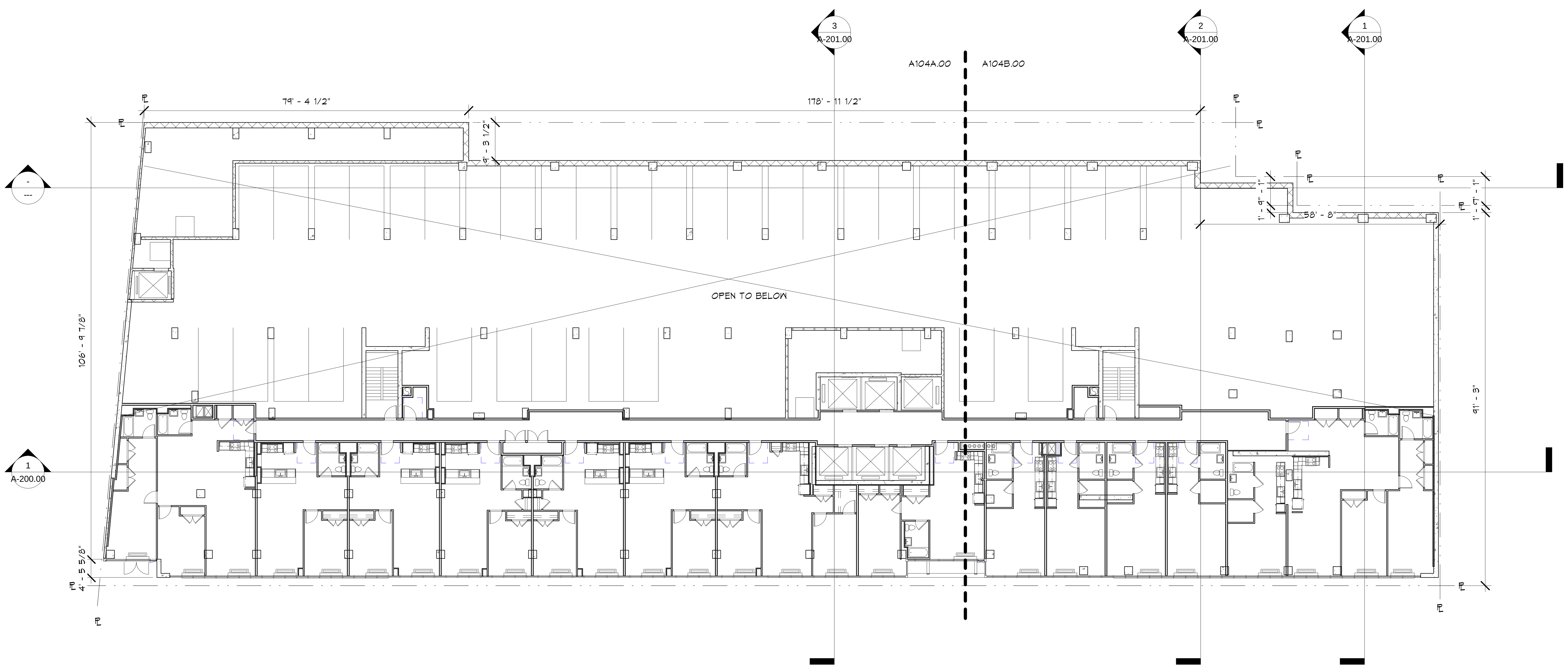
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
2ND FL PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-103B.00



1 T.O.F. 3RD FLOOR - FULL PLAN
1/16" = 1'-0"

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PARTNERS
19 W. 21 ST STREET
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212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

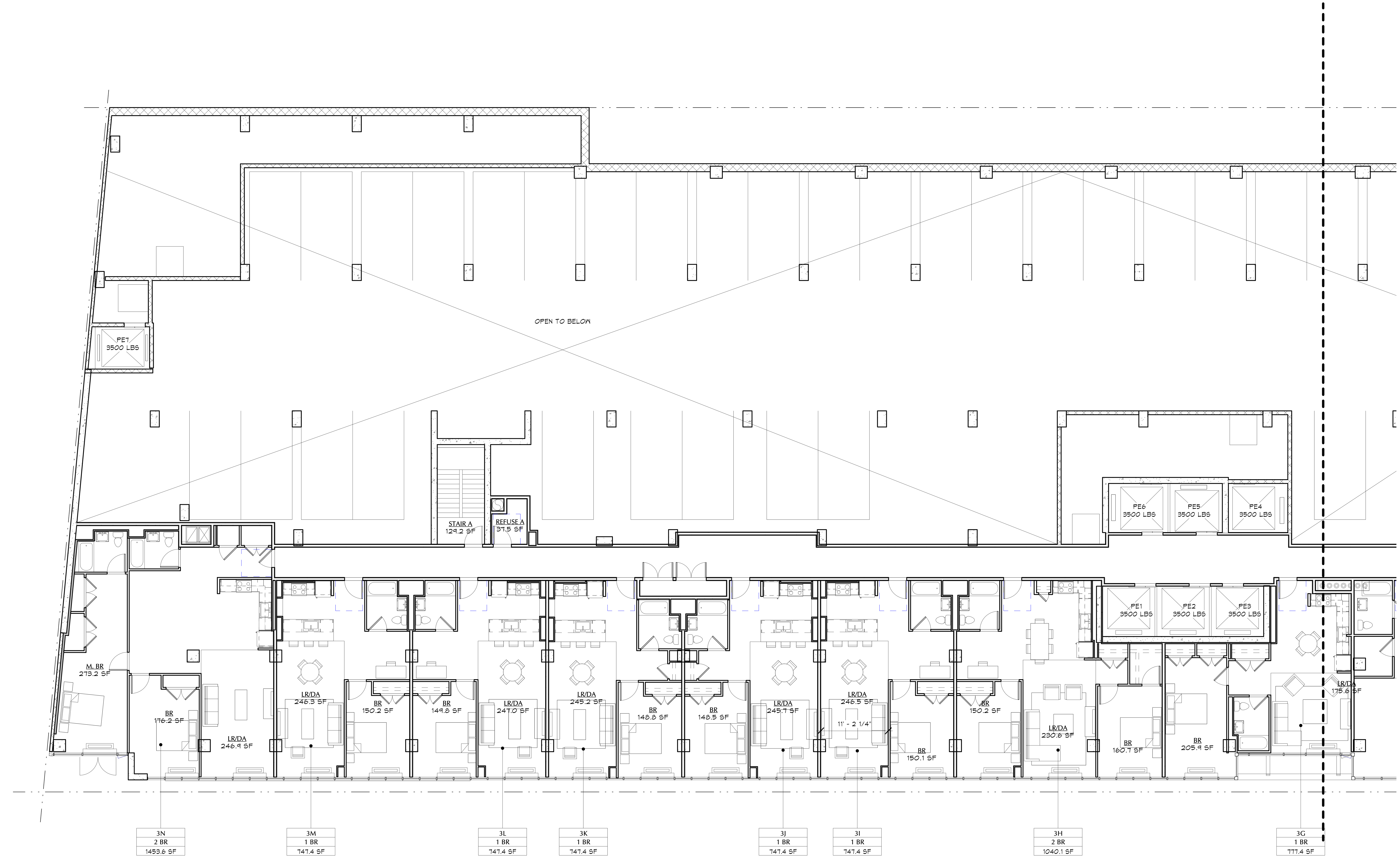
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
3RD FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-104.00



1 T.O.F. 3RD FLOOR - WEST
1/8" = 1'-0"

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New York, NY
11435

BLOCK:9998 Lot:25
PROJECT:1734.00

BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

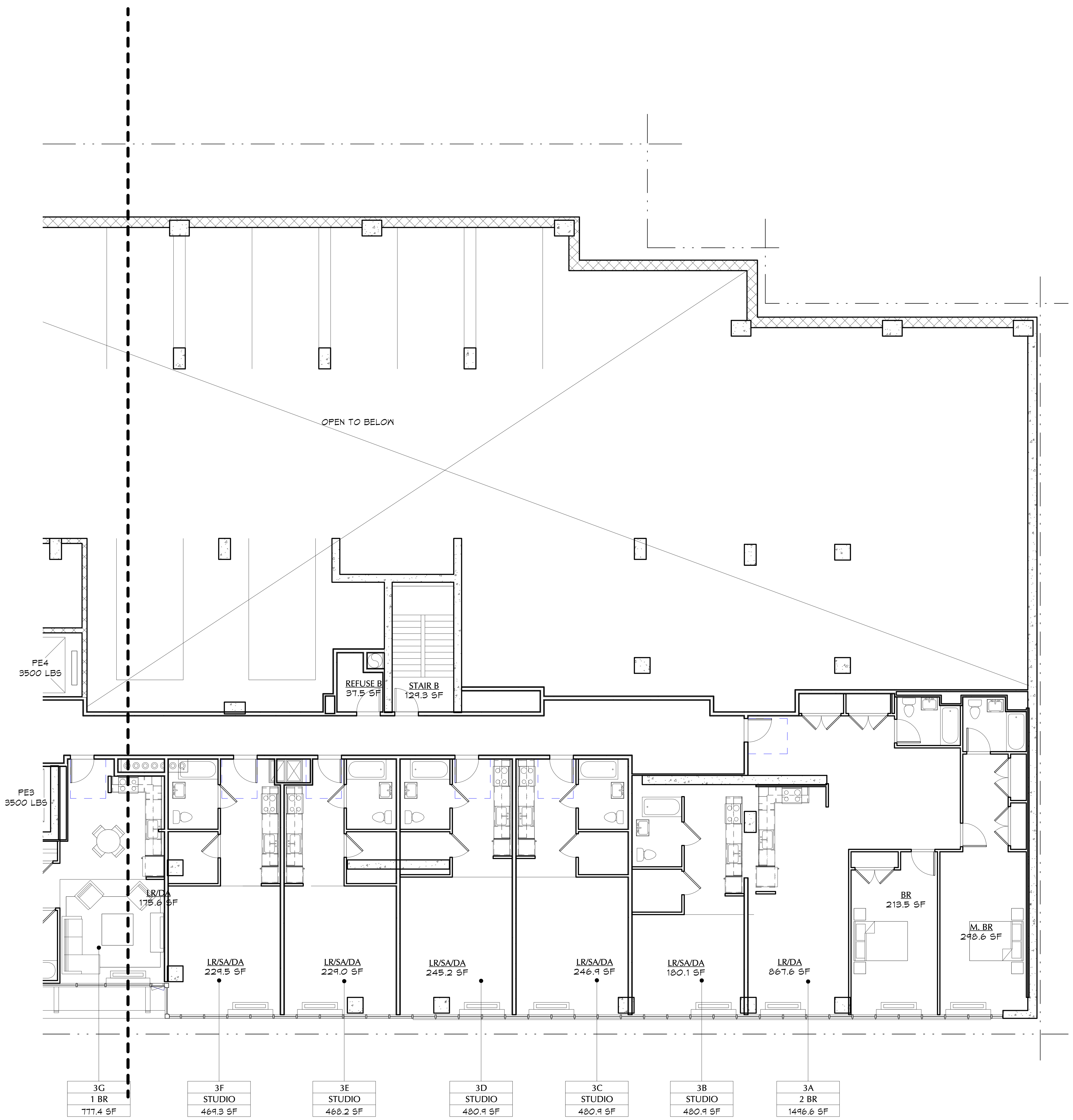
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
3RD FL PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-104A.00



1 T.O.F. 3RD FLOOR - EAST
1/8" = 1'-0"

11/21/2017 5:43:58 PM C:\Users\chris\Documents\Jamaica2_200_1_AR_chris.rvt

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19 W. 21 ST STREET
NEW YORK, NY 10010
212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BLOCK:9998 Lot:25
PROJECT:1734.00

BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

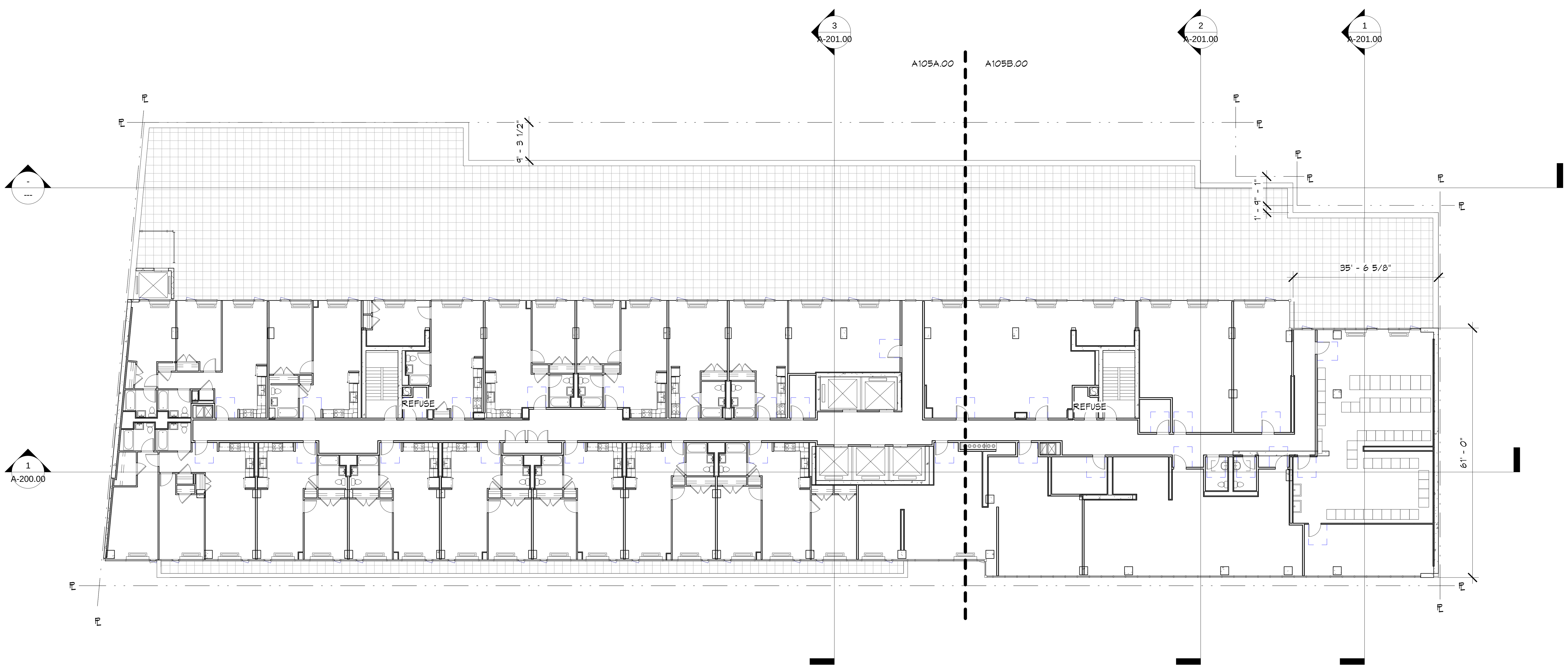
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
3RD FL PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-104B.00



1 T.O.F. 4TH FLOOR - FULL PLAN
1/16" = 1'-0"

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BLOCK:9998 Lot:25
PROJECT:1734.00
BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

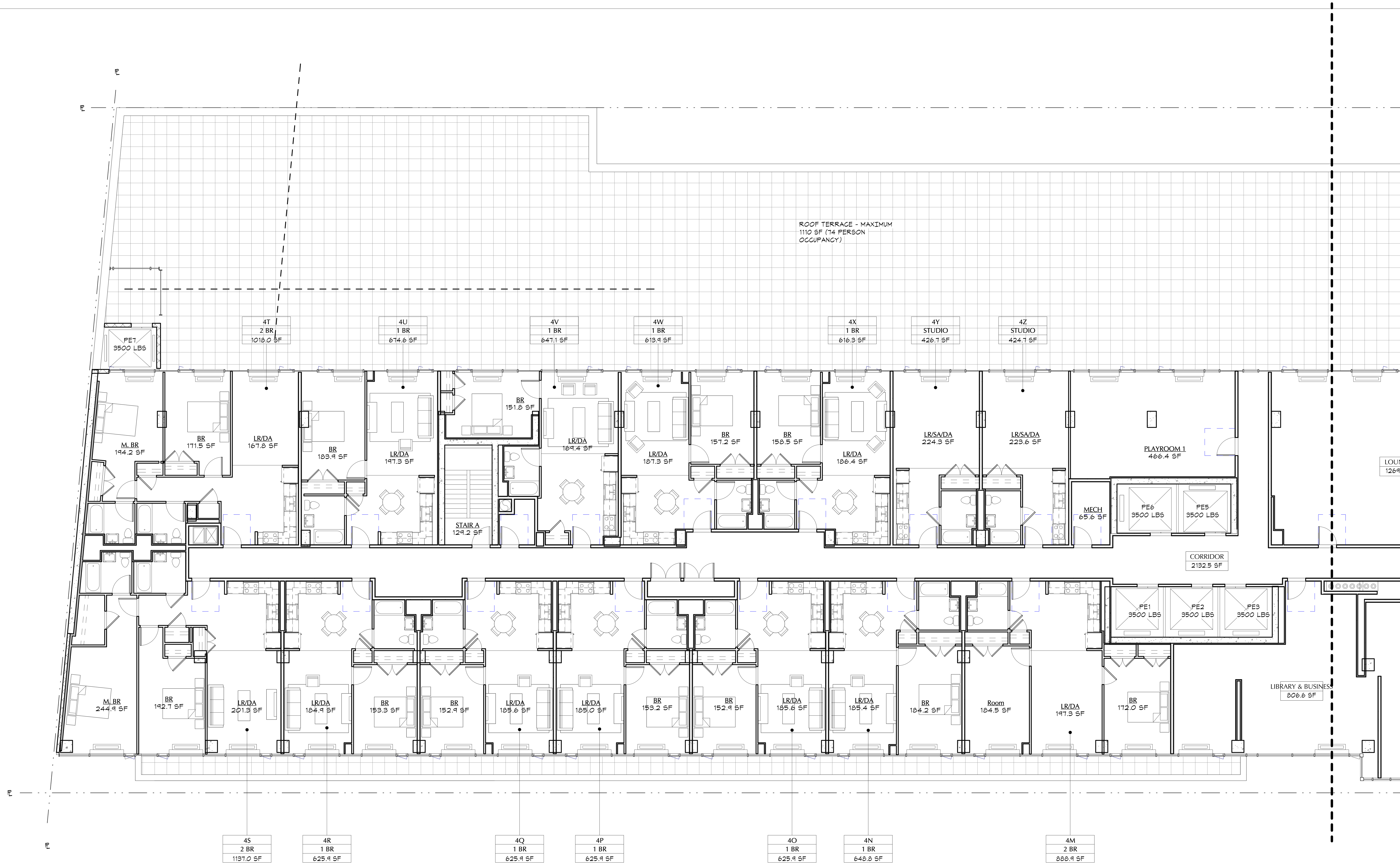
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
4TH FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-105.00



1 T.O.F. 4TH FLOOR - WEST
1/8" = 1'-0"

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BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

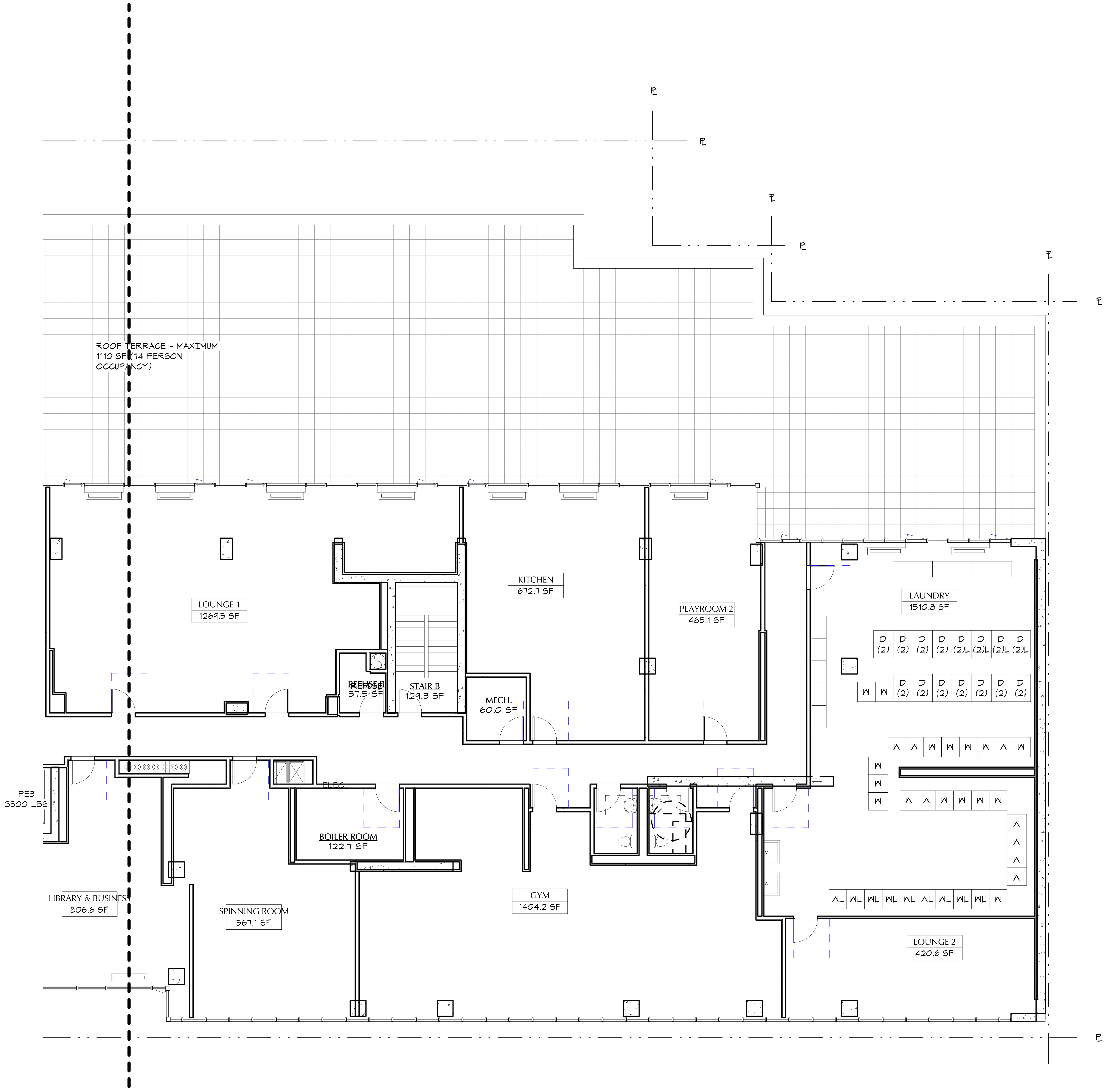
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
4TH FL PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-105A.00



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BLOCK:9998 Lot:25
PROJECT:1734.00

BOROUGH:QUEENS

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STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
4TH FL PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

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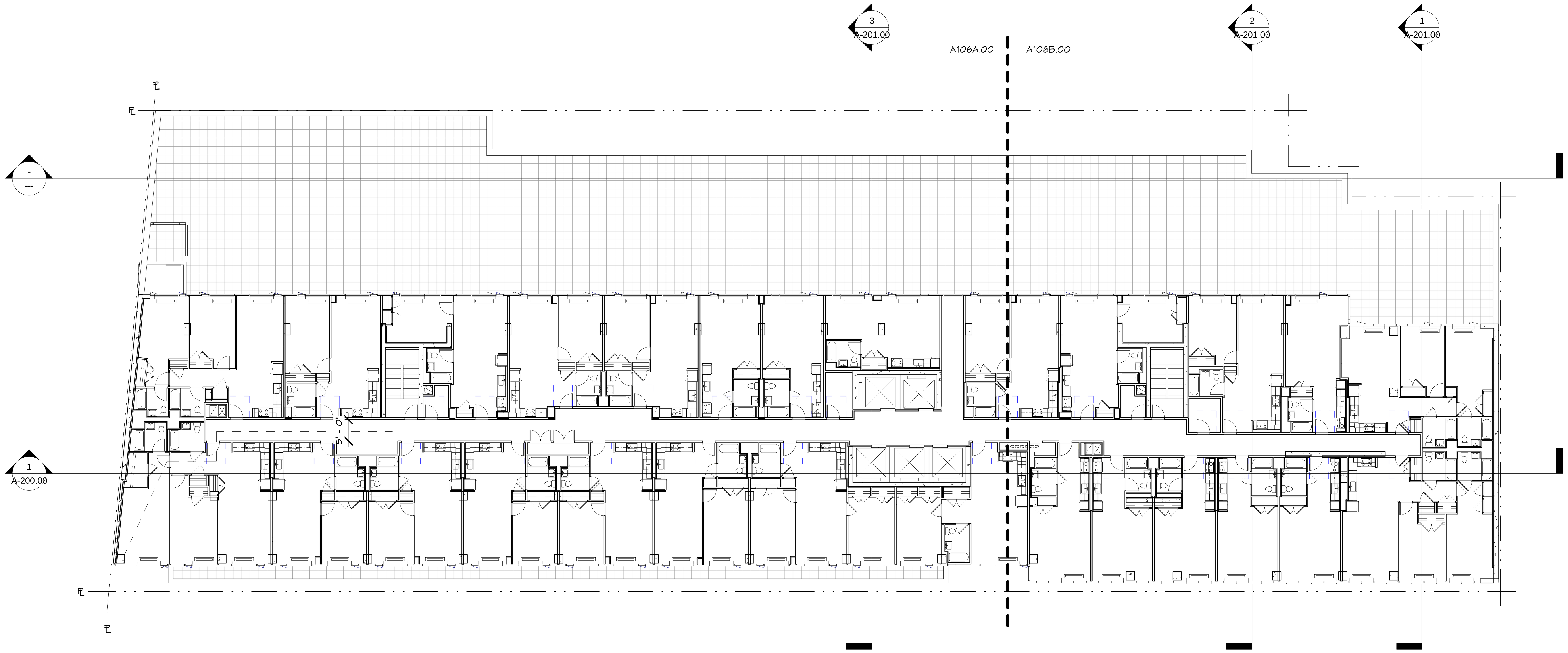

1 T.O.F. 5TH-7TH FLOOR - FULL PLAN
1/16" = 1'-0"

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BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
5TH-7TH FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
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DWG NO:
A-106.00

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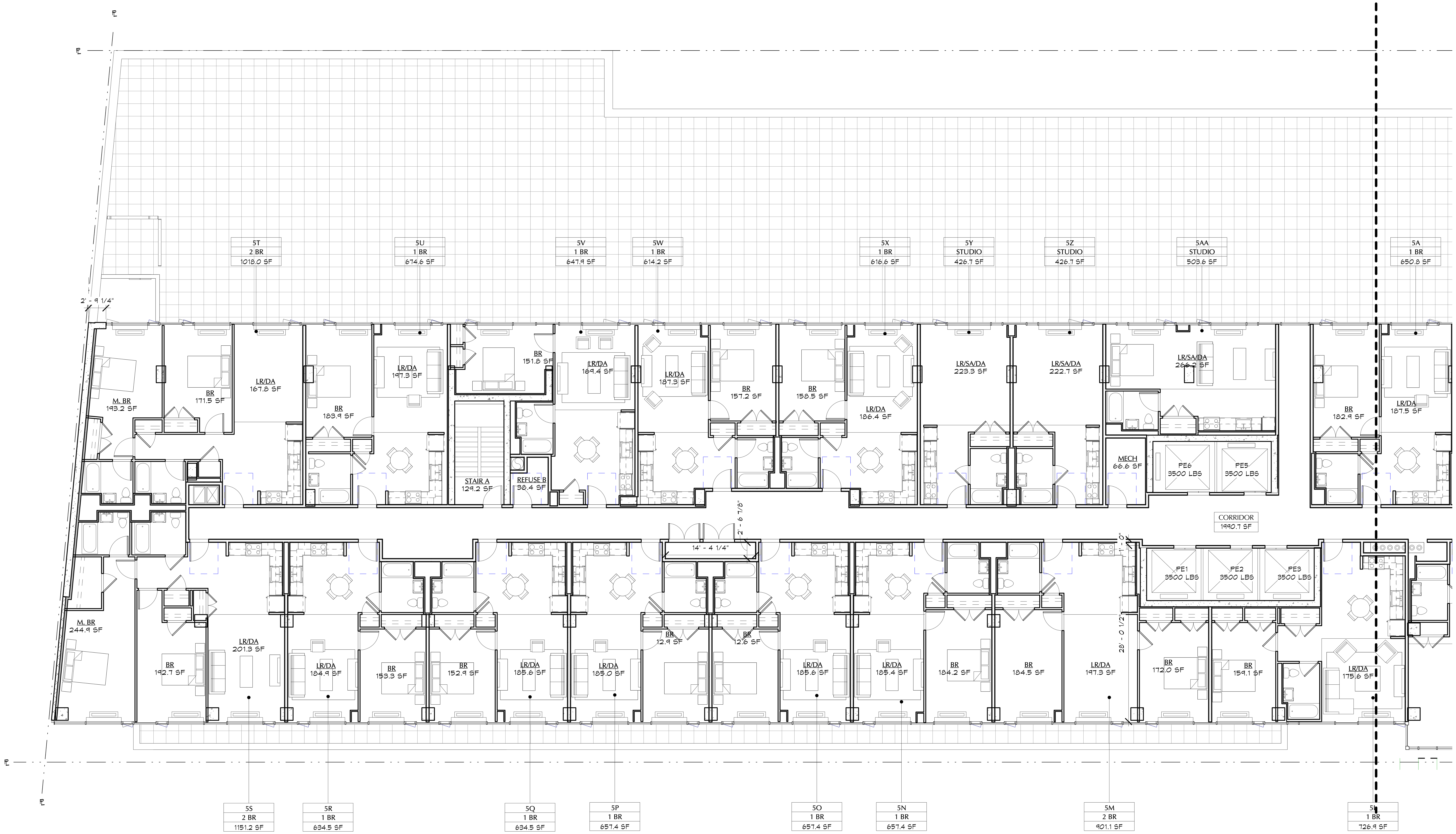

1 5TH-20TH FLOOR
1/8" = 1'-0"

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BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

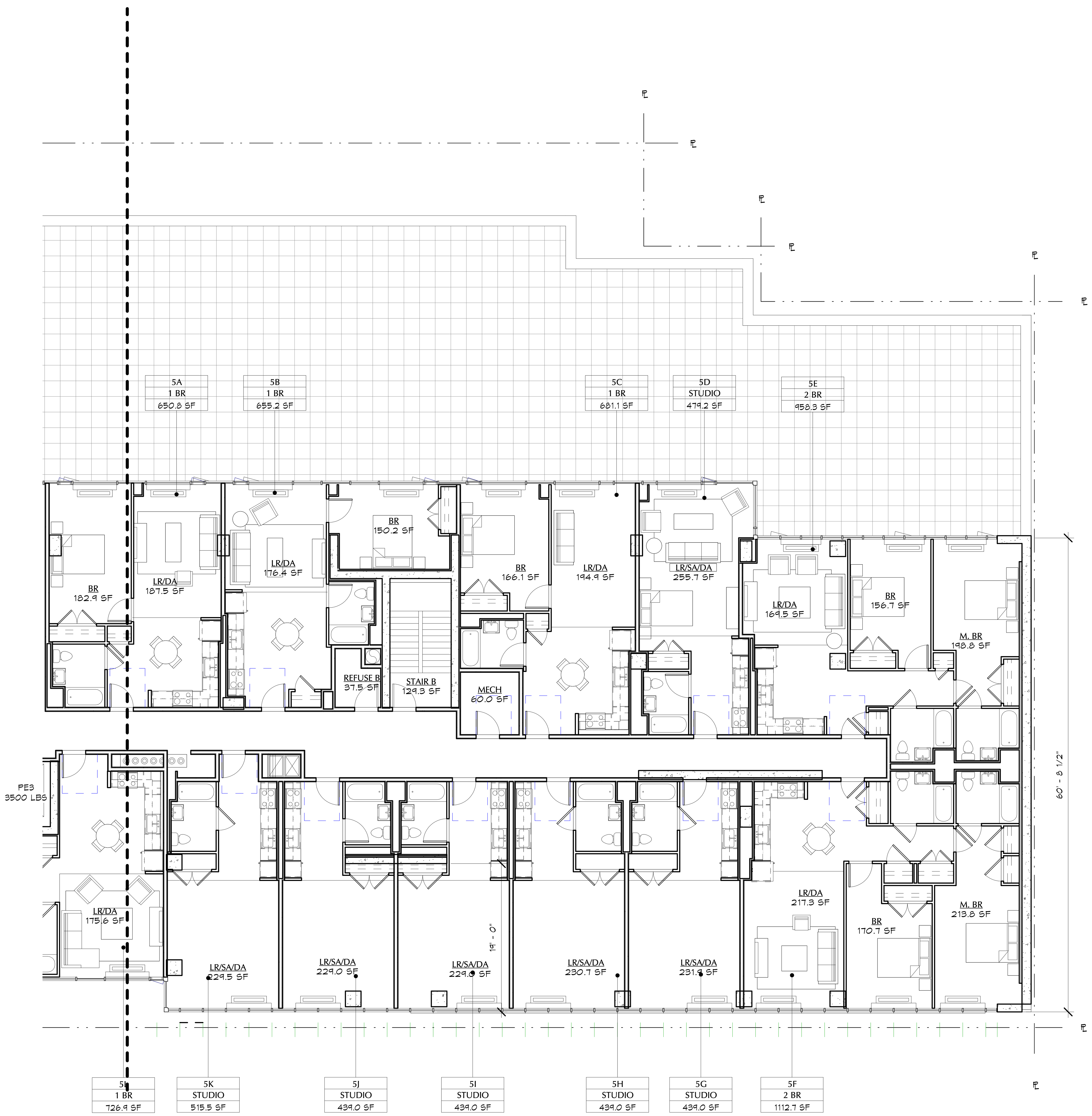
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
5TH-7TH FL PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-106A.00



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BOROUGH:QUEENS

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PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
5TH-7TH FL PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-106B.00

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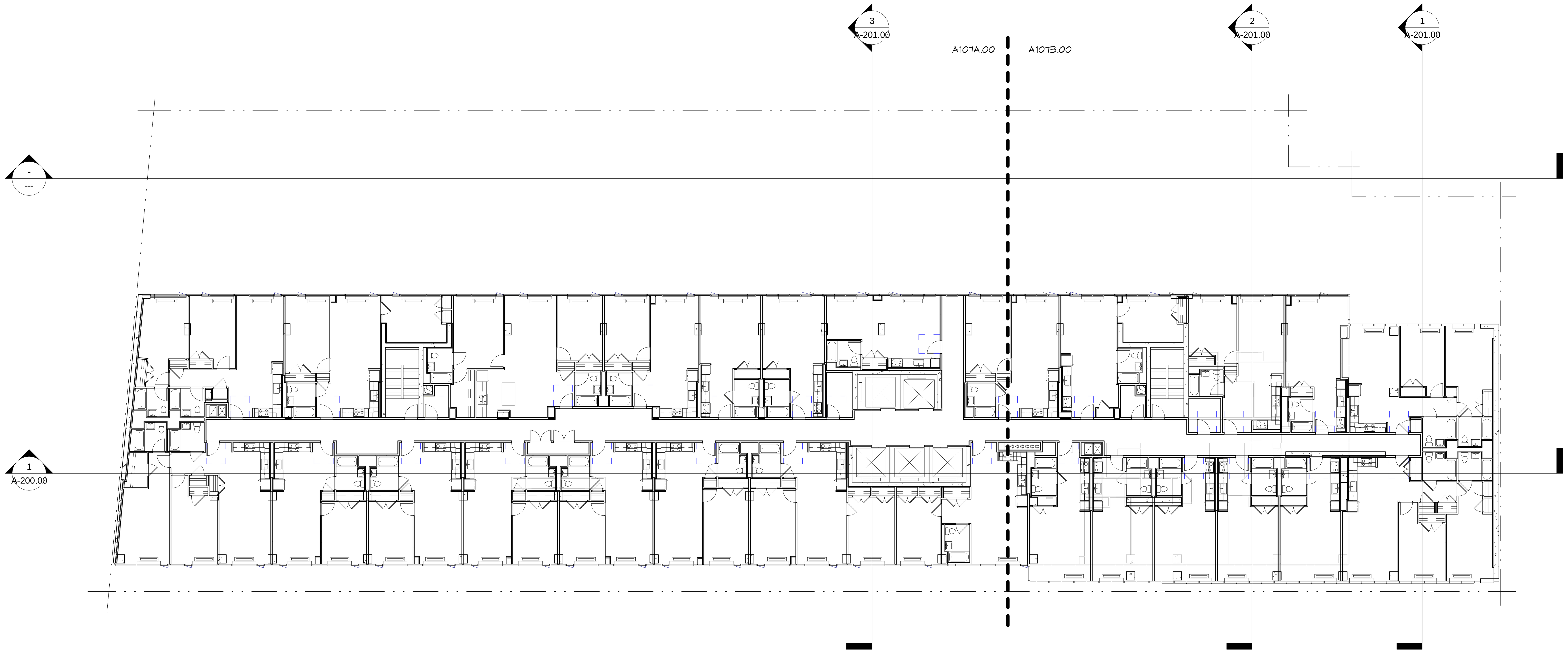

1 T.O.F. 8TH-20TH FLOOR FULL PLAN
1/16" = 1'-0"

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BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
8TH-20TH FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
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CHK BY: Checker
DWG NO:
A-107.00

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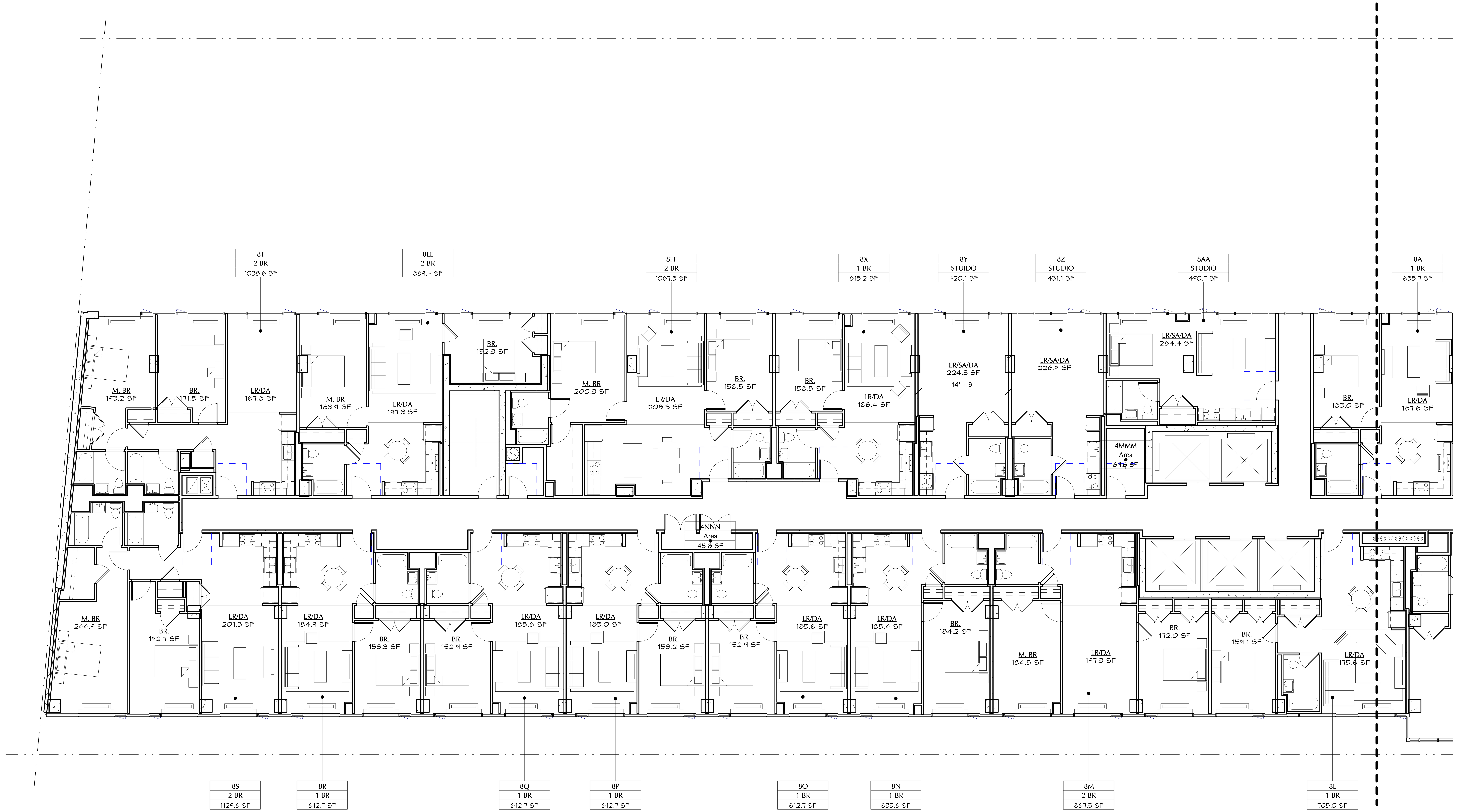

1 T.O.F. 8TH FLOOR - WEST
1/8" = 1'-0"

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BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
8TH-20TH FL PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-107A.00

1 T.O.F. 8TH FLOOR - EAST
1/8" = 1'-0"

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11435

BLOCK:9998 Lot:25
PROJECT:1734.00
BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
8TH-20TH FL PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
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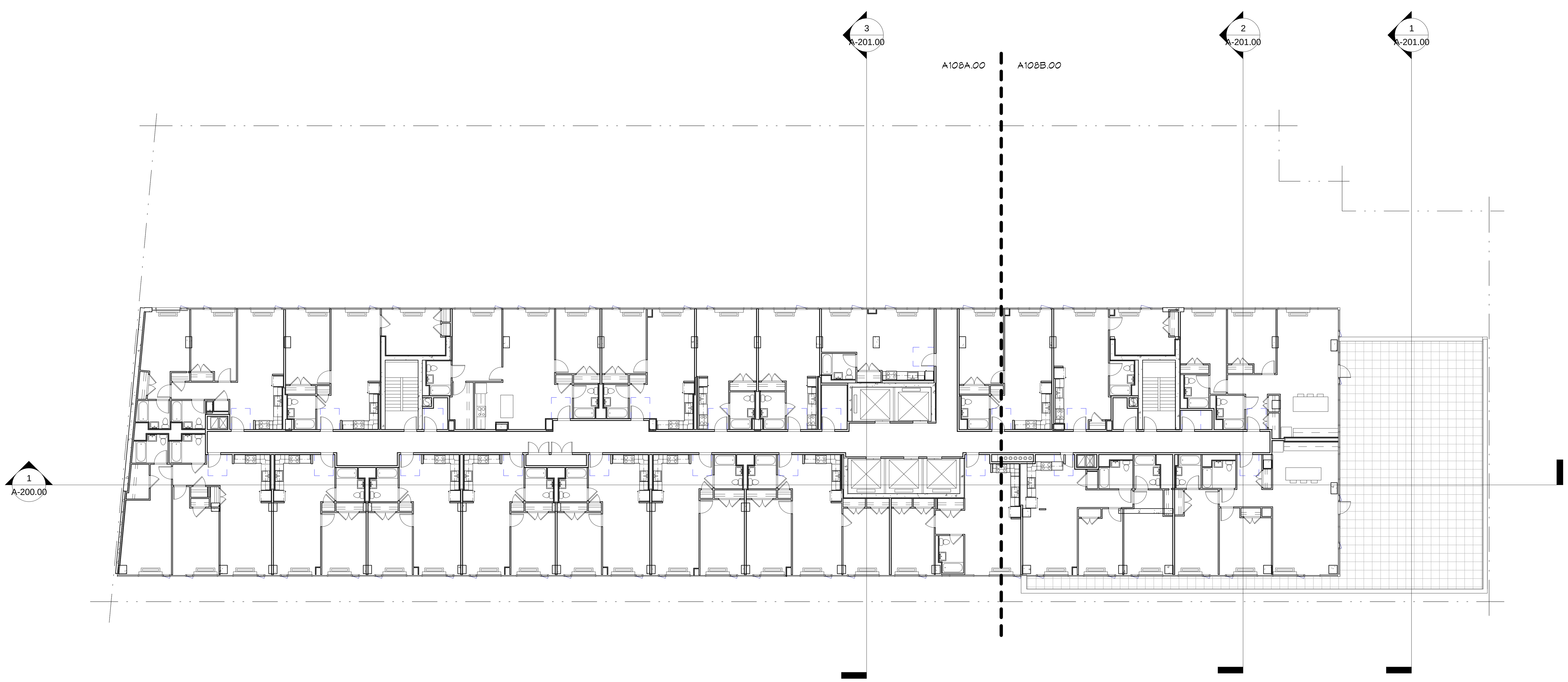

1 T.O.F. 21ST FLOOR - FULL PLAN
1/16" = 1'-0"

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11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
21ST FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-108.00

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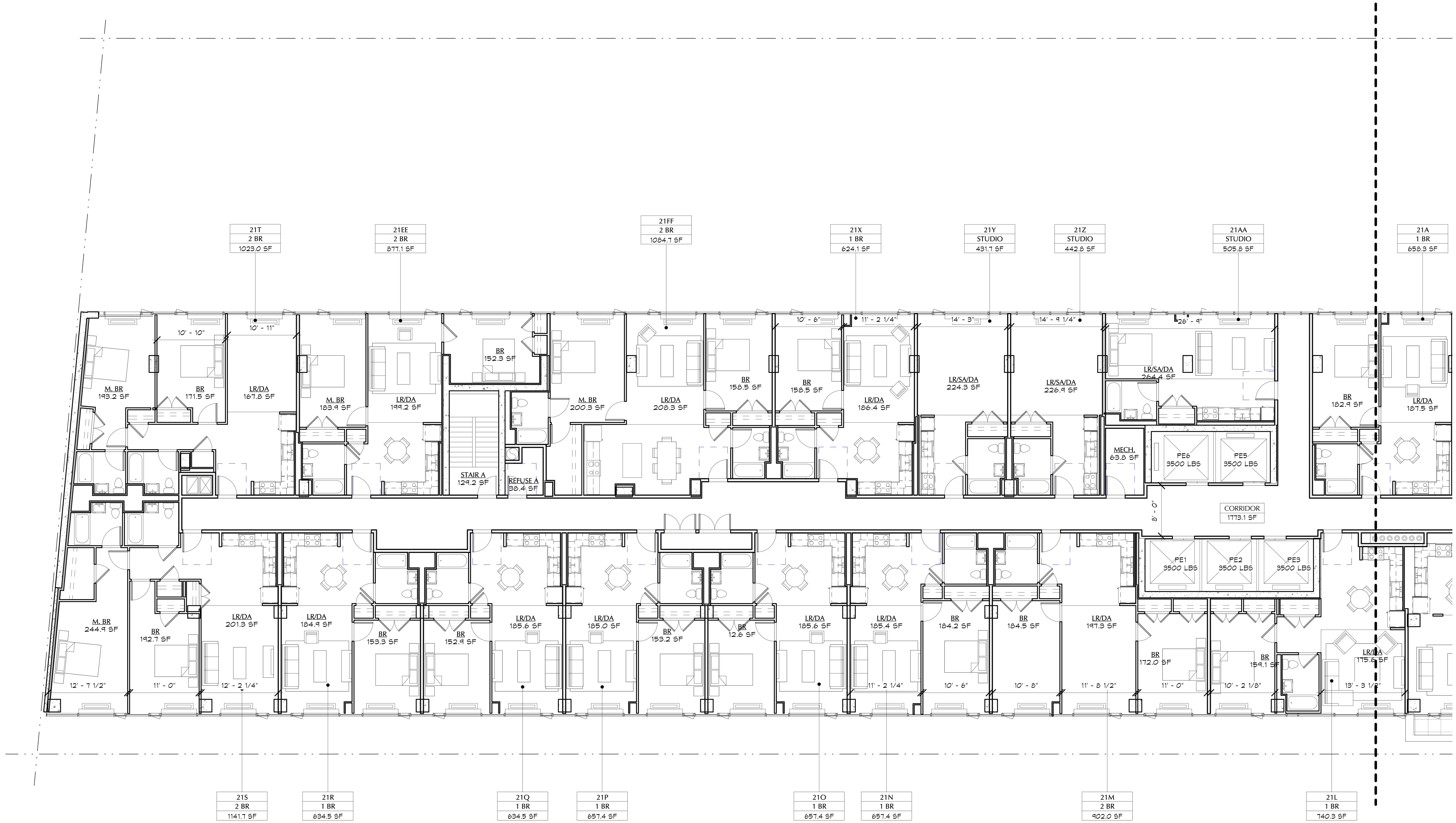

1 T.O.F. 21ST FLOOR - WEST
1/8" = 1'-0"

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BLOCK:9998 Lot:25
PROJECT:1734.00

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STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
21ST FL PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-108A.00

1 T.O.F. 21ST FLOOR - EAST
1/8" = 1'-0"

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BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

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MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

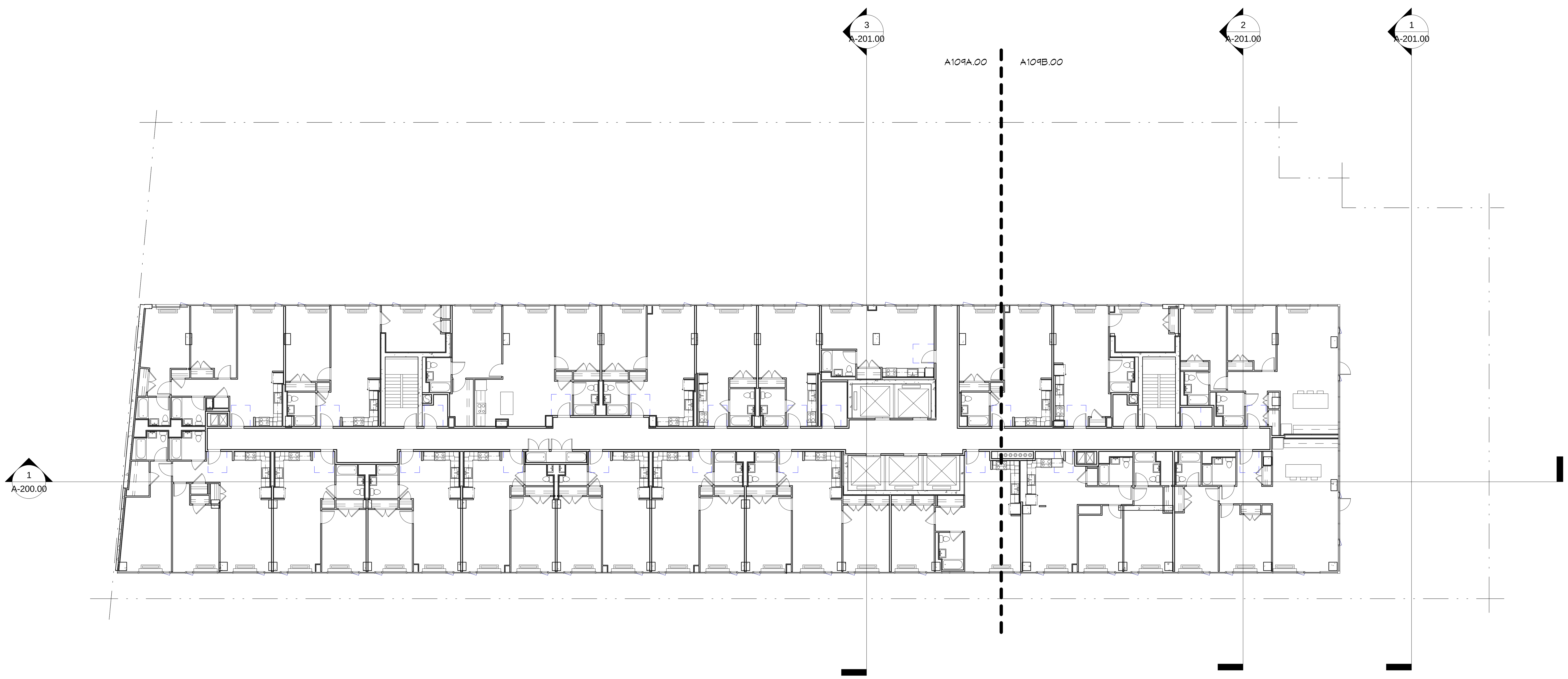
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
21ST FL PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-108B.00



1 T.O.F. 22ND-23RD FLOOR - FULL PLAN
1/16" = 1'-0"

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New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
22ND-23RD FLOOR PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-109.00

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1 T.O.F. 22ND FLOOR - WEST
1/8" = 1'-0"

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PROJECT:1734.00
BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
22ND-23RD FLOOR WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-109A.00

1 T.O.F. 22ND FLOOR - EAST
1/8" = 1'-0"

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BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

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MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

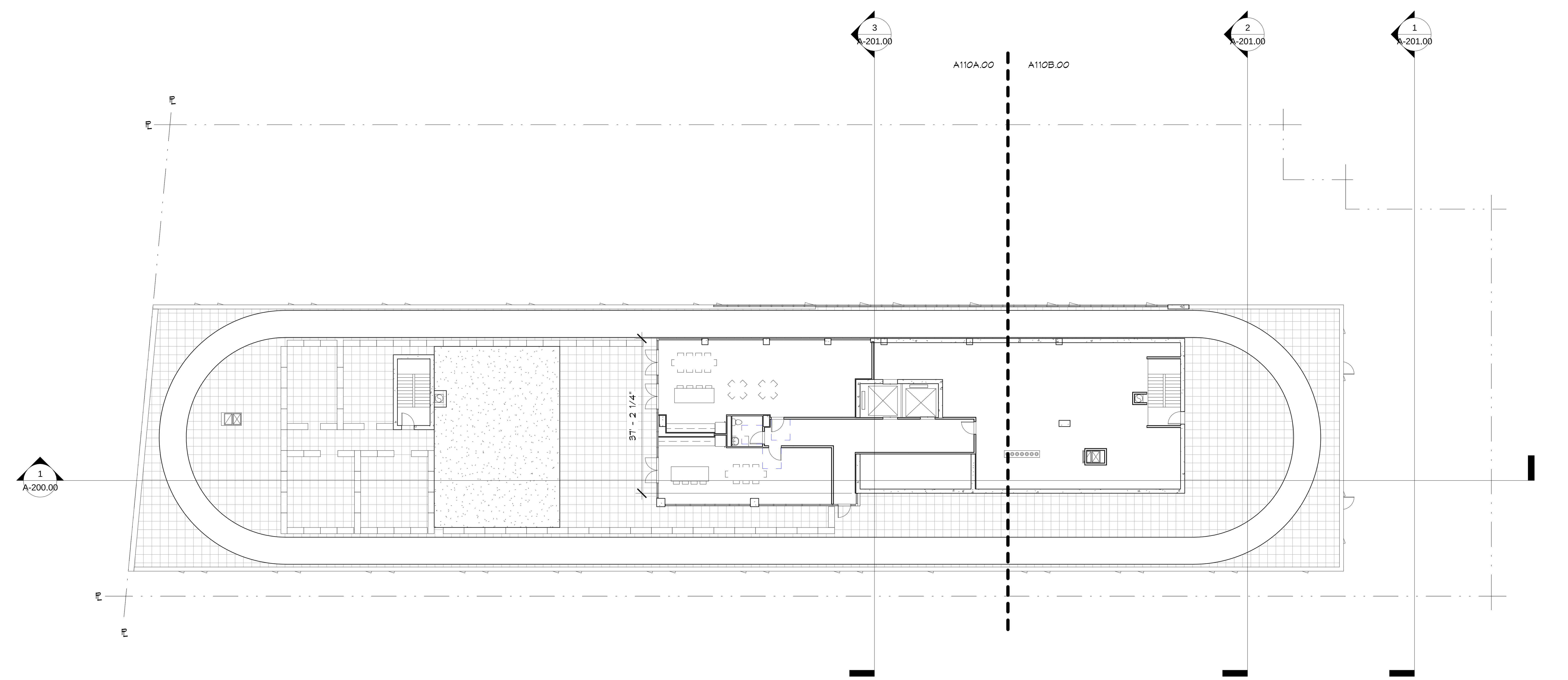
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
22ND-23RD FLOOR EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-109B.00



1 ROOF
1/16" = 1'-0"

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11435

BLOCK:9998 Lot:25
PROJECT:1734.00
BOROUGH:QUEENS

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
ROOF PLAN

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-110.00

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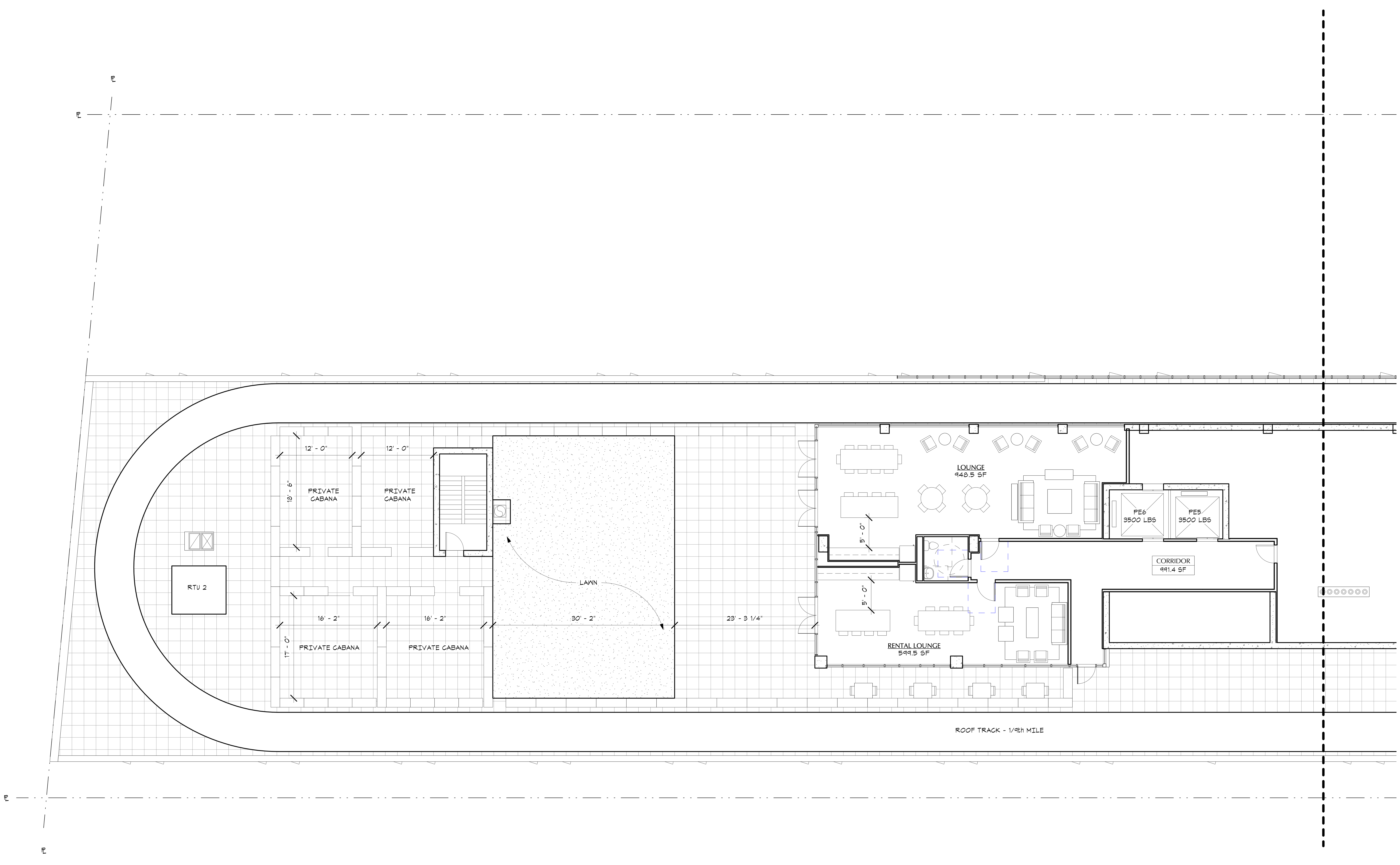

1 ROOF
1/8" = 1'-0"

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New York, NY
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BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

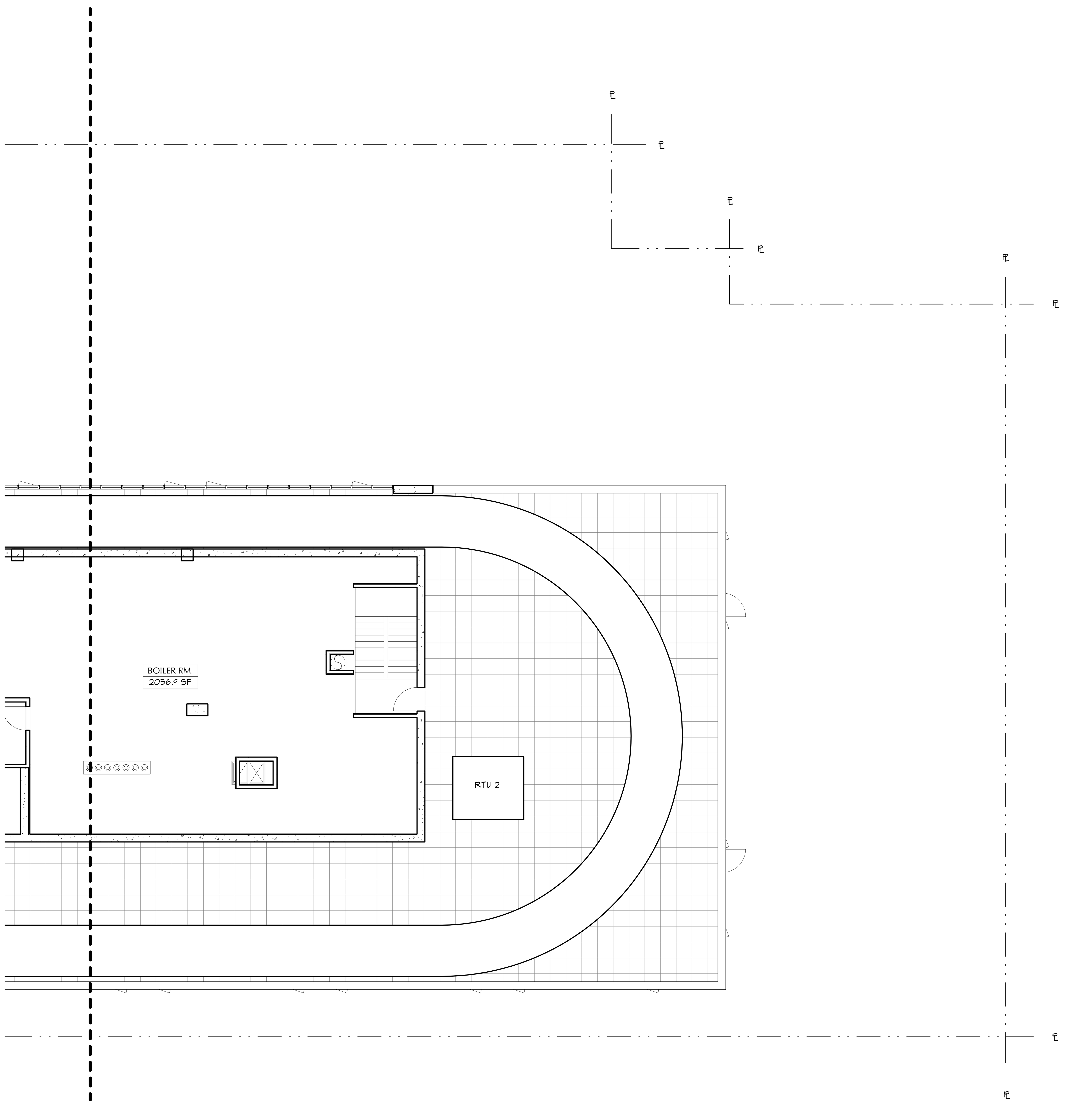
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
ROOF PLAN WEST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-110A.00



1 ROOF
1/8" = 1'-0"

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BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/8" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
ROOF PLAN EAST

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
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DWG NO:

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1 LONGITUDINAL BUILDING SECTION
1/16" = 1'-0"

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212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS

BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

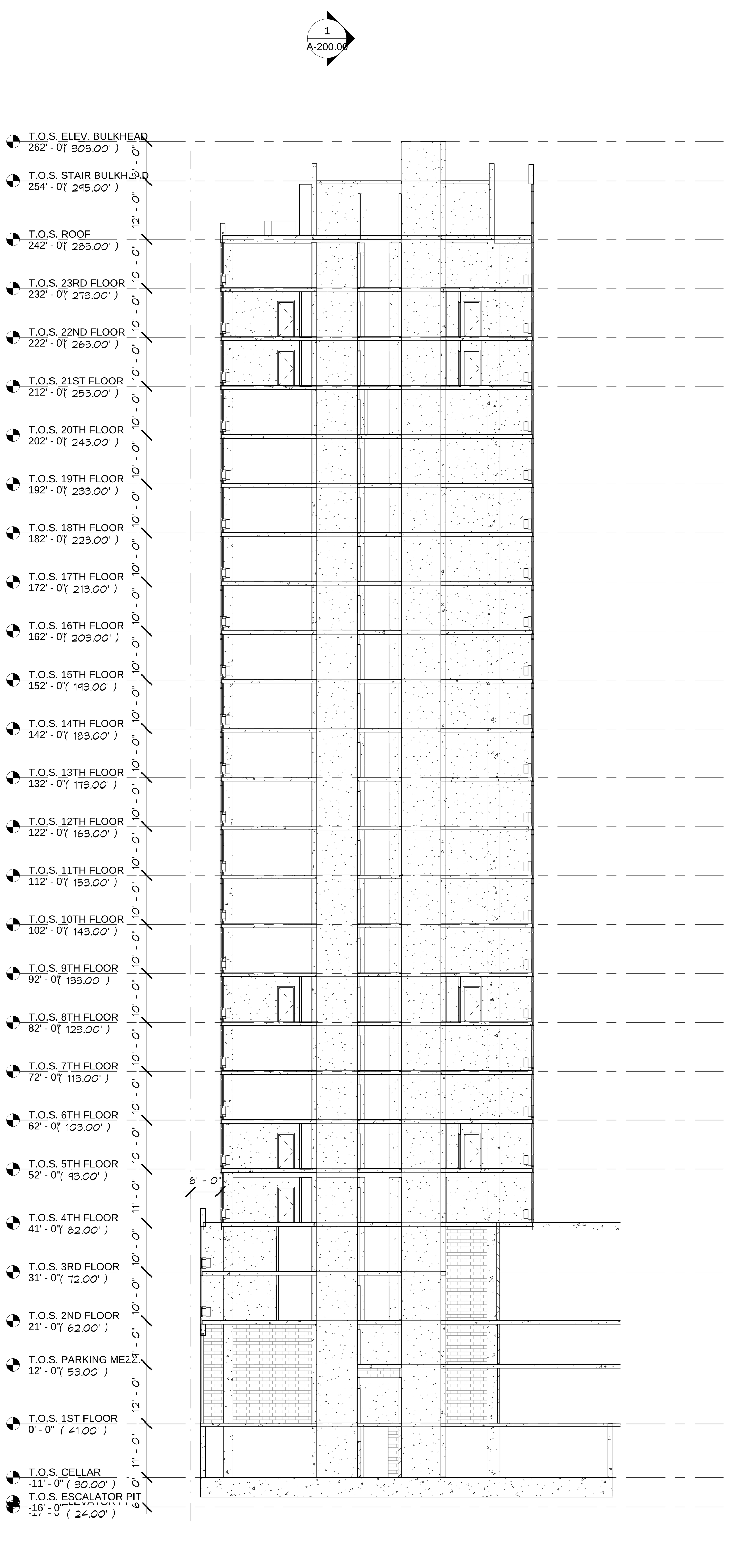
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
BUILDING SECTION

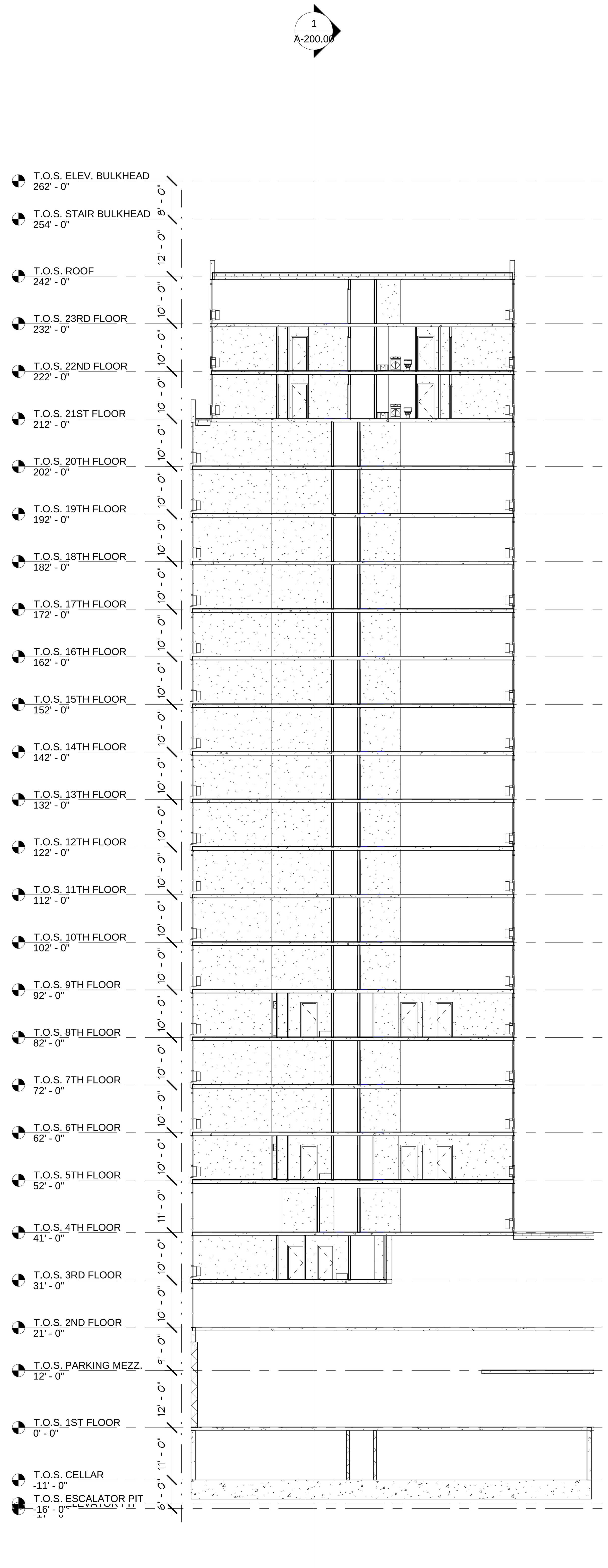
SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-200.00



3 TRANSVERSE SECTION 1
1/16" = 1'-0"



2 TRANSVERSE SECTION 2
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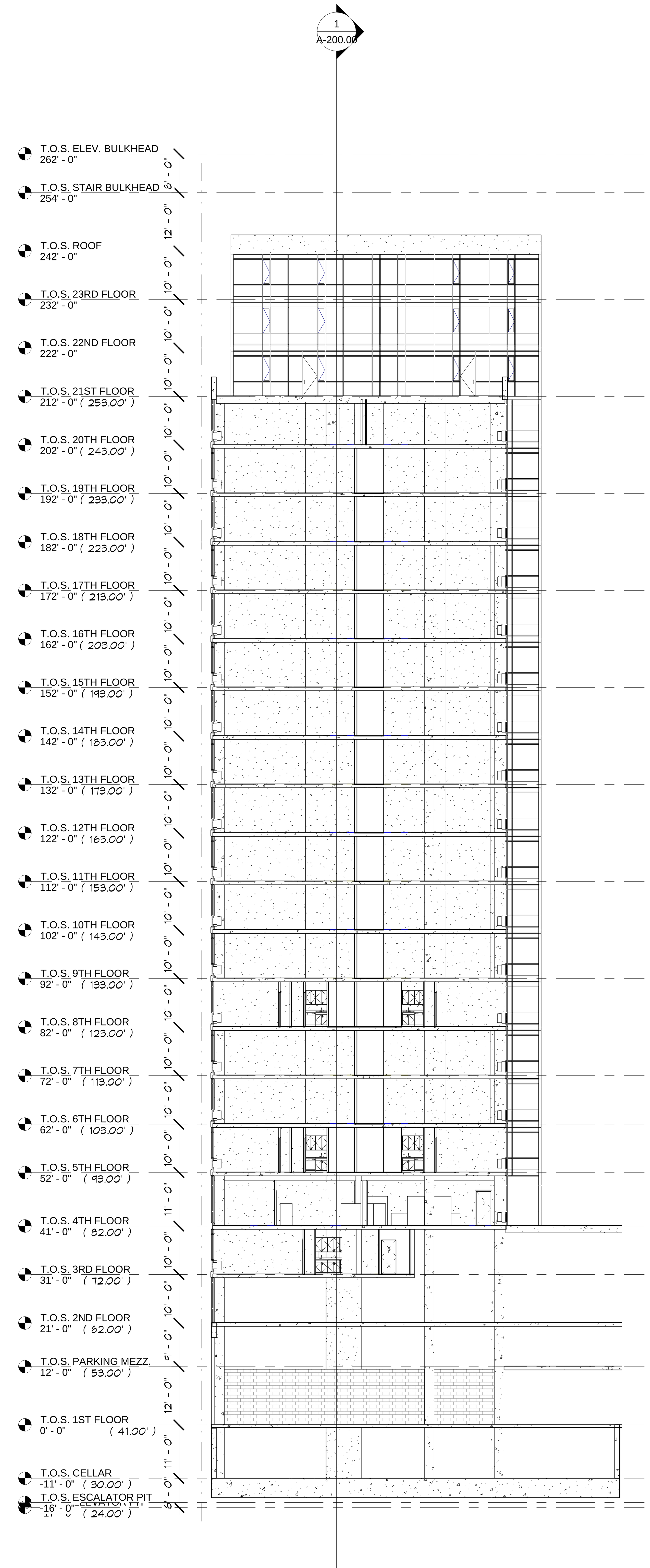

1 TRANSVERSE SECTION 3
1/16" = 1'-0"

GF55
PARTNERS
19 W. 21 ST STREET
NEW YORK, NY 10010
212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
BUILDING SECTIONS

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-201.00

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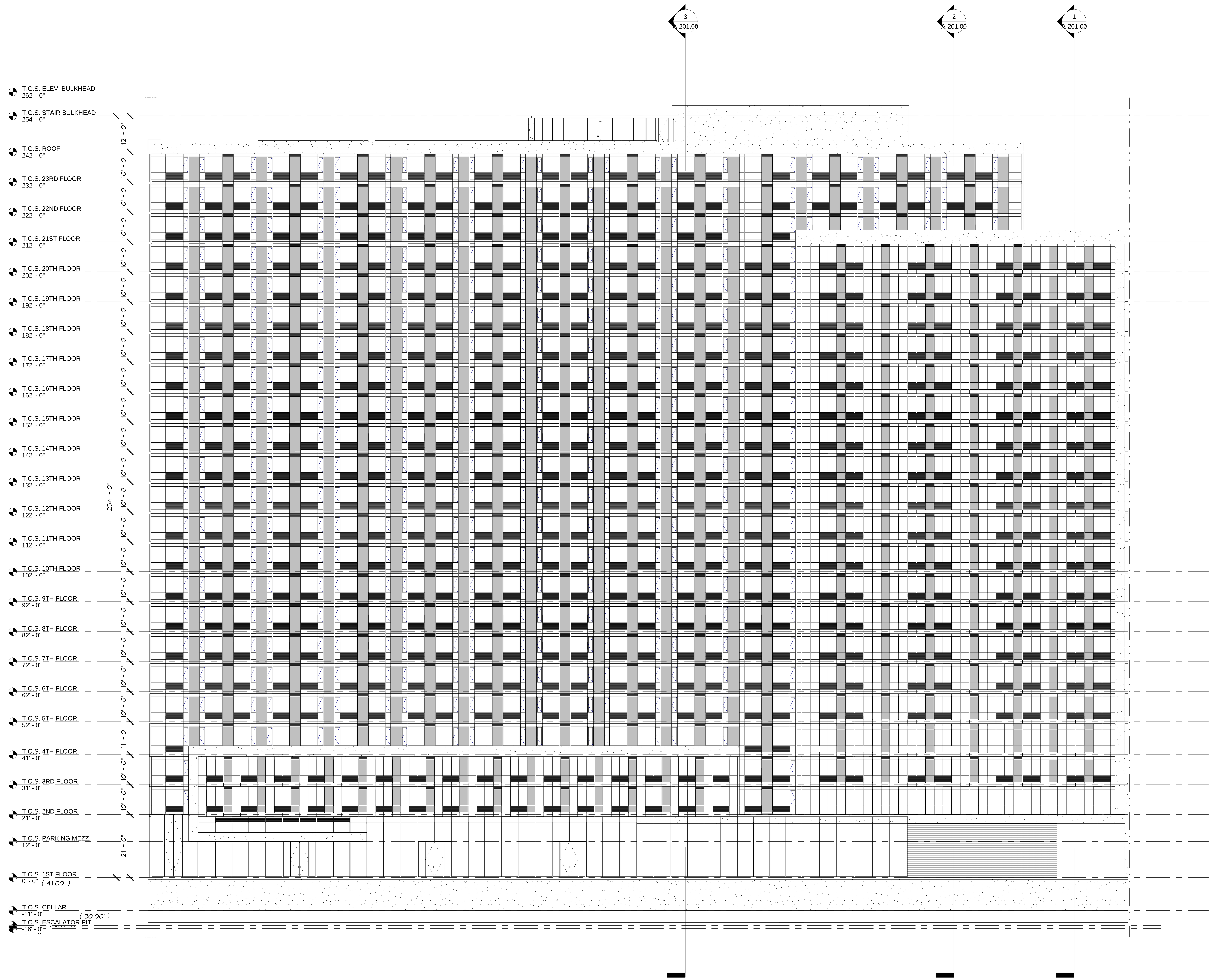

1 Construction - South 1/16"
1/16" = 1'-0"

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PARTNERS
19 W. 21 ST STREET
NEW YORK, NY 10010
212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

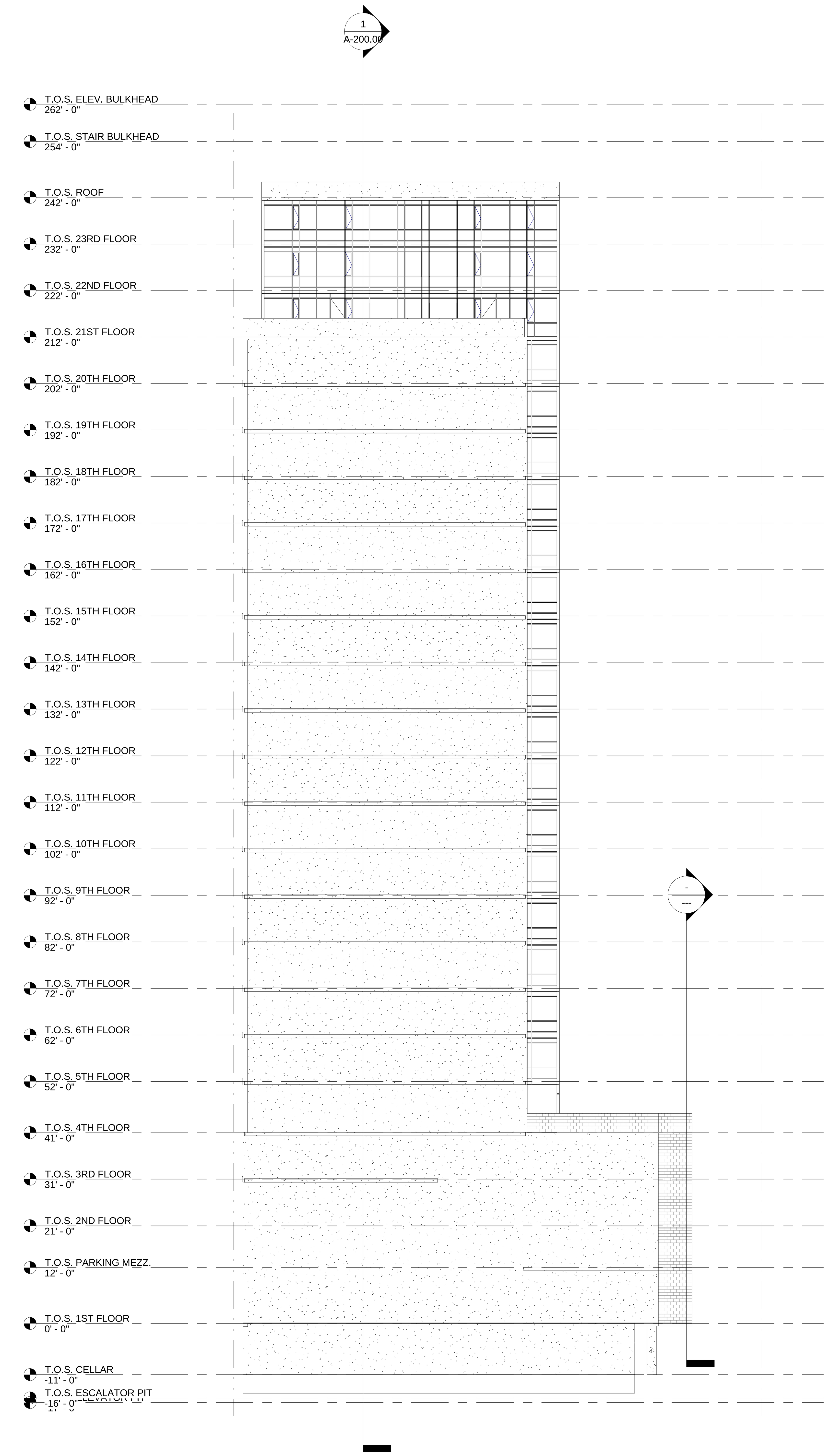
10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
SOUTH ELEVATION

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:
A-203.00



1 Construction - East 1/16"
1/16" = 1'-0"

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P A R T N E R S

19 W. 21 ST STREET
NEW YORK, NY 10010
212 352 3099

JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS

BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

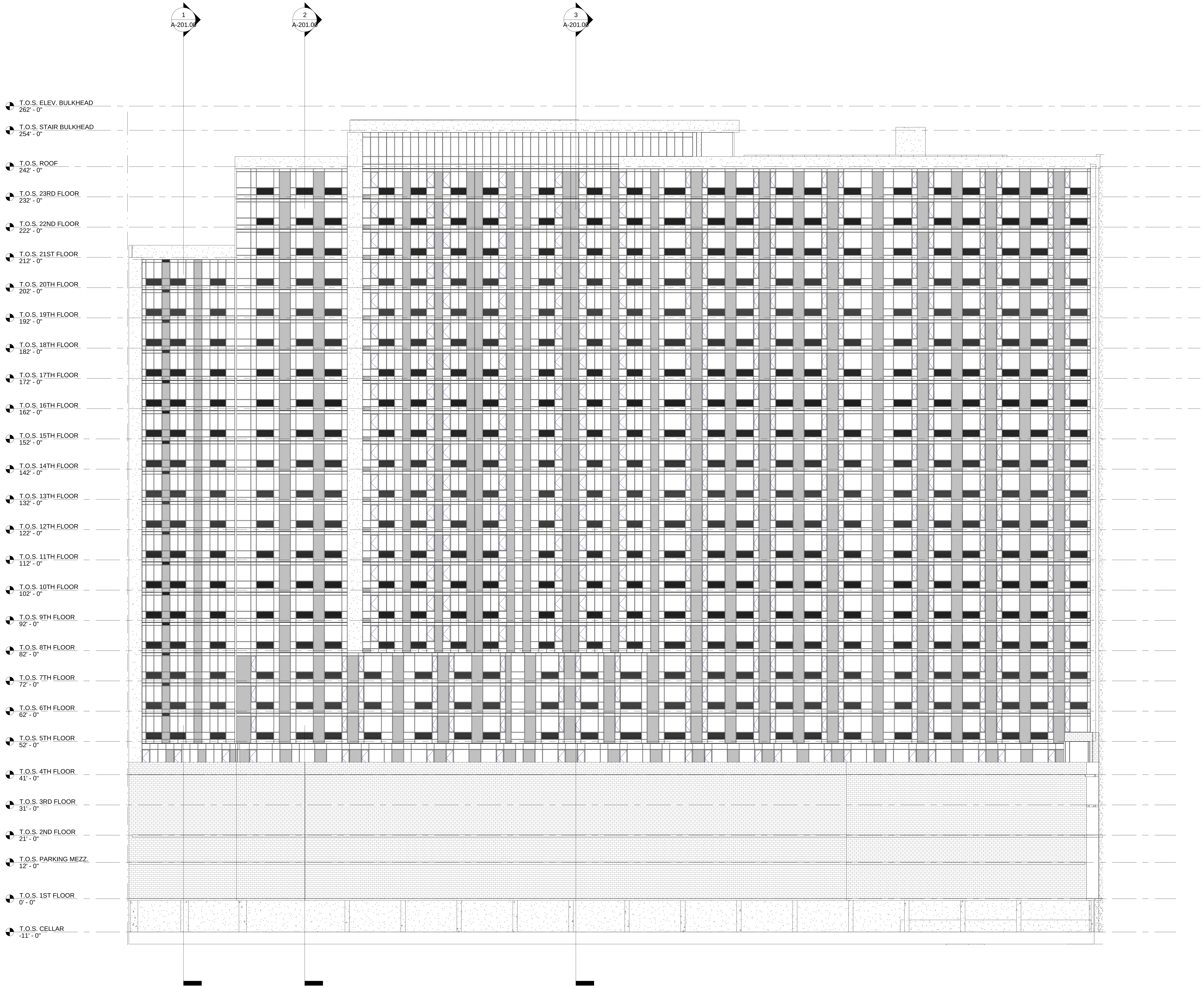
PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
EAST ELEVATION

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-205.00



1 Construction - North 1/16"
1/16" = 1'-0"

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212 352 3099
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JAMAICA 2
147-07 94TH AVENUE
New York, NY
11435

BOROUGH:QUEENS
BLOCK:9998 Lot:25
PROJECT:1734.00

DEVELOPER

STRUCTURAL ENGINEER

MEP/FP ENGINEER

OWNER

ISSUE
DD PROGRESS
11-21-2017

SCALE
1/16" = 1'-0"

10-20-17	100% SD
11-10-17	DD PROGRESS
11-22-17	DD PROGRESS

PROJECT
JAMAICA 2
147-07 94TH AVENUE

DRAWING
NORTH ELEVATION

SEAL AND SIGNATURE

DATE: 11-21-2017
PROJECT NO: 1734.00
DRAWING BY: Author
CHK BY: Checker
DWG NO:

A-206.00

APPENDIX B

METES AND BOUNDS

Schedule 1

Legal Description

ALL that certain plot, piece or parcel of land situate, lying and being in Jamaica in the Borough and County of Queens, City and State of New York, bounded and described as follows:

BEGINNING at a point on the northerly side of 94th Avenue (formerly known as Johnson Avenue) distant 60.97 feet easterly from the corner formed by the intersection of the northerly side of 94th Avenue with the easterly side of Sutphin Boulevard (as widened);

THENCE easterly along the northerly side of 94th Avenue, a distance of 328.25 feet to the easterly line of Lot 30 on a certain map entitled, "Map of Talfourd Lawn in Jamaica, Long Island, surveyed April, 1870 by E.W. Conklin filed July 11, 1871 as Map No. 460;

THENCE northerly at right angles to the northerly side of 94th Avenue and along the easterly line of said Lot 30, a distance of 93.07 feet;

THENCE westerly and parallel with the northerly side of 94th Avenue, 35.03 feet;

THENCE northerly at right angles to the preceding course, 7.01 feet to the southerly side of Lot 27 as laid out on the above mentioned map;

THENCE westerly at right angles to the preceding course and along the southerly line of Lot 27 a distance of 15.01 feet to the westerly line of said lot;

THENCE northerly at right angles to the preceding course and along the westerly side of said Lot 27, a distance of 13.21 feet;

THENCE westerly parallel with the northerly side of 94th Avenue and distant 113.29 feet northerly therefrom when measured at right angles to said Avenue, a distance of 107.41 feet;

THENCE South 11 degrees 25' 00" East .09 feet;

THENCE South 73 degrees 03' 30" West 159.84 feet;

THENCE South 11 degrees 25' 00" East along a line which is the prolongation in a southerly direction of the east side of the bridge abutment of the Long Island Railroad bridge over Guilford Street 113.73 feet to the northerly side of 94th Avenue, at the point or place of BEGINNING.

APPENDIX C

PREVIOUS ENVIRONMENTAL REPORTS

SUBSOIL
INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.

3770 MERRICK ROAD • SEAFORD, L. I., NEW YORK 11783
(516) 221-2333 • FAX (516) 221-0254

March 4, 2016

Artimus
315 West 118th Street
New York, NY 10026
Att: Evan Kashanian

Re: 147-07 94th Avenue
Jamaica, NY
Our Job #16-060

Gentlemen:

Forwarded herewith are the boring logs for drilling work completed recently at the above referenced site.

The purpose of the subsurface investigation was to determine the nature and extent of the underlying soil deposits and determine the structural engineering characteristics of the soil at the site. Two (2) test borings were drilled, one boring to a depth of 60 feet and one boring to a depth of 100 feet, using truck mounted drilling equipment at the above referenced site at the locations shown on our Boring Location Plan. The borings were advanced using hollow stem auger casing. A 2" diameter, 2'0" long split spoon sampler was advanced into the subsurface by the use of a CME automatic 140 lb. trip hammer with a 30" drop. From the drops of the hammer, blow counts required to advance the split spoon sampler over each 6" interval were recorded and is shown on the boring logs. Continuous split spoon samples were taken for the top 6-8 feet then every 5 feet thereafter to the final depths. A written description of the recovered soil sample per our geologist's visual identification of same is also presented on the logs.

The CME automatic hammer operates with an efficiency of approximately 90%. The original conventional use of rope, cathead and drop weight, on the other hand, operates with an efficiency of approximately 60%. As a consequence, the standard penetration test results obtained using the CME auto-hammer are on the order of two-thirds the value that would have been obtained had the original rope and cathead method been used. This is significant if you are using design charts for soil strength parameters based on historical data associated with the rope and cathead method. If so, you should adjust our data accordingly.

Our investigation revealed that the areas drilled are blanketed by 3-6 feet of asphalt, concrete and soil fill, underlain, generally, by a moderately dense to dense coarse to fine sand formation with traces of silt and gravel extending to the deepest depths drilled. A layer between 33-38 feet revealed higher percentages of silt.

SOIL MECHANICS DRILLING CORP.
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(516) 221-2333 • FAX (516) 221-0254

Natural ground water was encountered within the boreholes at depths of 22'5" and 20'9" below existing grade at the time the work was done.

The natural soil below the fill will satisfactorily support 2 tons per square foot and exhibit excellent drainage characteristics.

Liquefaction is not a design factor.

For seismic purposes the site is classified as Site Class "D" per the New York City Building Code. Table 1613.5.3(1) has a Site coefficient F_a as a function of site class and mapped spectral response acceleration at short periods $(S_S)^a$ is 1.51. Table 1613.5.3(2) has a Site Coefficient F_v as a function of site class and mapped spectral response acceleration at 1-second period $(S_1)^a$ is 2.4.

Frost penetration in this area is 4 feet. All exterior foundations must have a minimum of 4 foot of cover.

This report is a preliminary report. Please advise if and when production borings are to be performed. If that is undertaken, we will provide the TR-1 and TR-4 forms for filing with the Building Department.

Soil samples recovered during drilling operations will be stored in our lab for a period of 30 days after which they will be destroyed. During this period we will deliver these samples to any prescribed location upon request.

If after you examine the enclosed you have any further questions, please feel free to call and discuss them with us.

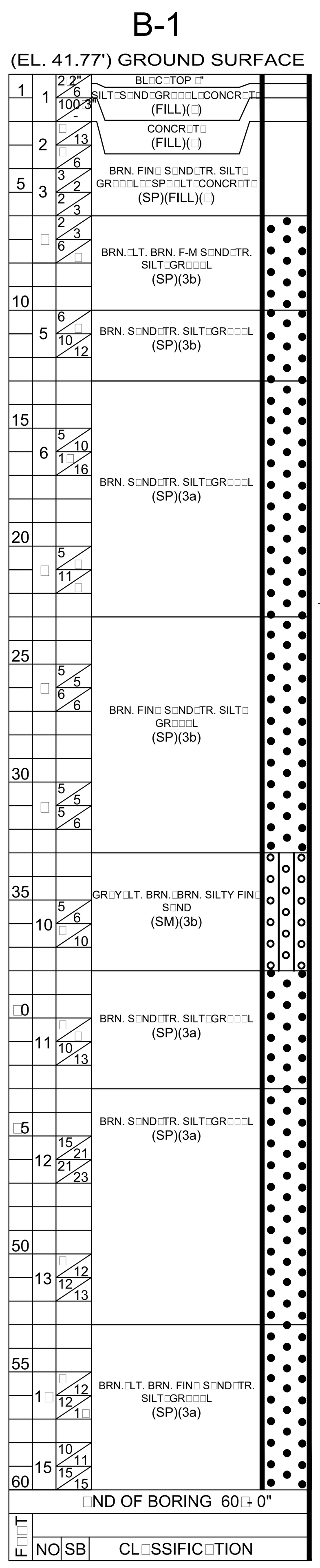
Billing is enclosed.

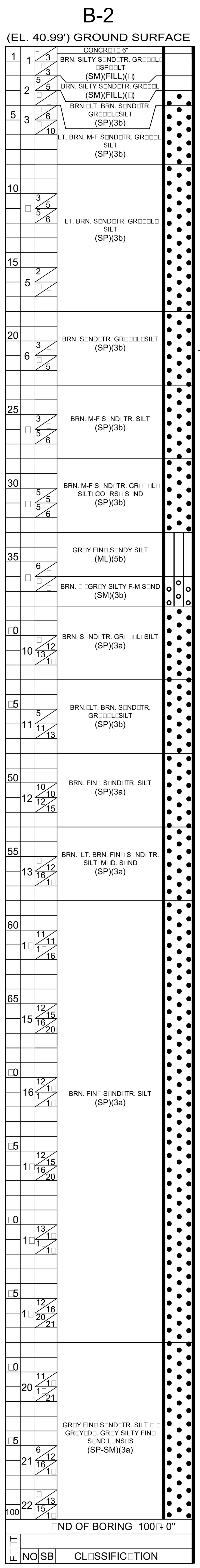
Very truly yours,

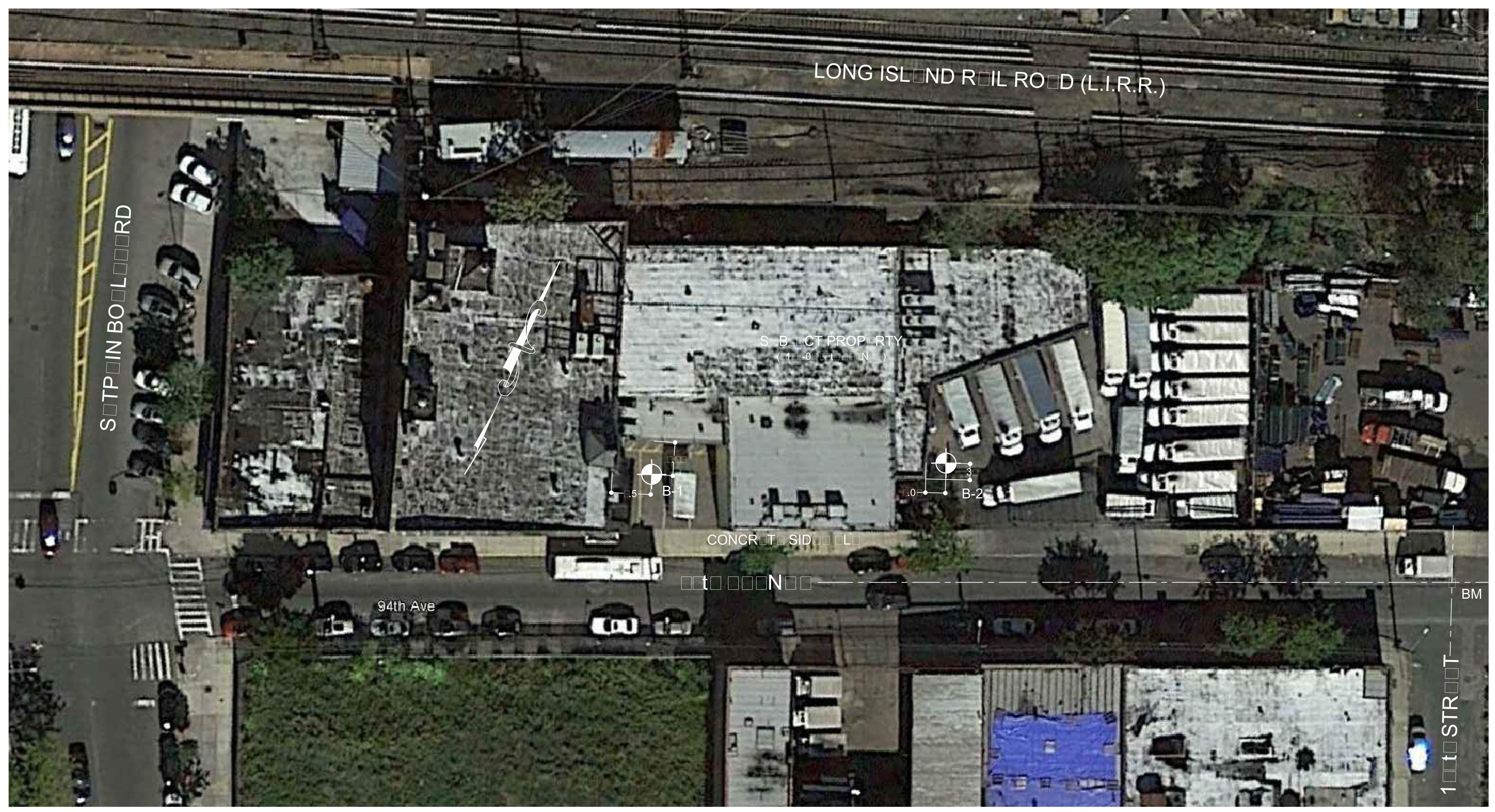
SOIL MECHANICS DRILLING CORP.

Carl Vernick, P.E.
President

CV:mlf
Encls.







BORING LOCATION PLAN
SCALE: N.T.S.

UNIFIED SOIL CLASSIFICATION

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
GW	WELL GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES. LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURE
GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURE
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND - SILT MIXTURES
SC	CLAYEY SANDS, SAND - CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS SANDY CLAYS, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES, N.Y.C. BLDG. CODE TABLE 1806.1

CLASS OF MATERIALS (Notes 1 & 3)	MAXIMUM ALLOWABLE FOUNDATION PRESSURE (TSF)	MAXIMUM ALLOWABLE FOUNDATION PRESSURE (kPa)
1. BEDROCK (NOTES 2 & 4)		
1a HARD SOUND ROCK - GNEISS, DIABASE, SCHIST	60	5746
1b MEDIUM HARD ROCK - MARBLE, SERPENTINE	40	3830
1c INTERMEDIATE ROCK - SHALE, SANDSTONE	20	1915
1d SOFT ROCK - WEATHERED ROCK	8	766
2. SANDY GRAVEL & GRAVEL (GW, GP) (NOTES 3 & 4)		
2a DENSE	10	958
2b MEDIUM	6	575
3. GRANULAR SOILS (GC, GM, SW, SP, SM, & SC)(NOTES 4, 5 & 7)		
3a DENSE	6	575
3b MEDIUM	3	287
4. CLAYS (SC, CL & CH)(NOTES 4, 6 & 7)		
4a HARD	5	479
4b STIFF	3	287
4c MEDIUM	2	192
5. SILTS & SILTY SOILS (ML & MH)(NOTES 4 & 7)		
5a DENSE	3	287
5b MEDIUM	1.5	144
6. ORGANIC SILTS, ORGANIC CLAYS, PEATS, SOFT CLAYS, LOOSE GRANULAR SOILS & VARVED SILTS	SEE 1804.2.1	SEE 1804.2.1
7. CONTROLLED & UNCONTROLLED FILLS	SEE 1804.2.2 OR 1804.2.3	SEE 1804.2.2 OR 1804.2.3

REFER TO SECTION 1804.2 OR NOTES FOLLOWING TABLE 1806.1 IN THE N.Y.C. BUILDING CODE FOR ADDITIONAL INFORMATION.

COMPACTION RELATED TO SPOON BLOWS PER FOOT

SAND & SILT		CLAY	
LOOSE	LESS THAN 10	SOFT	LESS THAN 4
MEDIUM	10 TO 30	MEDIUM	4 TO 8
DENSE	GREATER THAN 30	STIFF	GREATER THAN 8 TO 30
		HARD	GREATER THAN 30

" N " — STANDARD PENETRATION TEST - ASTM D 1586 (2" SPOON, 140lb HAMMER, 30" FALL)

N = 18 BLOWS PER FOOT — SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 24" DRIVE TO OBTAIN BLOWS PER FOOT (N) ADD THE 2ND & 3RD 6" INCREMENT

	ROTARY CASING	AUTO HAMMER CASING	SAMPLE SPOON
SIZE, INCHES	2.5		2.0
HAMMER WEIGHT, POUNDS			140
HAMMER FALL, INCHES			30

CB - CASING BLOWS PER 1 FOOT DRIVE
SB - SPOON BLOWS PER 6 INCH DRIVE
P - PUSHED BY WEIGHT OF HAMMER
WOR - WEIGHT OF ROD
UD - UNDISTURBED SOIL SAMPLE
NO - SAMPLE NUMBER
FEET - DEPTH FROM GND. SUR. NOTED AT EACH 5'
WOH - WEIGHT OF HAMMER (INCLUDES ROD)

THE LIABILITY OF SOIL MECHANICS DRILLING CORP., ITS OFFICERS OR EMPLOYEES, FOR ERRORS, OMISSIONS OR NEGLIGENCE RESULTING IN PERSONAL INJURIES, PROPERTY DAMAGE OR ANY CONSEQUENTIAL DAMAGES, IS LIMITED TO THE AMOUNT OF THE FEE PAID FOR THIS REPORT. THE RETENTION OR USE OF ANY PART OF THIS REPORT WILL CONSTITUTE AN ACCEPTANCE OF THIS LIMITED LIABILITY. IF THIS IS UNACCEPTABLE, THE CLIENT MUST NOTIFY SOIL MECHANICS DRILLING CORP. IN WRITING BY CERTIFIED MAIL WITHIN SEVEN DAYS FROM THE DATE OF RECEIPT. THE FEE CHARGED FOR THIS REPORT IS BASED ON THIS LIMITATION OF LIABILITY WHICH IS THE ESSENCE OF THIS AGREEMENT. IF THE CLIENT WANTS A HIGHER LIMITATION OF LIABILITY, SOIL MECHANICS DRILLING CORP. WILL NEGOTIATE ONE BASED UPON A HIGHER FEE BEING CHARGED FOR THE ADDITIONAL ASSUMPTION OF LIABILITY. SOIL MECHANICS DRILLING CORP., ITS OFFICERS OR EMPLOYEES, ASSUME NO LIABILITY OR RESPONSIBILITY TO PERSONS OTHER THAN THE CLIENT FOR WHOM THIS REPORT WAS PREPARED. ANYONE, OTHER THAN OUR CLIENT, RELIES ON THIS REPORT AT THEIR OWN RISK.

NOTES:

1. - SOIL DESCRIPTIONS ARE BY VISUAL EXAMINATION OF SOIL SAMPLES RECOVERED DURING DRILLING OPERATIONS.
2. - SOIL DESCRIPTIONS ARE IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.
3. - GROUND WATER WAS MEASURED INSIDE THE DRILL CASING AT THE COMPLETION OF EACH BOREHOLE.
4. - SOIL STRATIFICATIONS ARE ACCURATE TO WITHIN TWO FEET VERTICALLY.
5. - ELEVATIONS WERE REFERENCED TO B.M. - AT CENTERLINE OF ROADWAYS AS SHOWN. ACTUAL ELEVATION GIVEN 3?.13' REFERENCED FROM QUEENS TOPOGRAPHIC MAP SECTION ?12 CORRECTED TO NAVD88 DATUM.
6. - SOIL SAMPLES WERE OBTAINED USING A CENTRAL MINE EQUIPMENT (CME) AUTOMATIC TRIP HAMMER.
7. - BORINGS DRILLED ARE IN ACCORDANCE WITH THE NEW YORK CITY BUILDING CODE REQUIREMENTS.

SOIL MECHANICS DRILLING CORP.
subsoil investigations
3770 MERRICK ROAD * SEAFORD, NEW YORK 11783 * 516 - 221-2333

#147-07 94th AVENUE
-SUBSURFACE INVESTIGATION-
JAMAICA, NEW YORK

VERTICAL BORING SCALE: 1/4"=1'-0"	DRAWING DATE MARCH 4, 2016		DRAWING NUMBER 16L060-2 SHEET 1 OF 1.
DATES OF BORING FEBRUARY 26-29, 2016	DWN. BY: JMR	CKD. BY: CV	

PROJECT
#147-07 94th AVENUE
JAMAICA, NEW YORK

BORING PLAN
(GROUND SURFACE)

SEAL & SIGNATURE:

DATE:	MARCH 2016
PROJECT No:	16L060-2
DRAWING BY:	JMR
CHK BY:	CV
DWG No:	B-001.00
	1 OF 1

AKRF

Environmental, Planning, and Engineering Consultants
440 Park Avenue South
7th Floor
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

October 10, 2017

J2 147-07 94th Avenue LLC
℅ Mr. Evan Kashanian
Artimus Construction, Inc.
316 West 118th Street
New York, New York 10026

Re: Phase I Environmental Site Assessment
147-07 94th Avenue – Queens, New York
AKRF Project Number: 170430

Dear Mr. Kashanian:

AKRF, Inc. is pleased to submit this Phase I Environmental Site Assessment Report for the above-referenced Property. This report includes the findings of a reconnaissance of the Property, an evaluation of readily available historical information and selected environmental databases and electronic records. AKRF, Inc. met the requirements of American Society for Testing and Materials (ASTM) as established by ASTM Standard E1527-13 unless noted otherwise in Section 8.0: “Limitations and Data Gaps”.

We appreciate the opportunity to provide you with our services. If you should have any questions, please do not hesitate to contact us.

Sincerely,

Marcus Simons	Stephen Malinowski, QEP
Senior Vice President	Vice President

Enc.

EXECUTIVE SUMMARY

AKRF, Inc. (AKRF) was retained by J2 147-07 94th Avenue LLC (J2) to perform a Phase I Environmental Site Assessment (ESA) of the property located at 147-07 94th Avenue in the Jamaica section of Queens, New York (the Property), also identified as Queens Tax Block 9998, Lot 25. At the time of the reconnaissance, the approximately 35,000-square foot (SF) Property included three interconnected warehouse buildings, a concrete-paved loading dock, and asphalt-paved parking areas. The warehouse was occupied by cold food storage and a frozen food supplier. The surrounding area was predominantly commercial and industrial. Long Island Rail Road (LIRR) tracks are located north-adjacent. Residential properties are located further to the north and south. A Property location map is provided as Figure 1 and the Property details are shown on Figure 2.

Historically, the Property included low-rise dwellings by 1901. By 1925, the Property was identified as Amour & Co. Beef and Provisions. The Property also included a storage yard for the N.Y. Telephone Co. until approximately 1942. By 1951 and until sometime after 2006, the Property contained a produce warehouse and meat storage facilities. A refrigeration sales and service facility was identified in the eastern portion of the Property between approximately 1967 and 2006.

The objective of this assessment was to identify any potential environmental concerns associated with the site resulting from past or current site usage or usage of neighboring properties.

This Phase I Environmental Site Assessment was performed in conformance with ASTM Standard E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice* which satisfies USEPA's "all appropriate inquiries" (AAI) requirement for landowner liability defenses under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Any exceptions to, or deletions from, the Standard are described in Section 8.0. The term "Recognized Environmental Condition" (REC) means the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. The Standard also includes definitions of Historic REC, Controlled REC and *De Minimis* Condition.

A summary of the assessment findings is presented below:

Recognized Environmental Conditions

- Two closed-in-place 550-gallon underground storage tanks (USTs) formerly used to dispense diesel fuel are reportedly located beneath the asphalt-paved parking lot (see Figure 2). Supporting paperwork provided by the current owner, indicates that the tanks were emptied and the interiors cleaned on May 2, 2014, but no soil sampling was conducted.
- The remnants of a former aboveground storage tank (AST) were observed behind a partially demolished concrete block wall in the basement of 147-07 94th Avenue. The Property superintendent indicated that the AST was emptied and the interior cleaned at the time of the abandonment, but did not have any further information. This tank appears to be the closed-in place 2,000-gallon No. 2 fuel oil AST currently listed in the New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage (PBS) database. During the reconnaissance, no evidence of a leak or spill was observed within the vicinity of the tank.
- The Property was assigned an NYC (E) Designation for hazardous materials, noise, and air in September 2007 as a part of the Downtown Jamaica Redevelopment Plan. This designation requires that a subsurface testing protocol be submitted to, approved by, and completed to the satisfaction of

the NYC Office of Environmental Remediation (OER) before the issuance of any building permits associated with subsurface disturbance. OER will require appropriate remedial measures to be conducted prior to or as part of redevelopment (or renovation) involving subsurface disturbance or changes of the existing buildings to a more sensitive use.

- Historical Sanborn maps and the regulatory database information identified numerous industrial and automotive uses in the surrounding area between 1911 and 2006. Such uses with the potential to affect subsurface conditions beneath the Property included a saw clamps manufacturer, garages and gasoline tanks, a printing facility, filling stations and auto repair shops, Hyman's N.Y. & L.I. Express Inc. Motor Factory, and an air condition manufacturer. Several closed-status spills, some with documented subsurface contamination, were identified for the north-adjacent Long Island Rail Road (LIRR) facility between 1984 and 2005.
- The regulatory database also identified five Resource Conservation and Recovery Act (RCRA) hazardous waste non-generator/historical generators, six historic auto stations, spill listings, and PBS facilities within close proximity to the Property. Potential releases from these sites may have affected subsurface conditions beneath the Property.

Other on-site Environmental Concerns

- Based on the age of the buildings, asbestos containing materials (ACM) may be present. Suspect ACM observed during the reconnaissance included: plaster, sheetrock, joint compound, pipe insulation, electrical panels, caulks, putties, vinyl flooring and mastic, brick and block mortar, and roofing materials.
- Based on the age of the buildings, electrical equipment and lighting fixtures installed prior to 1979 may include polychlorinated biphenyl (PCB)- and/or mercury-containing components.

Recommendations

- The abandoned AST located in the basement of the Property building, should be properly closed and removed in accordance with applicable local, state, and federal regulations. Any evidence of a petroleum spill should be reported to NYSDEC and addressed in accordance with applicable requirements. Following removal, the underlying basement slab should be inspected for potential staining and/or releases from the tank and soil samples from below the slab may need to be collected.
- A subsurface (Phase II) investigation is recommended to determine whether former on- or off-site uses (including those identified as RECs above) have affected soil, soil vapor, and/or groundwater conditions. This investigation should be conducted in accordance with the (E) Designation requirements of OER. The Remedial Investigation should also be conducted to ensure that soil excavation and groundwater dewatering (if required during future construction) are conducted in accordance with applicable regulations, to determine if vapor mitigation is warranted for a new building, and assess whether any other remedial or environmental provisions should be incorporated into the development plan.
- During any subsurface disturbance, surplus excavated soil and debris must be handled and disposed of in accordance with applicable regulatory requirements. If any petroleum underground storage tanks are encountered, they should be closed and removed, along with any contaminated soil, in accordance with applicable requirements. Any evidence of a petroleum spill should be reported to NYSDEC and addressed in accordance with applicable requirements.

- If dewatering is required during potential future construction activities, water must be discharged in accordance with New York City Department of Environmental Protection (NYCDEP) requirements.
- Prior to any renovation or demolition activities with the potential to disturb suspect ACM, an asbestos survey should be conducted to determine whether these materials are ACM. If these materials prove to contain asbestos, they should be properly removed and disposed of in accordance with all state and federal regulations prior to any renovations that would disturb those materials, or building demolition.
- Unless there is labeling or test data that indicates that fluorescent lights and other electrical equipment are not mercury- and/or PCB-containing, if disposal is required, it should be performed in accordance with applicable federal, state and local regulations and guidelines.

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FIGURES

Figure 1 - Property Location
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1.0 INTRODUCTION

AKRF, Inc. (AKRF) was retained by J2 147-07 94th Avenue LLC (J2) to perform a Phase I Environmental Site Assessment (ESA) of the property located at 147-07 94th Avenue in the Jamaica section of Queens, New York (the Property), also identified as Queens Tax Block 9998, Lot 25. At the time of the reconnaissance, the approximately 35,000-square foot (SF) Property included three interconnected warehouse buildings, a concrete-paved loading dock, and asphalt-paved parking areas. The warehouse was occupied by cold food storage and a frozen food supplier. The surrounding area was predominantly commercial and industrial. Long Island Rail Road (LIRR) tracks are located north-adjacent. Residential properties are located further to the north and south. A Property location map is provided as Figure 1 and the Property details are shown on Figure 2.

The scope of services for this assessment was in conformance with ASTM Standard E1527-13 (*Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice)*. Any exceptions to, or deletions from, this practice are described in Section 8.0. The scope included the following:

- Observations of the Property (reconnaissance) to identify potential sources or indications of hazardous substances, including: aboveground storage tanks (ASTs); underground storage tanks (USTs); tank vents and fill ports; transformers and other items that could contain polychlorinated biphenyls (PCBs), drums or areas where hazardous materials were used, stored, or disposed; stained surfaces and soils; stressed vegetation, leaks, odors. In addition, neighboring properties were viewed, but only from public rights-of-way, to identify similar concerns.
- Readily available geological and groundwater (hydrogeological) information was evaluated to assist in determining the potential for contamination migration (including in soil, soil vapor, and/or groundwater) within, from, and onto the Property.
- The reconnaissance of the Property included observation of any readily visible suspect asbestos-containing materials (ACMs). However, no samples were collected or analyzed, and this reconnaissance provides neither definitive nor exhaustive information.
- A state database of county-level radon concentrations was used to determine typical indoor radon levels and compare them to United States Environmental Protection Agency (USEPA) guidelines.
- Historical fire insurance maps for the Property and nearby properties were reviewed to evaluate historical land uses.
- The following federal regulatory databases were reviewed to determine the regulatory status of the Site and properties within the ASTM-specified radii: the National Priority List (NPL); Superfund Enterprise Management System (SEMS), including Superfund Enterprise Management System Archive (SEMS-ARCHIVE); Comprehensive Environmental Response, Compensation, and Liability Information System-No Further Remedial Action Planned (CERCLIS-NFRAP); Corrective Actions Report (CORRACTS); Resource Conservation and Recovery Information System (RCRIS); and Emergency Response Notification System (ERNS). Federal ASTM supplemental records reviewed included: Toxic Chemical Release Inventory System (TRIS); Superfund Consent Decrees (CONSENT); Records of Decision (ROD); National Priority List Deletions (Delisted NPL); and United States Brownfields.
- The state records reviewed included the listings of hazardous material spills (SPILLS); Leaking Underground Storage Tanks (LTANKS); Chemical Bulk Storage (CBS); Solid Waste Facilities (SWF); Petroleum Bulk Storage (PBS); State Inactive Hazardous Waste Disposal Sites (SHWS); Hazardous Substance Waste Disposal Site Inventory (HSWDS); Major Oil Storage Facilities

(MOSF); Environmental Restoration Program (ERP); Voluntary Cleanup Program (VCP); and New York Brownfield Cleanup Program (BCP).

- Local agency reviews including online Buildings and Finance Department records and Environmental Quality Review (CEQR) E Designation Sites were conducted for the Property only.

2.0 PHYSICAL SITE DESCRIPTION

On September 19, 2017, Mr. Stephen Malinowski and Ms. Shira Clement of AKRF conducted a reconnaissance of the Property. Neighboring properties were also viewed from public rights-of-way. Jimmy, the owner’s representative, and Mr. Evan Kashanian, Ms. Julie Trapini, and Mr. Dennis Normile, of Artimus accompanied AKRF and answered pertinent questions. The weather was cloudy and approximately 72 °F, the visibility was good, and the premises were adequately illuminated by natural and artificial light. The Property was inspected for the presence of stained surfaces and soil, stressed vegetation, storage tanks, drums, leaking pipes, transformers, and any other evidence of hazardous material usage and storage on-site. Photographs documenting the inspection are included in Appendix A.

2.1 General Site Conditions

At the time of the reconnaissance, the Property included three interconnected buildings, an asphalt-paved parking lot and a concrete-paved loading dock in the southeastern portion of the Property, and a small asphalt-paved parking lot in the southwestern portion of the Property, on an approximately 35,000-SF tax lot. The buildings varied in height from one- to three-stories and only the westernmost building contained a basement. Interior building materials included vinyl and ceramic floor tiles; brick, carpeted and concrete floors; sheetrock, cinderblock, insulated wall panels, and brick walls; concrete ceilings, insulated ceiling panels and drop ceiling tiles. Interior building materials were noted to be in fair to damaged condition. The building was heated and cooled by a rooftop heating, ventilation, and air conditioning (HVAC) unit.

The basement of the western building was used for storage. This building was serviced by one hydraulic freight elevator and one traction passenger elevator. The mechanical room for the hydraulic elevator was inaccessible at the time of the inspection. An abandoned aboveground storage tank (AST) was observed in the southern portion of the basement. Based on documents received from the Property Owner, the tank was previously cleaned and closed-in place. No staining was observed around the tank but the area was not fully visible. Chemical storage within the basement included compressed gas cylinders of acetylene and small containers (5-gallons or less) of household cleaning supplies and Energex adhesive. Additional small containers were also observed in the basement; however, these containers were unlabeled and in poor condition so that the contents could not be identified. Two uncovered test pits advanced for geotechnical purposes were observed in the northwestern and northeastern portions of the basement. No apparent staining was noted in the soil beneath the floor slab. Floor drains in the basement, with no apparent staining or debris, were reportedly connected to the municipal sewer system. Small areas of shallow standing water were noted in the basement. The second and third floors contained electric and utility meters, office space, a kitchen, packaging and storage. Household chemicals were stored in this area with no apparent staining. Some patching was noted on the floors and walls.

The central and eastern buildings were used for cold food storage (freezer room warehouse), with access to loading docks for shipment of merchandise. A third geotechnical test pit was observed within an office in the eastern building. No staining was noted in the soil beneath the floor slab. Chemicals in these buildings including small containers (less than one gallon) silicone lubricant and AFCO Chlorilizer (surface sanitizer for use in food processing facilities) noted on the first floor. The roof was constructed of built-up roofing material and appeared in fair condition. Some patching was noted on the roof. Abandoned and new HVAC systems were noted on the roof. Few chemicals were observed in unlabeled containers. Slight staining was noted around the container; however, it did not appear to be indicative of a spill.

The parking lots contained dry wells with no apparent staining on the surrounding pavement. Site personnel were unaware if they were actually connected to the municipal sewer system. A concrete patched area was observed under parked cars along the eastern Property boundary. According to the owner's representative, the concrete was put in-place to curtail subsidence in the area and is not associated with historical underground storage tanks (USTs). Small containers (approximately 5 gallons or less) used to store gasoline were noted near the eastern Property boundary. There were no apparent stains visible in the viscidity of the small container storage area.

2.2 Topography and Hydrogeology

Topography at the Property is relatively level. Based on the U.S. Geological Survey, Jamaica, NY Quadrangle (2013) map, the Property is approximately 40 feet above the National Geodetic Vertical Datum of 1988 (an approximation of mean sea level).

Based on information from a previous environmental investigation conducted by AKRF at the south-adjacent property, the water table is estimated to be first encountered at approximately 20 feet below grade and groundwater is assumed to flow in a southerly direction toward Jamaica Bay, approximately 3.7 miles to the south. However, actual groundwater flow may be affected by many factors including underground utilities, subsurface features, seasonal and tidal fluctuations in groundwater levels, precipitation, geology, past pumping and other factors beyond the scope of this study.

2.3 Storage Tanks

2.3.1 Underground Storage Tanks (USTs)

During the site inspection, a concrete patch was observed in the southeastern portion of the Property, indicating the potential presence of former USTs; however, the owner's representative indicated that the concrete was put in-place to curtail subsidence in the area and is not associated with the historic UST(s). Additionally, the owner's representative reported that two 550-gallon diesel fuel USTs were closed in place in the southeastern parking area (see Figure 2). Based on documentation provided by the Property owner, the tanks previously contained No. 2 fuel oil. The contents were reportedly pumped out and subsequently cleaned and filled with concrete slurry. All interconnected lines were disconnected, purged, sealed and/or removed. These tanks are not registered to the Property address on the New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage (PBS) database

Off-site USTs are discussed in Section 5.2.2.

2.3.2 Aboveground Storage Tanks (ASTs)

An AST was observed in the southern portion of the basement. Based on documents received from the Property owner, the tank was previously cleaned out and closed-in place. No staining was observed around the tank; however, the area was not fully visible. No tank piping was observed leading to or from the tank. No evidence of a leak or spill was observed within its vicinity. The Property address is listed in the NYSDEC PBS database with one closed-in place 2,000-gallon No. 2 fuel oil AST (Facility ID 2-612215). The Property superintendent did not have any information regarding the tank; however, based on documentation provided by the current Property owner, the tank contents were pumped out and the tank was subsequently cleaned. The NYSDEC PBS database listing appears to have been updated appropriately to indicate the tank closure.

Off-site ASTs are discussed in Section 5.2.2.

2.4 Polychlorinated Biphenyls (PCBs) and Mercury

Until 1979, polychlorinated biphenyls (PCBs), which provided beneficial insulating properties, were used in a variety of products, in particular electrical equipment such as transformers, capacitors, fluorescent light fixtures, and voltage regulators, but also in hydraulic fluids and some other products such as caulking.

Based on the age of the buildings, electrical equipment (including switchgears), caulk, and lighting fixtures, switches and thermostats may include PCB- or mercury-containing components. No obvious leaks or odors were observed in connection with observed equipment or the lighting fixtures. Hydraulic oil associated with the elevator equipment may contain PCBs, since New York City Buildings Department (DOB) records do not indicate the install date.

2.5 Utilities

Consolidated Edison (Con Ed) provided electricity and natural gas to the Property. The Property was heated via natural gas-fired heaters and rooftop HVAC systems, and connected to New York City municipal water and sewer systems.

2.6 Waste Management and Chemical Handling

Private haulers (Royal Waste Services, Inc.) are responsible for refuse collection and disposal for the Property. No bulk chemical handling activities were observed at the Property and no evidence of current or former bulk chemical storage was noted. Small containers (generally 5 gallons or less) of paints, cleaning fluids, and building materials (i.e., roof cement, enamel, joint compound) were noted in storage areas the Property buildings with no evidence of associated leakage.

2.7 Radon

Radon is a colorless, odorless gas most commonly produced by the radioactive decay of certain rocks. According to a New York State Department of Health database the average level of radon found in basements in Queens County in October 2016 is 1.23 picocuries/liter, below the USEPA recommended action level of 4.0 picocuries/liter.

3.0 ASBESTOS-CONTAINING MATERIALS (ACM)

Asbestos refers to a group of natural minerals that provide good fire resistance and insulation. Asbestos is also commonly found in vinyl flooring, plaster, sheetrock, joint compound, ceiling tiles, roofing materials, gaskets, mastics, caulks and other products. Materials containing more than one percent asbestos are considered asbestos-containing materials (ACM). ACM are classified as either friable (i.e., more readily release fibers, such as most spray-applied fireproofing) or non-friable (such as floor tiles).

Suspect ACM were observed during the reconnaissance and included: plaster, sheetrock, joint compound, pipe insulation, electrical panels, caulks, putties, vinyl flooring and mastic, brick and block mortar, and roofing materials. Suspect ACMs were noted to be in good to damaged condition. ACM may also be present in other locations not readily accessible during the reconnaissance. This reconnaissance did not constitute and cannot substitute for an asbestos survey, which includes comprehensive inspection and material sampling with laboratory testing.

Regulatory requirements for ACM (or suspect ACM until proven not to be ACM) include maintenance requirements and, prior to any renovation or demolition, inspection/sampling by a NYS-certified asbestos inspector to determine if the project will disturb ACM. Any such ACM (and any other ACM subsequently identified) must be removed prior to the renovation or demolition.

4.0 ADJACENT LAND USE

The Property was abutted to the north by Long Island Rail Road (LIRR) train tracks; to the east by a scaffolding sales and installation facility; to the south by 94th Avenue, followed by a vacant lot and a construction site; and to the west by commercial uses. The surrounding area was primarily commercial and industrial, with residential uses in the greater surrounding area to the north and south.

5.0 PROPERTY HISTORY AND RECORDS REVIEW

5.1 Prior Ownership and Usage

5.1.1 Historical Land Use Maps

Historical maps were reviewed for indications of uses (or other evidence) suggesting hazardous materials generation, usage or disposal on or near the Property. Specifically, Sanborn Fire Insurance Maps from 1901, 1911, 1925, 1942, 1951, 1963, 1967, 1981, 1982, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993, 1995, 1996, 1999, 2001, 2002, 2003, 2004, 2005, and 2006 were reviewed and are provided in Appendix B.

1901

The Property comprised seven lots: two vacant and five with small dwellings.

The surrounding blocks were primarily vacant with few small, low-rise dwellings and sheds. Railroad tracks were noted approximately 75 feet north of the Property.

1911

Additional dwellings were noted in the central portion of the Property.

C.W. Cardwell Manufacturing Co. (manufacturer of saw clamps), was noted on the south-adjacent block, approximately 50 feet south of the Property. Additional dwellings were shown on the surrounding blocks.

1925

The lots comprising the Property were consolidated into one contiguous lot. The western portion of the Property was identified as Armour & Co. Beef & Provisions and contained one large structure utilized as a cooler, storage, and loading. An ammonia inlet was noted south-adjacent to the Property building, along 94th Avenue. The remainder of the Property was occupied by a N.Y. Telephone Co. storage yard with no structures.

The south-adjacent block contained a N.Y. Telephone Co. store house and garage with a gasoline tank, and two additional gasoline tanks associated with a dwelling and a private garage. Stores were shown in place of the C.W. Cardwell Manufacturing Co., previously shown on the south-adjacent block. A printing facility was shown on the west-adjacent block. Additional garages with gasoline tanks were located over 300 feet north of the Property.

1942

The Property was no longer identified as N.Y. Telephone Co. A newly depicted storage and attached garage was noted in the eastern portion of the Property. The remainder of the Property appeared similar to the 1925 map.

A filling station and gasoline tanks were noted approximately 300 feet north of the Property. A garage for the N.Y. Telephone Co. with several gasoline tanks was noted approximately 200 feet east of the Property, on the southeast-adjacent block. The former N.Y. Telephone Co. store house and garage was relabeled as a private garage and auto repair on the south-adjacent block. Additional cold storage and produce warehouses were noted on the south-adjacent block, in place of dwellings. The gasoline tank previously noted outside of a private garage was no longer shown on the south-adjacent block. Additional garages with gasoline tanks were noted over 300 feet southwest of the Property on the west-adjacent block.

1951

The store previously noted on the 1942 map was relabeled as wholesale produce. The remainder of the Property appeared similar to the 1942 map.

The surrounding area appeared similar to the 1942 map.

1963

The store in the eastern portion of the Property was relabeled as Merkel Inc. warehouse. No further significant changes were noted from the 1951 map.

An auto repair shop and Hyman's N.Y. & L.I. Express Inc. Motor Factory were noted approximately 170 feet northeast of the Property on the Property block. The former N.Y. Telephone Co. garage on the southeast-adjacent block was relabeled as Falmark Fabrics, Inc. and the gasoline tanks were no longer identified. A toy warehouse was shown in place of the former private garage and auto repair on the south-adjacent block. A filling station was shown approximately 170 feet west of the Property on the west-adjacent block. In the greater surrounding area, a kitchen cabinet manufacturer was noted approximately 300 feet north of the Property, in place of a garage.

1967

The former Merkel Inc. warehouse was relabeled as a refrigeration sales and service facility. The remainder of the Property appeared similar to the 1963 map.

An air condition manufacturer was shown in place of the toy warehouse on the south-adjacent block. No further significant changes were noted from the 1963 map.

1981

A one-story structure of unspecified use (with construction date of 1980) adjoined the meat cutting facility in the western portion of the Property.

An auto repair shop as noted approximately 300 feet north of the Property. Additional auto repair shops were noted over 300 feet northeast of the Property. The surrounding area appeared similar to the 1967 map.

1982

The Property and surrounding area appeared similar to the 1981 map.

1985-1986

The Property appeared similar to the 1982 map.

A filling station was noted on the west-adjacent block. No further significant changes were noted from the 1982 map.

1987-1993

The Property appeared similar to the 1986 map.

The filling station on the west-adjacent block was demolished and the lot was depicted as vacant. No further significant changes were noted from the 1986 map.

1995-1996

The Property appeared similar to the 1993 map.

Hyman's N.Y. & L.I. Express Inc. Motor Factory previously noted on the Property block to the east of the Property was depicted as unspecified manufacturing use. No further significant changes were noted from the 1993 map.

1999

The Property appeared similar to the 1996 map.

An unspecified manufacturing facility replaced the air condition manufacturer previously noted on the south-adjacent block. No further significant changes were noted from the 1996 map.

2001

The Property appeared similar to the 1999 map.

John Krauss Meat Packers formerly noted on the west-adjacent block was shown as a vacant lot. Government offices replaced several warehouses and meat storage facilities on the southwest-adjacent block.

2002-2006

The Property and surrounding area appeared similar to the 2001 map.

Summary

In summary, the Property and surrounding area were developed with small, low-rise dwellings and the LIRR as early as 1901. By 1925, the Property was identified as Amour & Co. Beef and Provisions. The Property was also occupied by a storage yard for the N.Y. Telephone Co. until approximately 1942. Between 1951 and 2006, the Property contained a produce warehouse and meat storage facilities. A refrigeration sales and service facility was identified in the eastern portion of the Property between approximately 1967 and 2006.

Sanborn maps indicated the surrounding area included primarily commercial and industrial uses, with some automotive facilities including:

- An auto repair shop and Hyman's N.Y. & L.I. Express Inc. Motor Factory (later replaced by unspecified manufacturing use) were noted approximately 170 feet northeast of the Property on the Property block (1963 through 2006 Sanborn maps).
- A garage for the N.Y. Telephone Co. with several gasoline tanks located approximately 200 feet east of the Property, on the southeast-adjacent block (1942 through 1951 Sanborn maps).
- C.W. Cardwell Manufacturing Co. (manufacturer of saw clamps) located approximately 50 feet south of the Property on the south-adjacent block (1911 Sanborn map).
- An air conditioner manufacturer and unspecified manufacturing use with a gasoline tank located approximately 50 feet south of the Property on the south-adjacent block (1967 through 2006 Sanborn maps).
- Garages with gasoline tanks noted on the south- and southwest-adjacent blocks (1925-1967 Sanborn maps).
- A printing facility located approximately 290 feet west of the Property on the west-adjacent block (1925 Sanborn map).
- A filling station located approximately 220 feet west of the Property on the west-adjacent block (1985 through 1986 Sanborn maps).

In the greater surrounding area, additional automotive and industrial uses were noted north of the LIRR train tracks between 1925 and 2006, including filling stations, garages with gasoline tanks, auto repair shops, and a kitchen cabinet manufacturer.

5.1.2 Historical Topographic Maps and Aerial Photographs

Since historical fire insurance maps were available for the Property (and surrounding area) and these maps included information relating to land use, aerial photographs would, most likely, not provide additional useful information relevant to the potential for recognized environmental conditions or other environmental concerns. As such, aerial photographs were not reviewed.

5.1.3 Property Tax Files and Zoning Records

Based on information provided by Environmental Data Resources, Inc. of Shelton, CT and New York City's Zoning and Land Use database, the Property is zoned as C6-4 (commercial).

5.1.4 Recorded Land Title Records

Copies of title records were not provided to AKRF for review. A review of computerized New York City Automated City Register Information System (ACRIS) records, which included records of financial transactions involving the Property, identified no environmental liens or use restrictions for the Property. Deed information obtained from the ACRIS files is summarized as follows:

Year	Grantor/Grantee Listed on Deed
1977	Grantor is Kiska Realty Corp.; Grantee is Land & Sea Development Corp.

5.1.5 Local Street Directories

A City Directory prepared by Environmental Data Resource, Inc. was reviewed as part of this Phase I ESA and is provided in Appendix C. The City Directory consisted of the names of businesses located on-site and in adjacent properties, compiled from city and reverse telephone directories, as listed in Table 1.

Table 1. Historical City Directories

Year	Comments
1922	**Site:** Not listed **Surrounding Properties:** Not listed
1934	**Site:** Armour & Co. **Surrounding Properties:** Residential; Commercial
1939	**Site:** Armour & Co. dressed beef **Surrounding Properties:** Residential; Commercial
1945	**Site:** Armour & Co. dressed beef **Surrounding Properties:** Commercial
1950	**Site:** Not listed **Surrounding Properties:** Commercial; ABC Athletic Wear Manufacturing Co. (147-26 94th Avenue)
1962	**Site:** Armour & Co. dressed beef; NY Butchers Dressed Meat Co. **Surrounding Properties:** Commercial
1967	**Site:** Eatwell Provisions Inc.; Met Provisions Inc. **Surrounding Properties:** Commercial
1970	**Site:** Eatwell Provisions Inc. **Surrounding Properties:** Commercial
1976	**Site:** Eatwell Provisions Inc. **Surrounding Properties:** Commercial
1983	**Site:** Not listed **Surrounding Properties:** Commercial
1991	**Site:** Ho Maj Inc.; Queen of the Ocean Inc.; Van Wall Industries Inc. **Surrounding Properties:** Commercial
1996	**Site:** Not listed **Surrounding Properties:** Not listed
2000	**Site:** World Wide Food **Surrounding Properties:** Commercial
2005	**Site:** Atlantic Pork & Provisions Inc.; World Wide Food **Surrounding Properties:** Commercial; Wards Manufacturing Inc. (147-20 94th Avenue)
2010	**Site:** Atlantic Pork & Provisions Inc.; Geisha Seafoods International; MRR Holding Corp.; Olympic Meats Inc.; World Wide Food Products Inc. **Surrounding Properties:** Wards Meat Manufacturing Inc. (147-20 94th Avenue)
2014	**Site:** Atlantic Pork & Provisions Inc.; Crystal Clean Building Maintenance Corp.; Geisha Seafoods International; World Wide Food Products Inc. **Surrounding Properties:** Commercial

Between 1934 and 2014, the Property was identified as various food facilities including Armour & Co., NY Butchers Dressed Meat Co., Eatwell Provisions Inc., Met Provisions Inc., World Wide Food, Atlantic Pork & Provisions Inc., Geisha Seafoods International, and Olympic Meats Inc. The Property was also listed as Van Wall Industries, Inc., MRR Holding Corp., and Crystal Clean Building Maintenance Corp. Based on the historical Sanborn maps, these uses are most likely associated with building maintenance and operations.

A review of historical city directories identified the following industrial, automotive, and dry cleaning facilities in close proximity to the Property:

- ABC Athletic Wear Manufacturing Co., approximately 50 feet south of the Property on the south-adjacent block (1950 Directory).
- Wards Manufacturing Inc., approximately 50 feet south of the Property on the south-adjacent block (2005 and 2010 Directories). This site is also listed on the BCP and PBS databases.

5.2 Regulatory Review

EDR of Shelton, Connecticut, was contracted to obtain information regarding the regulatory status of the Property and the surrounding area. This information included records from databases maintained by the USEPA and New York State Department of Environmental Conservation (NYSDEC). AKRF reviewed these records to identify the use, generation, storage, treatment and/or disposal of hazardous material and chemicals, or releases of such materials which may impact the project site. All applicable regulatory databases meet ASTM guidelines requesting utilization of information within 90 days' receipt from the appropriate agency. Copies of the pertinent sections of the EDR report are included in Appendix D.

5.2.1 Federal

Federal ASTM standard records reviewed included: the National Priority List (NPL); Superfund Enterprise Management System (SEMS), including Superfund Enterprise Management System Archive (SEMS-ARCHIVE); Comprehensive Environmental Response, Compensation, and Liability Information System-No Further Remedial Action Planned (CERCLIS-NFRAP); Corrective Actions Report (CORRACTS); Resource Conservation and Recovery Information System (RCRIS); and Emergency Response Notification System (ERNS).

Federal ASTM supplemental records reviewed included: Toxic Chemical Release Inventory System (TRIS); Superfund Consent Decrees (CONSENT); Records of Decision (ROD); National Priority List Deletions (Delisted NPL); and United States Brownfields.

National Priority List (NPL)

The NPL is the USEPA's database of some of the most serious uncontrolled or abandoned hazardous waste sites identified for probable remedial action under the Superfund Program. NPL sites can pose a significant risk of stigmatizing surrounding properties and thus impacting Property values.

No NPL sites were identified within one-mile of the Property.

Superfund Enterprise Management System (SEMS), including Superfund Enterprise Management System Archive (SEMS-ARCHIVE)

The SEMS (formerly known as CERCLIS) list is a compilation of known and suspected uncontrolled or abandoned hazardous waste sites which are, or were, under investigation by USEPA but have not been elevated to the status of a Superfund (NPL) site. Former CERCLIS sites that have been granted the status of No Further Remedial Action Planned (NFRAP), currently known as Superfund Enterprise Management System Archive (SEMS-ARCHIVE) sites, are also included in this database.

No SEMS or SEMS-ARCHIVE sites were identified with a ½-mile radius of the Property.

Corrective Actions Report (CORRACTS)

The CORRACTS database identifies hazardous waste handlers with RCRA corrective action activity.

No CORRACTS sites were identified within a one-mile radius of the Property.

Resource Conservation and Recovery Information System (RCRIS)

This database lists sites that have filed notification forms regarding hazardous waste activity, including: treatment, storage and disposal facilities (TSDs); conditionally exempt small quantity generators (CESQG), small quantity generators (SQG), and large quantity generators (LQG); and transporters regulated under RCRA.

The Property was not listed on any of the RCRIS databases.

No TSD facilities were identified within a ½-mile radius of the Property.

Five LQG facilities, three CESQG facilities, and 25 non-generators were identified within a ⅛-mile radius of the Property. The following off-site listings indicate some limited potential to have affected subsurface conditions beneath the Property:

- Jamaica 94th Avenue located 147-20 94th Avenue, approximately 50 feet south of the Property, was listed as a LQG of silver (D011) in 2016. No violations were reported.
- JFK Center Associates located at 94-19 Sutphin Boulevard, approximately 60 feet south of the Property, was listed as a LQG of ignitable waste (D001) in 2007. No violations were reported.
- Tri-Bro Auto Service Inc. located at 93-50 Sutphin Boulevard, approximately 120 feet west of the Property, was listed as a Non-Generator and historical SQG of ignitable waste (D001). No violations were reported.
- Air Train Station located at 93-40 Sutphin Boulevard, approximately 120 feet northwest of the Property, was listed as a CESQG of ignitable waste (D001), corrosive waste (D002), and benzene (D018). No violations were reported.
- The LIRR Jamaica Station located at 93-02 Sutphin Boulevard, approximately 340 feet west-northwest of the Property, was listed as a LQG in 2002, 2004, 2006, and 2007 of corrosive waste (D002), Silver (D011), undefined waste (D000), and lead (D008). No violations were reported.

Based on their location and/or listing details, the remaining facilities are not likely to have affected the Property subsurface.

Details of the listings are included in Appendix D.

Emergency Response Notification System (ERNS)

This federal database, compiled by the Emergency Response Notification System, records and stores information on certain reported releases of petroleum and other potentially hazardous substances.

The Property was not listed in the ERNS database.

Toxic Chemical Release Inventory System (TRIS)

The TRIS contains information reported by a variety of industries on their annual estimated releases of certain chemicals.

One TRIS site was identified within a ⅛-mile radius of the Property. Based on distance from the Property and inferred groundwater flow direction, this listing is not likely to have affected the property subsurface.

Superfund Consent Decrees (CONSENT)

Superfund consent decrees are major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. These decrees are periodically released by the United States District Courts after settlement by parties to litigation matters.

No CONSENT sites were identified within a one-mile radius of the Property.

Records of Decision (ROD)

ROD documents mandate permanent remedies at NPL sites, and contain technical and health information to aid in the cleanup.

No ROD sites were identified within a one-mile radius of the Property.

National Priority List Deletions (Delisted NPL)

This database described former NPL sites that are removed from the NPL list by the US EPA. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establish the criteria used by the EPA to delist sites where no further federal response is needed.

No delisted NPL sites were identified within a one-mile radius of the Property.

US Brownfields

The US Brownfields program is for properties that report cleanups to the EPA and are served by Brownfields grant programs.

One US Brownfields site was identified within a ½-mile radius of the Property, due to distance and direction from the Property this listing is not likely to have affected the property subsurface.

EDR US Historic Auto Station Listings

The EDR US Historic Auto Station database was researched to identify listings for the Property and within a ⅛-mile radius of the Property. This database lists properties that might include gas/filling station establishments based on EDR's search of select national business directories.

Seventeen historic auto stations were identified within a ⅛-mile radius of the Property. The following off-site listings have some potential to have affected subsurface conditions beneath the Property:

- Queens Village Car Service (automotive services) located at 93-43 Sutphin Boulevard, approximately 30 feet west-southwest of the Property on the Property block, between 2012 and 2014.
- Tri-Bro Auto Service located at 93-50 Sutphin Boulevard, approximately 120 feet west of the Property, was listed as Tri-Bro Auto Services Inc. and Barone Bros (gasoline service station) between 1969 and 1997.
- Standalone Customers Inc. (engine repair) located at 148-08 94th Avenue, approximately 170 feet east of the Property in 2013.

- Douglas M Taylor Inc. (general automotive repair) located at 94-06 Sutphin Boulevard, approximately 190 feet southwest of the property between 1980 and 1983.
- Powerline Auto Repair (general automotive repair) located at 147-32 Archer Avenue, approximately 270 feet north of the Property between 1998 and 2003.
- Duke T Auto Repair located at 147-22 Archer Avenue, approximately 300 feet north of the property, was listed as Duke T Auto Repair, Duke T Auto Repair Corp., Kalli Auto Repair, R & G Auto Repair Inc, S & K Auto Repair Inc., Medallion Cab Shifting (general automotive repair) between 1988 and 2005.

Based on distance from the Property and inferred groundwater flow direction, the remaining listings are not anticipated to have affected subsurface conditions at the Property.

Details of the listings are included in Appendix D.

5.2.2 State

The state records reviewed included the listings of hazardous material spills (SPILLS); Leaking Underground Storage Tanks (LTANKS); Chemical Bulk Storage (CBS); Solid Waste Facilities (SWF); Petroleum Bulk Storage (PBS); State Inactive Hazardous Waste Disposal Sites (SHWS); Hazardous Substance Waste Disposal Site Inventory (HSWDS); Major Oil Storage Facilities (MOSF); Environmental Restoration Program (ERP); Voluntary Cleanup Program (VCP); and New York Brownfield Cleanup Program (BCP).

New York State Spills Information Database (NY Spills)/Leaking Underground Storage Tanks (LTANKS)

This database includes releases reported to the NYSDEC, including tank test failures (for USTs only) and tank failures.

The Property was not listed on the NY Spills or LTANKS databases. Three hundred and nineteen spills were reported on surrounding properties within a ½-mile radius of the Property. Based on listing details, including nature of the spills, distance from the Property, and/or inferred groundwater flow direction, the following off-site listings have some potential to have affected subsurface conditions beneath the Property.

- Several closed-status spills were reported for the north-adjacent LIRR facility between 1984 and 2005. Most of the spills were related to hydraulic oil leaking onto the railroad tracks or ballasts. Some of the spill listings noted that ballasts had been contaminated with historical leaks from trains and were subsequently stockpiled on-site for future off-site disposal. The spill listings noted that this was common practice for contaminated ballasts.
- Spill No. 0650386 was reported in June 1994 at the LIRR Jamaica Station, located approximately 120 feet northwest of the Property. According to the spill listing, two 20,000-gallon No. 2 fuel oil USTs were abandoned in place in 1997. Groundwater was encountered at approximately 20 feet below grade and was observed to flow in a southwesterly direction. Low concentrations of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were detected in groundwater samples during a 2012 quarterly groundwater sampling event. Historical data indicated that elevated levels of petroleum-related VOCs were detected in soil; however, non-

aqueous phase liquid (NAPL) was not detected during previous investigations. Additional groundwater and soil sampling continued through 2015. Groundwater laboratory analytical results reportedly all met the NYSDEC Technical & Operational Guidance Series (TOGS) groundwater standards. Soil laboratory analytical results reportedly met the Final Commissioner Policy-51 (CP-51) concentrations, the Unrestricted Use Soil Cleanup Objectives, and the Restricted Residential Soil Cleanup Objectives. Based on the laboratory data and that the contaminated soil around the tanks was removed, NYSDEC closed the spill in 2015, concluding that any residual contamination would not be a threat to the public nor the environment.

- Spill No. 9907900 was reported in September 1999 at Tri-Bro Auto Service Inc., located approximately 120 feet west of the Property. According to the spill listing, the Port Authority was involved with the clean-up of the spill and the site was remediated according to the LIRR. Ten 550-gallon tanks were removed in 1999. No further pertinent information was provided. The spill was closed in December 2004.

Details from all spills are included in Appendix D.

Chemical Bulk Storage (CBS) Database

The New York CBS is a list of facilities that store regulated non-petroleum substances in aboveground tanks with capacities greater than 185 gallons and/or in underground tanks of any size.

One CBS facility, Atlas Transit Mix, was identified within a ⅛-mile radius of the Property. The facility status was listed as unregulated/closed with no further pertinent information provided. Based on the listing details and inferred groundwater flow direction, this listing is not likely to have affected the Property subsurface.

Solid Waste Facilities/Landfill Sites (SWF/LF)

The SWF/LF database is a comprehensive listing of state permitted/recorded solid waste management facilities including certain landfills, incinerators, transfer stations, recycling centers, and other sites which manage solid waste.

Twelve SWF/LF sites were identified within a ½-mile radius of the Property. Based on their distance from the Property (over 700 feet away) and inferred groundwater flow direction, these listings are not likely to have affected the Property subsurface.

Petroleum Bulk Storage (PBS) Database

This database lists facilities that registered having either aboveground or underground petroleum tanks with total storage exceeding 1,100 gallons. Facilities with more than 400,000 gallons appear on the Major Oil Storage Facilities (MOSF) database (see below).

The Property address is listed in the PBS database with one closed-in place 2,000-gallon No. 2 fuel oil AST. Eighteen PBS facilities were identified within a ⅛-mile radius of the Property. Details of nearby facilities are summarized in Table 1.

Table 1
Petroleum Bulk Storage Facility Data

Location	Capacity (gallons)/Type	Product Stored	Status	Approximate Distance/Direction from Site
Warehouse 94-01 Sutphin Boulevard Jamaica, NY	5,000 AST	No. 6 Fuel Oil	Tank Converted to Non-Regulated Use	50 feet south
94th Avenue Jamaica, LLC 147-20 94th Avenue Jamaica, NY	550 UST x5 275 UST x2	Unspecified	Closed- Removed	50 feet south
Tri- Bro Auto Service Inc. 93-50 Sutphin Boulevard Jamaica, NY	550 UST x 9	Gasoline	Closed-Removed	120 feet west
Sanford Equity 148-23 94th Avenue Jamaica, NY	550 UST x5	Diesel	Close- Prior to Micro Conversion	150 feet northeast
Chemical Bank 93-01 Sutphin Boulevard Jamaica, NY	3,510 AST	No. 2 Fuel Oil	In Service	300 feet north
Atlas Concrete 95-11 147th Place Jamaica, NY	1,080 UST 550 UST 4,000 UST 275 AST	Diesel Gasoline Diesel Waste oil/Used oil	Closed In-Place Closed In-Place In Service Closed-Removed	310 feet south
Notes: UST – underground storage tank AST – aboveground storage tank				

A spill was also listed for Tri-Bro Auto Service Inc. The spill listing indicated that the site was remediated and ten 550-gallon tanks were removed in 1999.

Based on listing details, distance from the Property, and/or inferred groundwater flow direction, the remaining PBS listings are not likely to have affected the Property subsurface.

Details of all PBS listings are included in Appendix D.

State Inactive Hazardous Waste Disposal Site Registry (SHWS)

This program, also known as State Superfund, lists information regarding a variety of sites likely requiring cleanup.

Three SHWS sites were identified within a one-mile radius of the Property. Based on the distances from the Property (over 1,200 feet away), these facilities are not anticipated to have affected the Property subsurface.

Details of the SHWS listing are included in Appendix D.

Hazardous Substance Waste Disposal Site Inventory (HSWDS)

The list includes any known or suspected hazardous substance waste disposal sites. Also included are sites delisted from the Registry of Inactive Hazardous Waste Disposal Sites and non-Registry sites that USEPA Preliminary Assessment (PA) reports or Site Investigation (SI) reports were prepared. Hazardous Substance Waste Disposal Sites are eligible to be Superfund sites.

No HSWDS site was identified within a ½-mile radius of the Property.

Major Oil Storage Facilities (MOSF) Database

These facilities have petroleum storage of 400,000 gallons or more.

No MOSF facilities were identified within a ⅛-mile radius of the Property.

Environmental Restoration Program (ERP)

These sites (which are generally municipally-owned) are receiving New York State funding for site investigation and remediation. Some sites in this program have known contamination, whereas others have not had sufficient investigation to determine whether contamination is present.

No ERP sites were identified within a ½-mile radius of the Property.

Voluntary Cleanup Program (VCP)

The VCP is a NYSDEC program for investigation and remediation of (generally) privately-owned sites. Some sites in this program have known contamination, whereas others have not had sufficient investigation to determine whether–contamination is present.

One VCP site was identified within a ½ -mile radius of the Property. Jamaica Light and Gas located at Beaver Road and 158th Street, approximately 1,250 feet east-northeast of the Property was identified as a former manufactured gas plant for 25 years. On-site soil was reportedly contaminated with coal tar and polycyclic aromatic hydrocarbons (PAHs). Based on its distance from the Property, inferred groundwater flow direction, and listing details, the facility is not anticipated to have affected the Property subsurface.

Brownfield Cleanup Program (BCP)

The BCP is a NYSDEC program is the successor to the VCP. Some sites have known contamination, whereas others have not had sufficient investigation to determine whether contamination is present.

Five BCP sites were identified within a ½-mile radius of the Property.

- Jamaica 94th Avenue, located approximately 50 feet south of the Property on the south-adjacent block, was remediated under the BCP in 2016. NYSDEC issued the Certificate of Completion (COC) in December 2016. The database listing indicated that remedial actions have been completed and potential exposures to site-related contaminants have been eliminated.
- The Crossing at Jamaica Station, located approximately 300 feet north of the Property, is currently undergoing remediation under the BCP. Based on its distance from the Property, inferred groundwater flow direction, and/or database listing details, this facility and the remaining facilities are not anticipated to have affected the Property subsurface.

5.2.3 Local Agency File Review

Records available online from the New York City Buildings and Finance Departments were viewed for the Property. Since the records typically address a multitude of issues, the review focused on items likely to relate to the potential presence of hazardous materials, e.g., petroleum tank installation applications and permits, and records indicating prior uses. Copies of pertinent information are included in Appendix E.

NYC Buildings Department (DOB)

DOB records were generally consistent with the historical information detailed in the Sanborn maps, reviewed in Section 5.1.1. Computerized records identified the following:

- A 2002 Certificate of Occupancy (C of O) for a three-story manufacturing structure with boiler room and storage in the cellar, wholesale establishments, accessory offices, storage, and loading on the first floor, accessory offices, storage and cooking on the second floor, and office and storage space on the third floor. An exterior yard was utilized for parking and loading.
- Work permits issued between 1990 and 2000 for various construction activities including structural work, plumbing improvements, and interior renovations.
- Dismissed DOB violations issued between 1982 and 2012 related to a boiler and an elevator. No further details were provided.
- Two dismissed DOB violations issued in 1992 and 2001 related to construction activities.
- Department of finance classification E1 (warehouse).

No pertinent environmental records were identified in the NYCDOB electronic files.

Department of City Planning

A search of NYC Environmental Quality Review Requirements (CEQR) data by EDR indicated that 84 sites within a ⅛-mile radius of the Property were assigned an (E) designation. The Property was assigned an (E) Designation for hazardous materials, noise, and air, as part of the Downtown Jamaica Redevelopment Plan (E-175) in September 2007.

New York City Department of Environmental Protection (NYCDEP)

AKRF sent a FOIL request to the NYCDEP on September 28, 2017 pertaining to environmental records. As of the date of this report, NYCDEP has not responded to the records request. If issues of potential concern are noted upon receipt of this information, an addendum to this report will be created to discuss relevant findings.

New York City Department of Health and Mental Hygiene (NYCDOHMH)

AKRF sent a FOIL request to the NYCDOHMH on September 28, 2017 pertaining to environmental records. As of the date of this report, the NYCDOHMH has not responded to the records request. If issues of potential concern are noted upon receipt of this information, an addendum to this report will be created to discuss relevant findings.

5.2.4 Additional Environmental Record Sources

To enhance the search, ASTM requires that additional local records be reviewed (i.e., beyond those included as part of the standard database search or checked online) when, in judgment of the environmental professional, such records for the Property or any adjoining property would be reasonably ascertainable; and useful, accurate and complete in light of the objective of the records review. These records include:

- Local brownfields lists
- Local lists of landfill/solid waste disposal sites

- Local lists of hazardous waste/contaminated Sites
- Local lists of registered tanks
- Local land records (for activity use limitations)
- Records of emergency release reports
- Records of contaminated public wells

Sources for these records include:

- Local/Regional Water Quality Agency
- Local Electric Utility (for PCB records)

In addition to the Local Agency File Review, AKRF sent a FOIL request to NYSDEC Region 2 on September 28, 2017 for the Property to determine whether pertinent environmental records for the Property could be obtained for further review. As of the date of this report, NYSDEC has not responded to the records request. If issues of potential concern are noted upon receipt of this information, an addendum to this report will be created to discuss relevant findings.

AKRF sent a FOIL request to the New York State Department of Health (NYSDOH) on September 28, 2017 for the Property to determine whether pertinent environmental records for the Property could be obtained for further review. As of the date of this report, NYSDOH has not responded to the records request. If issues of potential concern are noted upon receipt of this information, an addendum to this report will be created to discuss relevant findings.

On September 29, 2017 AKRF reviewed USEPA's computerized database for any environmental records for the Property. The Property was not identified in the USEPA's computerized database.

In AKRF's judgment, no other local records meeting the ASTM criteria are pertinent for the Property.

6.0 USER-PROVIDED INFORMATION

In preparing this Phase I ESA, AKRF requested that the client provide any pertinent information regarding the Property, specifically:

- The reason for performing the Phase I ESA;
- Whether they were aware of any pertinent current or historic activities at or near the Property, including but not limited to: hazardous substances or petroleum, waste management practices, filling or disposal drains, septic/sewer systems, and potable and non-potable wells;
- Owner and occupant information and whether they were aware of any previous Phase I ESAs or other potentially pertinent reports, plans or information;
- Whether any *environmental liens* or *activity and land use limitations* are in place or filed or recorded against the Property or whether there was pending, threatened, ongoing or past violations, litigation or enforcement action relevant to hazardous substances or petroleum products;
- Whether they had any specialized knowledge or experience related to the Property or nearby properties (e.g., specialized knowledge of the chemicals used by this type of business);

- Whether the (anticipated) purchase price reflects that the Property is or could be contaminated; and
- Whether they were aware of commonly known or reasonably ascertainable information about environmental conditions of the Property including current/past uses of the Property and adjacent properties.

The Phase I ESA was conducted as part of due-diligence associated with potential redevelopment of the Property. To the extent that pertinent additional information was provided, it has been summarized elsewhere in this report.

7.0 PREVIOUS STUDIES

Tank Closure Records

AKRF was provided with tank closure and abandonment records for the Property. According to the records, two 550-gallon No. 2 fuel oil USTs were abandoned in place by Don Carlo Environmental Services Inc. (Don Carlo) in June 2014. According to the documentation provided by Don Carlo, product was pumped from the tanks and the tanks were reportedly cleaned and subsequently filled with slurry to permanent seal the tanks. All interconnected lines were also reportedly disconnected, purged, and sealed or removed. On-site representatives indicated that the tanks formerly contained diesel fuel.

In a separate letter, Don Carlo documented the abandonment of one 2,000-gallon No. 2 fuel oil AST. On February 25, 2014, the tank contents were pumped out and the tank was cleaned. All interconnected lines were reportedly disconnected, purged, and sealed or removed. The tank was closed in-place and the NYSDEC PBS database records were appropriately updated to reflect the status change. No soil samples were collected to determine if there was any impact to underlying soils during the closure and abandonment of the tanks.

Tank records are provided in Appendix F.

8.0 LIMITATIONS AND DATA GAPS

This assessment met the requirements of the American Society for Testing and Materials (ASTM) as established by ASTM Standard E1527-13 which satisfies USEPA's All Appropriate Inquiry (AAI) requirement in support of establishing "bona fide prospective purchaser" status under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). At the time it was performed, with the following limitations:

- The hydraulic elevator mechanical room located in the basement of the western building was inaccessible at the time of the inspection.
- An evaluation of lead-based paint was not included as part of this Phase I ESA.
- Results of this investigation are valid as of the dates on which the investigation was performed.
- To the extent that interviews were not conducted with the list of interviewees cited in the ASTM Standard (past and present owners, operators, and occupants of the Property and local government officials), AKRF does not believe that this represents a significant data gap likely to result in additional or significantly changed recognized environmental conditions or conclusions.
- The Property area history was not conducted in five-year intervals. However, sufficient information about the history of the Property and surrounding area could be obtained from the available historical Sanborn maps, city directories, and available local records, and this data gap is not likely to alter the conclusions of this report.
- Agency file reviews for the Property and adjacent properties consisted of a review of standard databases and electronic records maintained by pertinent departments and agencies (summarized in Section 5.2). AKRF believes that this file review was sufficient in determining the potential for recognized environmental conditions or other environmental concerns at the Property and additional reviews beyond this are not warranted and would not likely change the conclusions of this assessment.

9.0 CONCLUSIONS AND RECOMMENDATIONS

This Phase I ESA was performed in conformance with ASTM Standard E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*. Any exceptions to, or deletions from, this practice are described in Section 8.0. The term "Recognized Environmental Condition" means the presence or likely presence of hazardous substances or petroleum at the property, including the ground, groundwater, or surface water at or under the Property.

Recognized Environmental Conditions

- Two closed-in-place 550-gallon underground storage tanks (USTs) formerly used to dispense diesel fuel are reportedly located beneath the asphalt-paved parking lot (see Figure 2). Supporting paperwork provided by the current owner, indicates that the tanks were emptied and the interiors cleaned on May 2, 2014, but no soil sampling was conducted.
- The remnants of a former aboveground storage tank (AST) were observed behind a partially demolished concrete block wall in the basement of 147-07 94th Avenue. The Property superintendent indicated that the AST was emptied and the interior cleaned at the time of the abandonment, but did not have any further information. This tank appears to be the closed-in place 2,000-gallon No. 2 fuel oil AST currently listed in the New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage (PBS) database. During the reconnaissance, no evidence of a leak or spill was observed within the vicinity of the tank.
- The Property was assigned an NYC (E) Designation for hazardous materials, noise, and air in September 2007 as a part of the Downtown Jamaica Redevelopment Plan. This designation requires that a subsurface testing protocol be submitted to, approved by, and completed to the satisfaction of the NYC Office of Environmental Remediation (OER) before the issuance of any building permits associated with subsurface disturbance. OER will require appropriate remedial measures to be conducted prior to or as part of redevelopment (or renovation) involving subsurface disturbance or changes of the existing buildings to a more sensitive use.
- Historical Sanborn maps and the regulatory database information identified numerous industrial and automotive uses in the surrounding area between 1911 and 2006. Such uses with the potential to affect subsurface conditions beneath the Property included a saw clamps manufacturer, garages and gasoline tanks, a printing facility, filling stations and auto repair shops, Hyman's N.Y. & L.I. Express Inc. Motor Factory, and an air condition manufacturer. Several closed-status spills, some with documented subsurface contamination, were identified for the north-adjacent Long Island Rail Road (LIRR) facility between 1984 and 2005.
- The regulatory database also identified five Resource Conservation and Recovery Act (RCRA) hazardous waste non-generator/historical generators, six historic auto stations, spill listings, and PBS facilities within close proximity to the Property. Potential releases from these sites may have affected subsurface conditions beneath the Property.

Other on-site Environmental Concerns

- Based on the age of the buildings, asbestos containing materials (ACM) may be present. Suspect ACM observed during the reconnaissance included: plaster, sheetrock, joint compound, pipe insulation, electrical panels, caulks, putties, vinyl flooring and mastic, brick and block mortar, and roofing materials.
- Based on the age of the buildings, electrical equipment and lighting fixtures installed prior to 1979 may include polychlorinated biphenyl (PCB)- and/or mercury-containing components.

Recommendations

- The abandoned AST located in the basement of the Property building, should be properly closed and removed in accordance with applicable local, state, and federal regulations. Any evidence of a petroleum spill should be reported to NYSDEC and addressed in accordance with applicable requirements. Following removal, the underlying basement slab should be inspected for potential staining and/or releases from the tank and soil samples from below the slab may need to be collected.
- A subsurface (Phase II) investigation is recommended to determine whether former on- or off-site uses (including those identified as RECs above) have affected soil, soil vapor, and/or groundwater conditions. This investigation should be conducted in accordance with the (E) Designation requirements of OER. The Remedial Investigation should also be conducted to ensure that soil excavation and groundwater dewatering (if required during future construction) are conducted in accordance with applicable regulations, to determine if vapor mitigation is warranted for a new building, and assess whether any other remedial or environmental provisions should be incorporated into the development plan.
- During any subsurface disturbance, surplus excavated soil and debris must be handled and disposed of in accordance with applicable regulatory requirements. If any petroleum underground storage tanks are encountered, they should be closed and removed, along with any contaminated soil, in accordance with applicable requirements. Any evidence of a petroleum spill should be reported to NYSDEC and addressed in accordance with applicable requirements.
- If dewatering is required during potential future construction activities, water must be discharged in accordance with New York City Department of Environmental Protection (NYCDEP) requirements.
- Prior to any renovation or demolition activities with the potential to disturb suspect ACM, an asbestos survey should be conducted to determine whether these materials are ACM. If these materials prove to contain asbestos, they should be properly removed and disposed of in accordance with all state and federal regulations prior to any renovations that would disturb those materials, or building demolition.
- Unless there is labeling or test data that indicates that fluorescent lights and other electrical equipment are not mercury- and/or PCB-containing, if disposal is required, it should be performed in accordance with applicable federal, state and local regulations and guidelines.

10.0 SIGNATURE PAGE

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312.

We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Property for which the assessment was performed. We have performed all the appropriate inquiries in conformance with standards and practices set forth in 40 CFR Part 312.

Marcus Simons
Senior Vice President

Stephen Malinowski, QEP
Vice President

11.0 QUALIFICATIONS

The purpose of this assessment was to convey a professional opinion about the potential presence or absence of contamination, or possible sources of contamination on the property, and to identify existing and/or potential environmental problems associated with the property including *Recognized Environmental Conditions* as defined in ASTM Standard E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*.

The assessment was performed in accordance with customary principles and practices in the environmental consulting industry, and in accordance with the above-referenced ASTM Standard, except as noted otherwise in Section 8.0. It should only be used as a guide in determining the possible presence or absence of hazardous materials on the property at the time of the reconnaissance, as it is based upon the review of readily available records relating to both the property and the surrounding area, as well as a visual reconnaissance of current conditions.

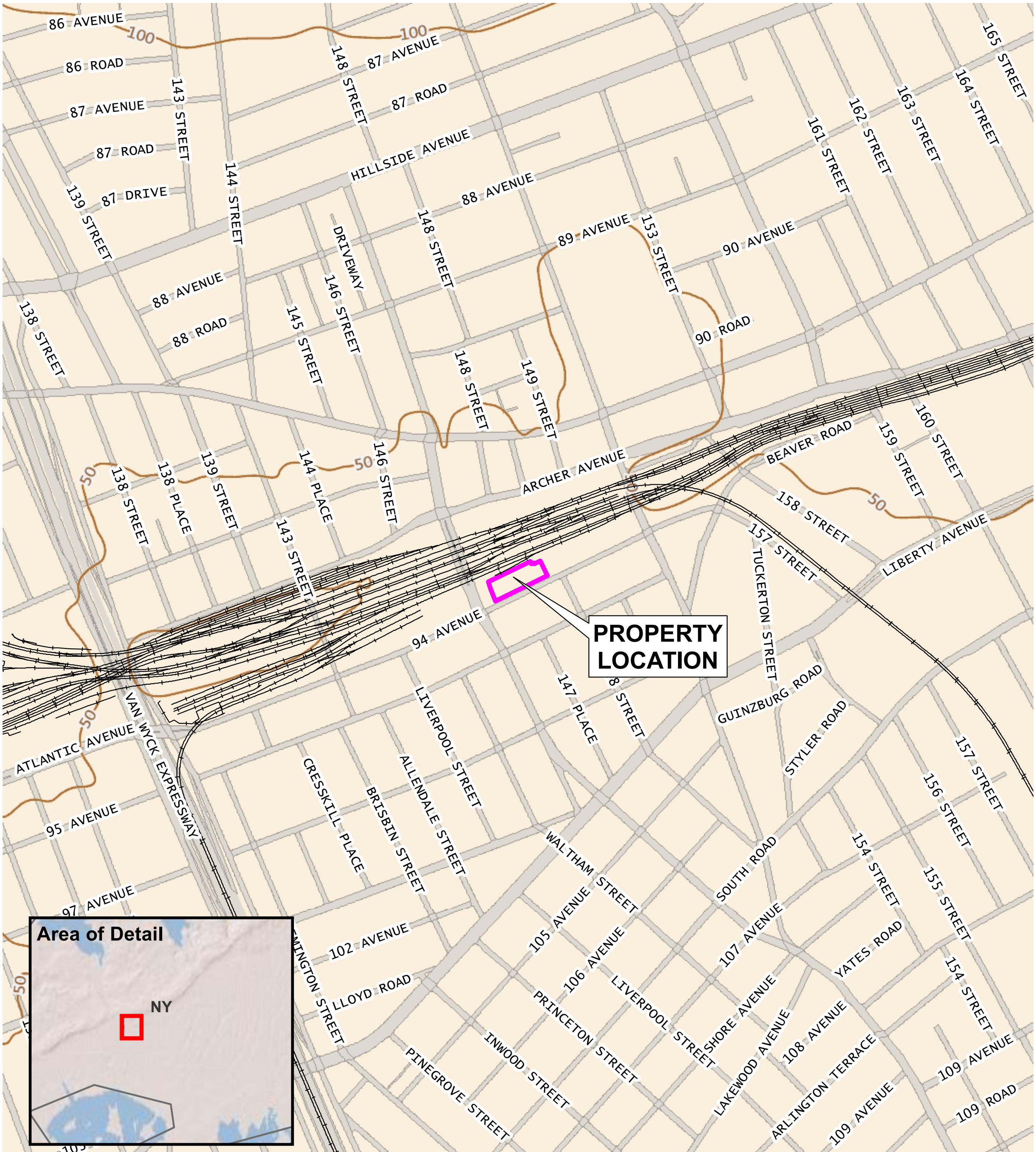
This Phase I Assessment is not, and should not be construed as, a guarantee, warranty, or certification of the presence or absence of hazardous substances, which can be made only with testing, and contains no formal plans or recommendations to rectify or remediate the presence of any hazardous substances which may be subject to regulatory approval. This report is not a regulatory compliance audit.

This report is based on services performed by AKRF, Inc. professional staff and observation of the property and its surroundings. We represent that observations made in this assessment are accurate to the best of our knowledge, and that no findings or observations concerning the potential presence of hazardous substances have been withheld or amended. The research and reconnaissance have been carried to a level that meets accepted industry and professional standards. Nevertheless, AKRF and the undersigned shall have no liability or obligation to any party other than J2 147-07 94th AVENUE LLC and their successors or assignees, and AKRF's obligations and liabilities to the above, their successors or assignees is limited to fraudulent statements made, or grossly negligent or willful acts or omissions.

12.0 REFERENCES

1. Environmental Data Resources, Inc., 147-07 94th Avenue, Jamaica, NY 11435, Regulatory Radius Map™ Report with GeoCheck®, September 18, 2017.
2. *U.S. Geological Survey – Jamaica, New York 2013Quadrangle*, 7.5 minute Series (Topographic), Scale 1:24,000, 2013.
3. New York State Department of Health: Office of Public Health - Environmental Radiation Section, Basement Radon Screening Data, October 2016.
4. Historical Sanborn maps dated 1901, 1911, 1925, 1942, 1951, 1963, 1967, 1981, 1982, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993, 1995, 1996, 1999, 2001, 2002, 2003, 2004, 2005 and 2006.
5. Environmental Data Resources, Inc., 147-07 94th Avenue, Jamaica, NY 11435, City Directory Abstract, September 18, 2017.
6. New York City Department of Buildings, Building Information Search Online (http://a810-bisweb.nyc.gov/bisweb).
7. Petroleum Tank Cleaners, Ltd. – Fire Department Affidavit and tank closure for one 2,000-gallon No. 2 fuel oil AST, March 2014.
8. Petroleum Tank Cleaners, Ltd. – Fire Department Affidavit and tank abandonment for two 550-gallon No. 2 fuel oil USTs, June 2014.
9. *Remedial Investigation Report (RIR)* – 147-20 94th Avenue, Jamaica, New York, AKRF, Inc., June 2016.

FIGURES



Map Source: USGS Topo base map service from The National Map

0 800 1,600

SCALE IN FEET

AKRF

440 Park Avenue South, New York, NY 10016

147-07 94th Avenue

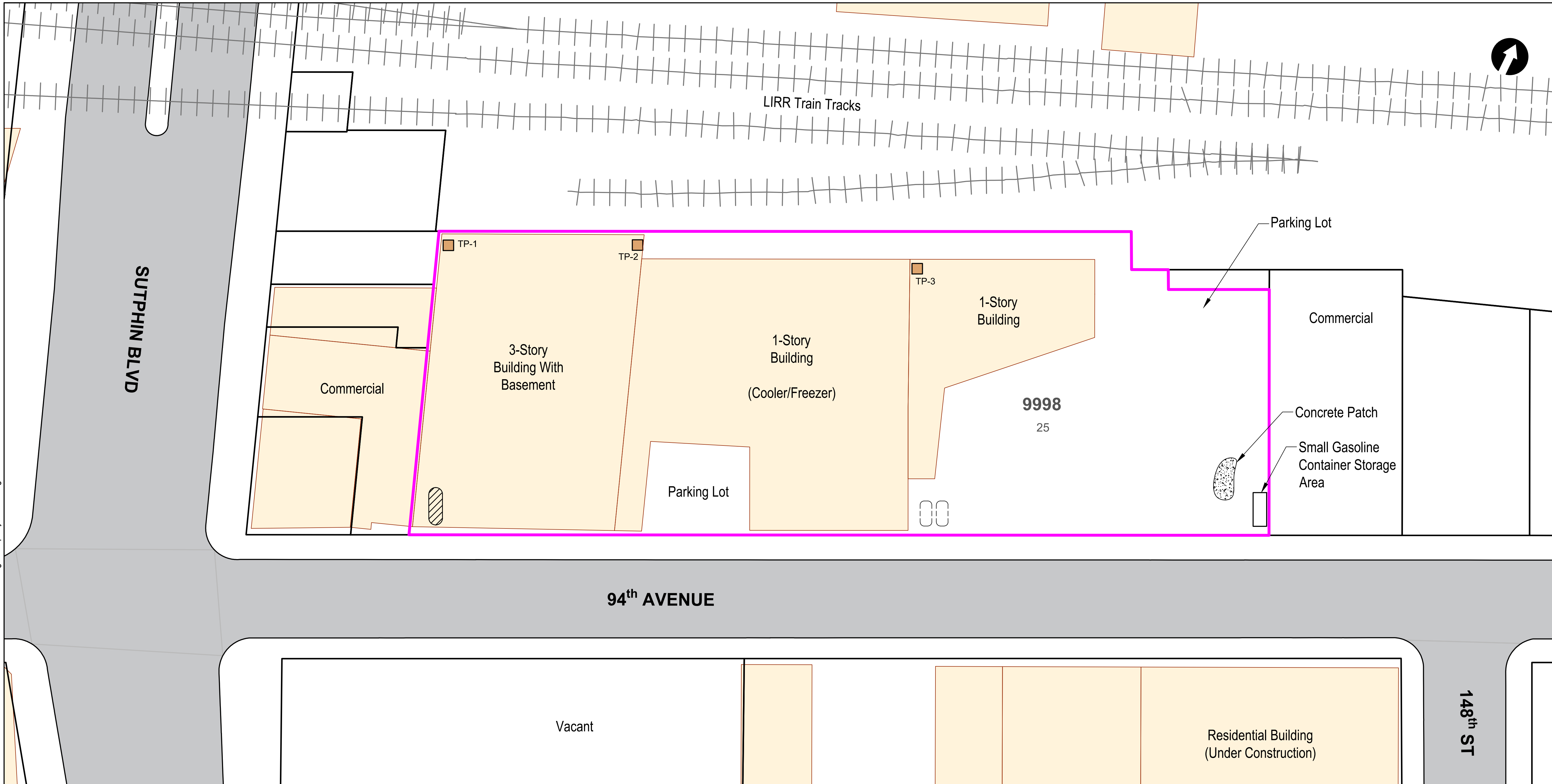
Queens, New York

PROPERTY LOCATION

DATE
9/21/2017

PROJECT NO.
170340

FIGURE
1



LEGEND

	PROJECT SITE BOUNDARY		EXISTING PRELIMINARY GEOTECHNICAL TEST PIT (4' X 4')
25	LOT BOUNDARY AND TAX LOT NUMBER		APPROXIMATE LOCATION OF 2,000-GALLON #2 FUEL OIL AST (ABANDONED IN PLACE)
9998	TAX BLOCK NUMBER	UST	UNDERGROUND STORAGE TANK
	BUILDING	AST	ABOVEGROUND STORAGE TANK
	APPROXIMATE LOCATION OF 550-GALLON #2 FUEL OIL UST (ABANDONED IN PLACE)		

0 20 40 80
SCALE IN FEET

Map Source:
NYCDCP (NYC Dept. of City Planning 2016) GIS database.

AKRF
440 Park Avenue South, New York, NY 10016

147-07 94th Avenue
Queens, New York

PROPERTY DETAIL

DATE
10/3/2017
PROJECT NO.
170340
FIGURE
2

APPENDIX A

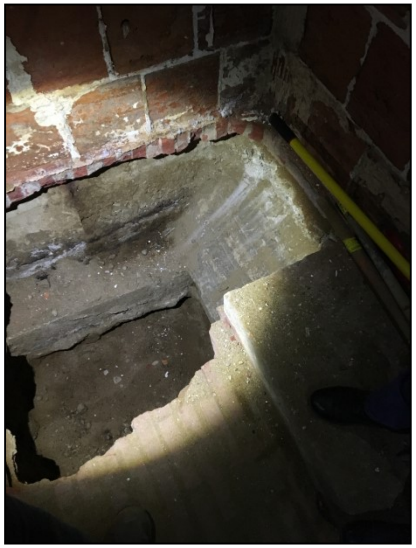
PHOTOGRAPHIC DOCUMENTATION

Photograph 1: Looking northeast at the Property from 94th Avenue.

Photograph 2: Chemical storage area located in the basement of the western Property building.

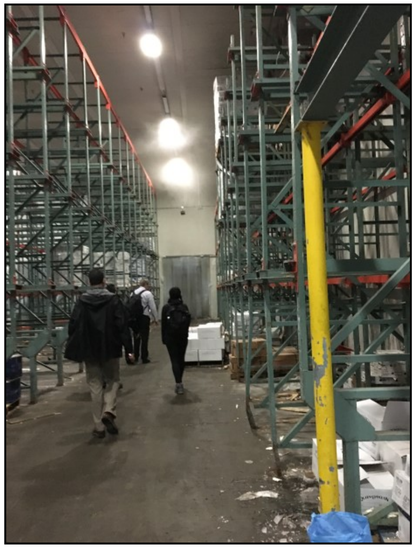
Photograph 3: Vacant storage area within the basement of the western Property building.

Photograph 4: View of the concrete vault for abandoned in-place AST.



Photograph 5: Geotechnical test pit located in the basement of the western Property building.

Photograph 6: Office space located in the western Property building.



Photograph 7: Cooler/freezer storage located on the first floor of the central Property building.

Photograph 8: Packaging space located in the western Property building.

Photograph 9: View of the roof looking east.

Photograph 10: Repair patches from former roof repairs.

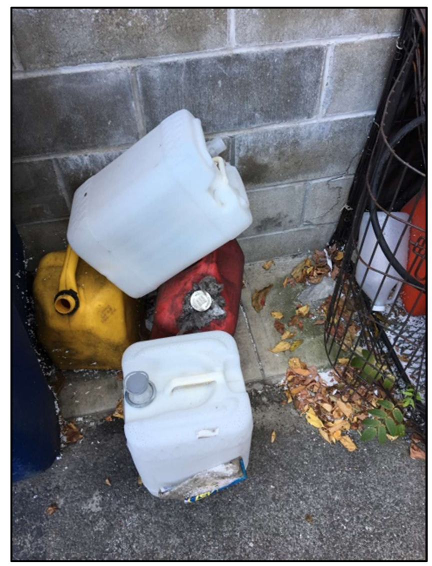
Photograph 11: Roof mounted HVAC system.

Photograph 12: Cable elevator room located on the roof.

Photograph 13: View of southeastern loading dock and parking lot.

Photograph 14: Concrete patch beneath the cars in eastern parking area.


Photograph 15: Concrete patch reportedly above abandoned in-place USTs.


Photograph 16: View of small gasoline container storage area in the southeastern parking lot.

APPENDIX B

HISTORICAL SANBORN MAPS

147-07 94th Avenue

14707 94TH AVE

Jamaica, NY 11435

Inquiry Number: 5052378.3

September 18, 2017

Certified Sanborn® Map Report

EDR®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

APPENDIX E

STANDARDS, CRITERIA, AND GUIDANCE

1.0 SCGS FOR SITE CHARACTERIZATION AND REMEDIAL INVESTIGATION

The following standards and criteria typically will apply to Site Characterizations and Remedial Investigations conducted in New York State:

- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes
- 6 NYCRR Part 375 – Environmental Remediation Programs
- 6 NYCRR Parts 700-706 - Water Quality Standards
- 6 NYCRR Part 182 - Endangered & Threatened Species of Fish & Wildlife
- 6 NYCRR Part 608 - Use and Protection of Waters
- 6 NYCRR Part 661 - Tidal Wetlands - Land Use Regulations
- 6 NYCRR Part 663 - Freshwater Wetlands Maps and Classification
- 6 NYCRR Part 257 - Air Quality Standards
- 10 NYCRR Part 5 of the State Sanitary Code - Drinking Water Supplies (May 1998)
- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- 6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures

The following guidance typically applies to Site Characterizations and Remedial Investigations conducted in New York State:

- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
- Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (October 1994)
- Technical Guidance for Screening Contaminated Sediments (January 1999)
- Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorus Wildlife (July 1987)
- Wildlife Toxicity Assessment for Cadmium in Soils (May 1999)
- Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants
- The 10 ppt Health Advisory Guideline for 2,3,7,8-TCDD in Sportfish Flesh
- The 1 ppm Health Advisory Guideline for Cadmium in Sportfish Flesh
- Criteria for the Development of Health Advisories for Sportfish Consumption
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006)
- DER Interim Strategy for Groundwater Remediation at Contaminated Sites in New York State

2.0 SCGS FOR REMEDY SELECTION

The following standards and criteria typically apply to the remedy selection process conducted in New York State:

- 6 NYCRR Part 375 – Environmental Remediation Programs
- 6 NYCRR Part 376 – Land Disposal Restrictions
- 6 NYCRR Part 608 – Use and Protection of Waters
- 6 NYCRR Part 661 – Tidal Wetlands - Land Use Regulations
- 6 NYCRR Part 663 – Freshwater Wetlands - Permit Requirements
- 6 NYCRR Parts 700-706 – Water Quality Standards
- 19 NYCRR Part 600 – Waterfront Revitalization and Coastal Resources

The following guidance typically applies to the remedy selection process conducted in New York State:

- TAGM 4044 – Accelerated Remedial Actions at Class 2, Non-RCRA Regulated Landfills (March 1992)
- TAGM 4051 – Early Design Strategy (August 1993)
- Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)
- TAGM 3028 – "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- Freshwater Wetlands Regulations – Guidelines on Compensatory Mitigation (October 1993)
- Air Guide 1 – Guidelines for the Control of Toxic Ambient Air Contaminants
- Technical Guidance for Screening Contaminated Sediments (January 1999)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.047FS Presumptive Remedies: Policy and Procedures (September 1993)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.048FS Presumptive Remedies:
- Site Characterization and Technology Selection for CERCLA sites with Volatile Organic Compounds in Soils (September 1993)
- USEPA Office of Solid Waste and Emergency Response Directive 9355.049FS Presumptive Remedy for CERCLA Municipal Landfills (September 1993)

3.0 SCGS FOR UNDERGROUND STORAGE TANK (UST) CLOSURE

The following standards and criteria typically apply to UST closures conducted in New York State:

- 6 NYCRR Part 612 – Registration of Petroleum Storage Facilities (February 1992)
- 6 NYCRR Part 613 – Handling and Storage of Petroleum (February 1992)
- 6 NYCRR Part 614 – Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992)
- 6 NYCRR Part 371 – Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Subpart 374-2 – Standards for the Management of Used Oil
- 6 NYCRR Parts 700-706 – Water Quality Standards
- 40 CFR Part 280 – Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks

The following guidance typically applies to UST closures conducted in New York State:

- Spill Response Guidance Manual
- Permanent Closure of Petroleum Storage Tanks
- TAGM 3028 – "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- TOGS 1.1.1 – Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
- Air Guide 1 – Guidelines for the Control of Toxic Ambient Air Contaminants
- NYSDOH Environmental Health Manual CSFP-530 – “Individual Water Supplies - Activated Carbon Treatment Systems”

4.0 SCGS FOR REMEDIAL ACTION

The following standards and criteria typically apply to Remedial Actions conducted in New York State:

- 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response
- 40 CFR Part 144 – Underground Injection Control Program
- 10 NYCRR Part 67 – Lead
- 12 NYCRR Part 56 – Industrial Code Rule 56 (Asbestos)
- 6 NYCRR Part 175 – Special Licenses and Permits - Definitions and Uniform Procedures
- 6 NYCRR Part 361 – Siting of Industrial Hazardous Waste Facilities

- 6 NYCRR Part 371 – Identification and Listing of Hazardous Wastes (November 1998)
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
- 6 NYCRR Subpart 373-4 – Facility Standards for the Collection of Household Hazardous Waste and Hazardous Waste from Conditionally Exempt Small Quantity Generators (November 1998)
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste (November 1998)
- 6 NYCRR Part 375 – Inactive Hazardous Waste Disposal Sites (as amended January 1998)
- 6 NYCRR Part 376 – Land Disposal Restrictions
- 19 NYCRR Part 600 – Waterfront Revitalization and Coastal Resources
- 6 NYCRR Part 608 – Use and Protection of Waters
- 6 NYCRR Part 661 – Tidal Wetlands - Land Use Regulations
- 6 NYCRR Part 663 – Freshwater Wetlands - Permit Requirements
- 6 NYCRR Parts 700-706 – Water Quality Standards (June 1998)
- 6 NYCRR Part 750 through 758 – Implementation of NPDES Program in NYS ("SPDES Regulations")
- Technical Guidance for Screening Contaminated Sediments (January 1999)

The following guidance typically applies to Remedial Actions conducted in New York State:

- TAGM 4013 – Emergency Hazardous Waste Drum Removal/ Surficial Cleanup Procedures (March 1996)
- TAGM 4046 – Determination of Soil Cleanup Objectives and Cleanup Levels (January 1994)
- TAGM 4059 – Making Changes To Selected Remedies (May 1998)
- TAGM 3028 – "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)
- TOGS 1.1.1 – Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
- TOGS 1.3.8 – New Discharges to Publicly Owned Treatment Works
- TOGS 2.1.2 – Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites
- Air Guide 1 – Guidelines for the Control of Toxic Ambient Air Contaminants

- State Coastal Management Policies
- OSWER Directive 9200.4-17 – Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)
- NYSDOH Environmental Health Manual CSFP-530 – "Individual Water Supplies - Activated Carbon Treatment Systems"

5.0 SCGS FOR SITE MANAGEMENT

The following standards and criteria typically apply to Site Management activities conducted in New York State:

- 6 NYCRR Part 175 – Special Licenses and Permits--Definitions and Uniform Procedures

The following guidance typically applies to Site Management activities conducted in New York State:

- Groundwater Monitoring Well Decommissioning Procedures (May 1995)
- The activity is a component of a program selected by a process complying with the public participation requirements of section 1.10, to the extent applicable.
- NYSDOH Environmental Health Manual CSFP-530 – "Individual Water Supplies - Activated Carbon Treatment Systems"

APPENDIX F

QUALITY ASSURANCE PROJECT PLAN

147-25 94TH AVENUE

QUEENS, NEW YORK

Quality Assurance Project Plan

AKRF Project Number: 170340
NYSDEC BCP Site Number: TBD

Prepared for:

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Prepared by:

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ATTACHMENTS

Attachment A – Resumes for Remedial Engineer, Project Director, Project Manager, Project Manager Alternates, and Field Team Leader

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of all environmental sampling, including under the Remedial Action Work Plan (RAWP) at the 147-25 94th Avenue site, hereafter referred to as the "Site." The Site is an approximately 35,000-square foot parcel located in the Jamaica neighborhood of the Queens, New York and is identified on the New York City Tax Map as Tax Block 9998, Lot 25.

The objective of this QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental investigative, sampling, and remedial activities conducted under the RAWP. Adherence to the QAPP will ensure that defensible data will be obtained during all environmental work at the Site.

2.0 PROJECT TEAM

The project team will be drawn from AKRF professional and technical personnel, and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities.

2.1 PROJECT DIRECTOR, REMEDIAL ENGINEER, AND QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) OFFICER

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management, and field program decision-making. The project director will communicate regularly with all members of the AKRF project team and the NYSDEC to ensure a smooth flow of information between involved parties. Stephen Malinowski will serve as the project director for the RAWP.

The Remedial Engineer for this project will be Michelle Lapin, P.E. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site. The Remedial Engineer will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal. The Remedial Engineer will be responsible for all appropriate communication with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH).

Stephen Malinowski, QEP will also serve as the QA/QC officer and will be responsible for adherence to the QAPP. The QA/QC officer will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic Site visits to assess implementation of the procedures. The QA/QC officer will also be responsible for reviewing Data Usability Summary Reports (DUSRs) for soil analytical results, as described in Section 5.0 of this QAPP. Ms. Lapin's and Mr. Malinowski's resumes are included in Attachment A.

2.2 PROJECT MANAGER

The project manager will be responsible for directing and coordinating all elements of the RAWP. The project manager will prepare reports and participate in meetings with the Site owner/Participant, and/or the NYSDEC. Stephen Malinowski, QEP, will serve as the project manager for the RAWP. Mr. Malinowski is a New York State Professional Geologist.

2.3 PROJECT MANAGER ALTERNATE

The project manager alternate will be responsible for assisting the project manager. The project manager alternate will help prepare reports and will participate in meetings with the Site owner/Participant, and/or the NYSDEC. Adrianna Bosco will serve as the project manager alternate for the RAWP. Ms. Bosco's resume is included in Attachment A.

2.4 FIELD TEAM LEADER, FIELD TECHNICIAN, AND SITE SAFETY OFFICER, AND ALTERNATES

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plan and Health and Safety Plan (HASP), included in Appendix G of the RAWP. The field team leader will also act as the field technician and Site safety officer (SSO), and will report to the project manager or project manager alternate on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified and responsible person able to act professionally and promptly during environmental work at the Site. Jacob Menken will be the field team leader. Field team leader alternates include Mark Candelario and Tara Simmons, both of AKRF. Mr. Menken's resume is included in Attachment A.

2.5 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OFFICER

The laboratory QA/QC officer will be Heather Hall of SGS Accutest Inc. (Accutest), the New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory being employed for all environmental sampling at the Site. The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. She will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued. She will also conduct a final check on the analytical calculations and sign off on the laboratory reports.

3.0 STANDARD OPERATING PROCEDURES (SOPS)

The following sections describe the SOPs for the remedial activities included in the RAWP. During these operations, safety monitoring will be performed as described in the HASP, included as Appendix G of the RAWP.

3.1 DECONTAMINATION OF SAMPLING EQUIPMENT

All sampling equipment (augers, drilling rods, split spoon samplers, probe rods, pumps, etc.) will be either dedicated or decontaminated between sampling locations. Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® (or Alconox®) mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/Simple Green® (or Alconox®) mixture and bristle brush.
4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

3.2 MANAGEMENT OF INVESTIGATION DERIVED WASTE (IDW)

IDW will be containerized in New York State Department of Transportation (NYSDOT)-approved 55-gallon drums or disposed of via tri-axel trucks during excavation activities. The drums will be sealed at the end of each work day and labeled with the date, the excavation grid(s), the type of waste (i.e., drill cuttings), and the name and phone number of an AKRF point-of-contact. All IDW exhibiting field evidence of contamination will be disposed of or treated according to applicable local, state, and federal regulations.

4.0 SAMPLING AND LABORATORY PROCEDURES

4.1 SOIL SAMPLING

Soil sampling will be conducted according to the following procedures:

- Characterize the sample according to the modified Burmister soil classification system.
- Field screen the sample for evidence of contamination (e.g., odors, staining,) using visual and olfactory methods and screen for volatile organic compounds (VOCs) using a photoionization detector (PID) equipped with a 10.6 electron Volt (eV) lamp.
- Collect an aliquot of soil from each proposed sample location, place in laboratory-supplied glassware, label the sample in accordance with Section 4.6 of this QAPP, and place in an ice-filled cooler for shipment to the laboratory.
- Complete the proper chain of custody paperwork and seal the cooler.
- Record sample location, sample depth, and sample observations (evidence of contamination, PID readings, soil classification, etc.) in field log book and boring log data sheet, if applicable.
- Decontaminate any soil sampling equipment between sample locations as described in Section 3.1 of this QAPP.

4.2 GROUNDWATER SAMPLING

Groundwater samples will be collected at least one week following well development. Low flow sampling techniques will be used, as described in U.S. EPA's Ground-Water Sampling Guidelines for Superfund and Resource Conservation and Recovery Act (RCRA) Project Managers [EPA 542-S-02-001, May 2002]. Sampling will be conducted according to the following procedure:

- Prepare the sampling area by placing plastic sheeting over the well. Cut a hole in the sheeting to provide access to the well cover.
- Slowly remove the locking cap and immediately measure the vapor concentrations in the well with a PID calibrated to the manufacturer's specifications.
- Measure the depth to water and total well depth, and check for the presence of non-aqueous phase liquid (NAPL) using an oil/water interface probe. Measure the thickness of NAPL, if any, and record in field book and well log. Collect a sample of NAPL using a disposable plastic weighted bailer or similar collection device. Groundwater samples will not be collected from wells containing measurable NAPL.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a well where the total

depth is 20 feet, screened interval is 10 to 20 feet, and depth to water is 14 feet, the mid-point of the water column within the screened interval would be 17 feet.

- For a 2-inch well, connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a Horiba Quanta multi-parameter (or equivalent) meter. Connect tubing to the output of the cell and place the discharge end of the tubing in a five-gallon bucket.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 foot as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be approximately 0.5 liter and will be no greater than 3.8 liters/minute.
- Transfer discharged water from the 5-gallon buckets to 55-gallon drums designated for well-purge water.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

Table 1
Stabilization Criteria

Parameter	Stabilization Criteria
PH	+/- 0.1 pH units
Specific Conductance	+/- 3% mS/cm
ORP/Eh	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

Notes: mS/cm = millisievert per centimeter
mV = millivolt
NTU = nephthalometric turbidity unit
mg/l = milligram per liter

- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing and place into the required sample containers as described in Section 4.4 of this QAPP. Label the containers as described in Section 4.6 of this QAPP and place in an ice-filled cooler for shipment to the laboratory.

- Collect one final field sample and analyze for turbidity and water quality parameters (pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity).
- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of the sample filter in a 55-gallon drum designated for disposable sampling materials and PPE. The purge water will be managed as described in Section 3.2 of this QAPP.
- Decontaminate the pump, oil/water interface probe, and flow-through cell, as described in Section 3.1 of this QAPP.
- Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume), and observations in the project logbook and field data sheet, if applicable.

4.3 SOIL VAPOR SAMPLING

Soil vapor sampling will be conducted in accordance with the NYSDOH Vapor Intrusion Guidance and as follows:

- Install a 2-foot by 2-foot 6-mil plastic sheeting or plastic bucket (the shroud) over the vapor sampling point tubing and seal to the surface along the perimeter using duct tape or non-VOC putty, as appropriate.
- Puncture the shroud and pull the vapor sampling point tubing through the shroud to allow for sample collection. Seal the puncture as necessary with duct tape or modeling clay.
- Pierce a second hole in the shroud, and insert new, dedicated silicone tubing through the hole, connecting the other end of the tubing to the helium tank/canister to allow introduction of the helium tracer gas. Seal the puncture as necessary with duct tape/modeling clay.
- Connect the vapor sampling point tubing to the low-flow air pump inlet port. Connect the low-flow air pump discharge port to a 1 liter Tedlar bag.
- Calculate and purge the soil gas sampler of approximately three sampling point volumes using the air pump and Tedlar bag. The air withdrawal flow rate will be maintained to the extent practicable at less than 0.2 liter per minute to better control the physical extent from which soil vapor is being drawn from.
- Field screen the sample within the Tedlar bag using a calibrated PID and a helium detector (MGD 2002 or equivalent). If elevated concentrations (greater than 1%, or 10,000 parts per million) of helium are detected, inspect surface seal, and add hydrated bentonite/modeling clay or make other necessary modifications to reinforce the seal.
- After purging the soil gas sampler, disconnect the sampling point tubing from the air pump and plug/cap tubing prior to conducting the vapor sampling.

  Following successful testing of the surface seal, the following procedures shall be implemented to collect each soil vapor sample:

- Connect sampling point tubing to the inlet of the SUMMA canister flow controller/vacuum gauge assembly which should have been calibrated for sample collection over the sampling period specified in the work plan.
- Open canister valve completely and record the initial reading from the vacuum gauge on the assembled canister. Record the corresponding time on the log sheet and in the field book.

- Begin routine sampling measurement collection. Routine measurements will include time, sample canister vacuum, and ambient PID reading in vicinity of samples. One time measurements include canister and flow controller IDs. Write in required measurements on the canister tags.
- At the end of the sampling period and always prior to the vacuum gauges reaching to 0 vacuum, close the canister valves, remove the flow controller/vacuum gauge assemblies, and cap canisters with threaded caps.
- Non-dedicated equipment should be decontaminated between locations.

4.4 LABORATORY METHODS

Table 2 summarizes the laboratory methods that will be used to analyze field samples as well as the sample container type, preservation, and applicable holding times. Accutest of Dayton, New Jersey, a NYSDOH ELAP-certified laboratory subcontracted to AKRF, will be used for all chemical analyses in accordance with the Division of Environmental Remediation (DER)-10 2.1(b) and 2.1(f) with Category B Deliverables.

Table 2
Laboratory Analytical Methods for Analysis Groups

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil	Volatile Organic Compounds (VOCs)	8260C	EnCore samplers (3) and 2 oz. plastic jar	≤ 6 ºC	48 hours to extract; 14 days to analyze
	Semivolatile Organic Compounds (SVOCs)	8270D	8 oz. Glass Jar	≤ 6 ºC	14 days to extract; 40 days to analyze
	Total Analyte List (TAL) of 23 Metals, and Hexavalent Chromium	6000/7000 Series, 6010C, and 7196A	8 oz. Glass Jar	≤ 6 ºC	6 months holding time; Mercury 28 days holding time; Hexavalent chromium 30 days to extract, 7 days to analyze
	Pesticides	8081B	8 oz. Glass Jar	≤ 6 ºC	14 days to extract; 40 days to analyze
	Polychlorinated Biphenyls (PCBs)	8082A	8 oz. Glass Jar	≤ 6 ºC	14 days to extract; 40 days to analyze
Groundwater	VOCs	8260C	5 40 mL Glass Vials	HCl to pH < 2 and ≤ 6 ºC	48 hours to extract; 14 days to analyze
	SVOCs	8270D	2,000 mL Amber Jar	≤ 6 ºC	7 days to extract; 40 days to analyze
	TAL 23 Metals and Hexavalent Chromium	6000/7000 Series, 6010C, and 7196A	2,000 mL Amber Jar	HNO_3 to pH <2	6 months for metals; 28 days for mercury; 24 hours for hexavalent chromium
	Pesticides	8081B	2,000 mL Amber Jar	≤ 6 ºC	7 days to extract; 40 days to analyze
	PCBs	8082A	2,000 mL Amber Jar	≤ 6 ºC	7 days to extract; 40 days to analyze
Soil Vapor	VOCs	TO-15	6L SUMMA® Canister	None	14 days

Notes:
EPA - Environmental Protection Agency
Hg – Mercury
RCRA – Resource Conservation and Recovery Act

4.5 QUALITY CONTROL (QC) SAMPLING

In addition to the laboratory analysis of the soil samples, additional analysis will be included for QC measures, as required by the Category B sampling techniques. These samples will include field blank, trip blank, matrix spike/matrix spike duplicate (MS/MSD), and blind duplicate samples at a frequency of one sample per 20 field samples collected or per sample digestion group (SDG). QC samples will be analyzed for the same parameters as the accompanying samples, with the exception of any trip blanks, which will be analyzed for the VOC list only.

4.6 SAMPLE HANDLING

4.6.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody (COC) documents, and laboratory reports. All samples will be given a unique name and the collection date at the end of the sample same in a year, month, day (YYYYMMDD) format. Blind duplicate sample nomenclature will consist of the sample type, followed by an "X"; MS/MSD samples nomenclature will consist of the parent sample name, followed by "MS/MSD"; and trip and field blanks will consist of "TB-" and "FB-", respectively, followed by a sequential number of the trip/field blanks collected within the sample digestion group (SDG). Special characters, including primes/apostrophes ('), will not be used for sample nomenclature.

4.6.1.1. Endpoint Soil Sampling

Soil endpoint samples will be identified with "EP-" and the endpoint sample number in sequential order that the endpoint sample was collected, and the depth below grade the sample was collected from in parentheses. Table 3 provides examples of the sampling identification scheme for the post-excavation endpoint samples.

Table 3
Endpoint Sample Nomenclature

Sample Description	Sample Designation
Post-excavation endpoint soil sample EP-1 collected from 15 feet below grade on August 1, 2018	EP-1(15)20170801
Matrix spike/matrix spike duplicate sample of post-excavation endpoint soil sample EP-1 collected from 15 feet below grade on August 1, 2018	EP-1 (15) MS/MSD 20180801
Duplicate of post-excavation endpoint soil sample EP-1 collected from 15 feet below grade on August 1, 2018	EP-X (15) 20180801

4.6.1.2. Waste Classification/ Tank Excavation Soil Sampling

In addition to the nomenclature detailed in Section 4.6.1.1, any confirmatory endpoint samples collected from a tank excavation will be identified by the excavation grid area and the cardinal direction of the sidewalls. The sample(s) collected from the bottom of the excavation will be amended with a "B-", followed by the number of bottom samples collected from the excavation in sequential order. Waste classification samples will be amended with "WC-" and the alphanumeric grid identification. Additionally, samples will be amended with the depth the sample was collected in feet below grade in parentheses. The alphanumeric grid is presented on Figure 10 of the RAWP. Table 4 provides examples of the sampling identification scheme for proposed waste classification samples and any hotspot or tank excavation samples.

Table 4
Waste Classification/Hotspot/Tank Excavation Sample Nomenclature

Sample Description	Sample Designation
Waste classification composite sample collected between grade and 5 feet below grade in grid A1 on August 1, 2018	WC-A1-C (0-5) 20180801
Waste classification grab sample collected between grade and 5 feet below grade in grid A1 on August 1, 2018	WC-A1-G (0-5) 20180801
Soil sample collected from the northern sidewall of a tank grave of UST 1 encountered at 4 feet below grade on August 1, 2018	UST-1-N (4) 20180801

Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification, including Site name, BCP Site number, Site address
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler's initials

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. All samples will be shipped to the laboratory at least twice per week. At the start and end of each workday, field personnel will add ice to the cooler(s) as needed.

The samples will be prepared for shipment by placing each sample in laboratory-supplied glassware, then wrapping each container in bubble wrap to prevent breakage, and adding freezer packs and/or fresh ice in sealable plastic bags. The COC form will be properly completed by the sampler in ink, and all sample shipment transactions will be documented with signatures, and the date and time of custody transfer. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the samples remain under strict COC protocol.

Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on COC forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

4.7 FIELD INSTRUMENTATION

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the Site for referencing proper operation, maintenance, and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be equipped with an 10.6 electron volt (eV) lamp and will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas in accordance with the manufacturer's standards.

4.8 QUALITY ASSURANCE (QA)

All soil, groundwater, and soil vapor sample laboratory analytical data will be reviewed by a third-party validator and a Data Usability Summary Report (DUSR) will be prepared to document the usability and validity of the data. The Final Engineering Report (FER) will include a detailed description of endpoint sampling activities, data summary tables, concentration map showing endpoint sample locations and concentrations, DUSR, and laboratory reports.

ATTACHMENT A

RESUMES OF PROJECT DIRECTOR, PROJECT MANAGER, PROJECT MANAGER ALTERNATE, AND FIELD TEAM LEADER

MICHELLE LAPIN, P.E.

SENIOR VICE PRESIDENT

Michelle Lapin is a Senior Vice President with more than 29 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's Hazardous Materials group and offers extensive experience providing strategic planning and management for clients. Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, air and geotechnical problems. Her other duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes groundwater investigations, formulation and administration of groundwater monitoring programs and remediation throughout the Northeast. Her experience with groundwater contamination includes Level B hazardous waste site investigations; leaking underground storage tank studies, including hazardous soil removal and disposal and associated soil and water issues; soil gas/vapor intrusion surveys; and wetlands issues. Ms. Lapin is experienced in investigation and remediation concerning hazardous waste cell closures, and landfills. She has directed hundreds of Phase I, Phase II, and Phase III investigations and remediations, many of them in conjunction with developers, law firms, lending institutions, and national retail chains. She is also experienced in the cleanup of contaminated properties under Brownfield Cleanup Program (BCP) regulations.

BACKGROUND

Education

M.S., Civil Engineering, Syracuse University, 1985
B.S., Civil Engineering, Clarkson University, 1983

Professional Licenses/Certifications

New York State P.E.
State of Connecticut P.E.

Professional Memberships

Member, National Society of Professional Engineers (NSPE), National and CT Chapters
Member, American Society of Civil Engineers (ASCE), National and CT Chapters
Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council (EPC)
Member, Environmental Professionals' Organization of Connecticut (EPOC)
Board Member, New York City Brownfield Partnership
Member, NAIOP, a Commercial Real Estate Development Association

Years of Experience

Year started in company: 1994
Year started in industry: 1986

RELEVANT EXPERIENCE

Gedney Way Landfill, White Plains, NY

Ms. Lapin was the Engineer of Record for this closure of a former ash landfill, which is also utilized as a leaf and yard waste compost facility by the City of White Plains. The landfill closure required investigations to document the landfill's disposal history and the extent of the solvent contamination and methane. The investigation and closure of the landfill were completed to satisfy the requirements of a New York State Department of Environmental Conservation's (NYSDEC) consent order, were completed in compliance with NYSDEC DER-10 and 6NYCRR Part 360, and included placement of landfill cap, methane recovery system, and sealing of storm sewers traversing the landfill.

Roosevelt Union Free School District – District-wide Improvement Program, Roosevelt, NY

Ms. Lapin managed the hazardous materials investigation for the Draft and Final Environmental Impact Statements (EIS) for the improvement program, which included the demolition of three existing elementary schools and portions of the junior-senior high school, and the reconstruction of three replacement elementary schools, a separate replacement middle school, and renovations to the high school. Following the EIS, additional hazardous materials investigations were completed, including comprehensive asbestos and lead surveys; Phase I and Phase II Environmental Site Assessments; the preparation of asbestos, lead, hazardous materials and demolition specifications; and obtaining site-specific variances from the New York State Department of Labor (NYSDOL). The middle school remediation was conducted through coordination with the New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Health (NYSDOH), the New York State Education Department (NYSED) and the local school district. The project was approved, and construction/renovation for the new middle school completed such that the school opened for the Fall 2008 semester as planned.

Memorial Sloan Kettering Cancer Center-CUNY 74th Street EIS, New York, NY

AKRF was engaged by Memorial Sloan-Kettering Cancer Center (MSK) and CUNY-Hunter College (CUNY) to prepare an EIS for a proposed joint facility located on a New York City-owned parcel located between East 73rd Street and East 74th Street adjacent to the FDR Drive in Manhattan. The proposed facility was formerly occupied by the Department of Sanitation, and had included over 41 underground storage tanks, will include an ambulatory medical care center for MSK and educational and medical research facilities for CUNY.

Ms. Lapin is leading the hazardous materials work which includes the preparation of the Phase I and II environmental site assessments, remedial action work plans (RAWPs), and construction health and safety plans (CHASPs) for submission to the New York City Office of Environmental Remediation (OER) for the Voluntary Cleanup Program (VCP) and to the New York State Department of Environmental Conservation (NYSDEC) for remediation of a petroleum spill. The RAWPs and CHASPs included provisions for excavation of contaminated soil and rock, removal of tanks and environmental monitoring during the construction activities. AKRF also performed a pre-demolition asbestos survey of the remaining concrete foundation structures and prepared specifications for asbestos abatement, soil management and underground storage tank removal and disposal.

Brooklyn Bridge Park, Brooklyn, NY

AKRF prepared an Environmental Impact Statement (EIS) and is continuing to provide technical and planning support services for Brooklyn Bridge Park, which revitalizing the 1.3-mile stretch of the East River waterfront between Jay Street on the north and Atlantic Avenue on the south. The new park, allows public access to the water's edge, allowing people to enjoy the spectacular views of the Manhattan skyline and New York Harbor. It also provides an array of passive and active recreational opportunities, including lawns, pavilions, and a marina. As with many waterfront sites around New York City, the lands along the Brooklyn waterfront have a long history of industrial activities. Some of these industries used dangerous chemicals and generated toxic by-products that could have entered the soil and groundwater. In addition, landfilling activities along the shoreline also used ash and other waste materials from industrial processes. Based on site inspections, historical maps, government records, and other sources, AKRF has been investigating the potential for the presence for hazardous materials in the park. This information was compiled into a Phase 1 Environmental Site Assessment report. AKRF has also provided and continues to support to the design team related to designing the project to minimize costs related to remediating hazardous materials where possible. Ms. Lapin is serving as senior manager for the hazardous materials investigations.

East River Science Park, New York, NY

Originally, New York University School of Medicine (NYUSOM) retained the firm to prepare a full Environmental Impact Statement (EIS) for its proposed East River Science Park (ERSP). The proposed complex was to occupy an underutilized portion of the Bellevue Hospital campus between East 30th Street and approximately East 28th Street, immediately south of NYU's campus. As originally contemplated, Phase I was to include 618,000 square feet of development, including a clinical practice and research building, a biotech center, 220 housing units for post-doctorate staff, a child care center, and a conference center. This phase would include reuse of the former Bellevue Psychiatric Building, a historic structure on East 30th Street east of First Avenue. Phase II was to include a second biotech building with a library to serve NYU and Bellevue at the eastern end of the block between 29th and 30th Streets. Phase III was to include a third biotech building and parking. The project's EIS considered a full range of issues, including land use, socioeconomics, shadows, historic resources, open space, traffic and transportation, air quality, noise, and construction. The firm also prepared all of the traffic and transportation studies for the urban design and master planning efforts. Ms. Lapin managed the Phase I Environmental Site Assessment and other hazardous materials-related issues.

Events relating to September 11, 2001 put a hold on the project for a number of years. When the project resurfaced, it had a new developer and a decreased scope. Ms. Lapin updated the hazardous materials issues for the new developer and consulted with them regarding remediation strategies and involvement of regulatory agencies. For the actual remediation/development, the city requested oversight by AKRF to represent its interests (the city is retaining ownership of the land). Ms. Lapin completed directing the remediation oversight on behalf of the City of New York for the remediation of the former psychiatric hospital building, laundry building and parking areas associated with Bellevue Hospital. The new development includes a biotechnology center (Commercial Life Science Research and Office Park) comprising two buildings (combined 550,000 square feet), street level retail, and an elevated plaza.

New York City School Construction Authority (SCA), Environmental Consulting Hazardous Materials Services

The SCA was established by the New York State government to construct school facilities to reduce overcrowding and to provide new schools in growing neighborhoods. Focusing on the environmental consulting services, dating back to the 1980s and the days of the New York City Board of Education, the firm continues to provide broad support to SCA's effort, including environmental assessments in meeting the requirements of the State Environmental Quality Review Act (SEQRA), and site selection and property acquisition support for potential new sites. AKRF is currently serving under three individual on-call contracts for site acquisition and environmental consulting services, hazardous materials consulting services, and architectural and engineering services.

AKRF has undertaken various assignments under two consecutive hazardous materials on-call contract, including environmental assessment, remedial design, and plumbing disinfection consulting tasks. For potential new school sites, assignments include initial due diligence, Phase I environmental site assessments (ESAs) and multi-media subsurface investigation of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school, likely remediation requirements, and associated costs. For sites undergoing design and development, assignments include preparation of remediation plans, design of sub-slab depressurization systems (SSDS) and contract specifications, and construction oversight. The work has also included conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills for existing schools. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours. Ms. Lapin is the QA/QC officer for all of the SCA hazardous materials assignments and the Professional Engineer (P.E.) of record for the various remediation systems, including sub-slab depressurization systems (SSDS).

Hudson River Park, New York, NY

Ms. Lapin is directing AKRF's hazardous materials work during construction of Hudson River Park, a five-mile linear park along Manhattan's West Side. As the Hudson River Park Trust's (HRPT's) environmental consultant, AKRF has overseen preparation and implementation of additional soil and groundwater investigations [working with both the New York State Department of Environmental Conservation (NYSDEC) and the New York City Department of Environmental Protection (NYCDEP)], all health and safety activities, and removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the Environmental Impact Statement (EIS) process, including extensive database and historical research, and soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

Davids Island Site Investigations, New Rochelle, NY

Ms. Lapin managed the hazardous materials investigation of Davids Island, the largest undeveloped island on the Long Island Sound in Westchester County. The 80-acre island features pre- and post-Civil War military buildings and parade grounds, and is viewed as a major heritage, tourism, and recreational amenity. The island, formerly known as Fort Slocum, was used by the U.S. military, beginning in the 19th century, as an Army base, hospital, and training center. The island was planned for county park purposes. The investigation included a Phase I Environmental Site Assessment, with historical research going back to the 17th century, a Phase II (Subsurface) Investigation, underground storage tank investigations, asbestos surveys, and conditions surveys of all remaining structures. Cost estimates were submitted to Westchester County for soil remediation, asbestos abatement, and building demolition.

Yonkers Waterfront Redevelopment Project, Yonkers, NY

For this redevelopment along Yonkers' Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I Environmental Site Assessments of 12 parcels, investigations of underground storage tank removals and associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, which enabled construction of mixed-use retail, residential development, and parking.

Storage Deluxe, Various Locations, NY

Ms. Lapin manages the firm's ongoing work with Storage Deluxe, which includes Phase I Environmental Site Assessments and Phase II Subsurface Investigations, underground storage tank removals and associated remediation, asbestos surveys and abatement oversight, and contaminated soil removal and remediation for sites in Connecticut, the Bronx, Brooklyn, Manhattan, Queens, Westchester County, and Long Island.

Columbia University Manhattanville Academic Mixed-Use Development, New York, NY

Ms. Lapin served as Hazardous Materials Task Leader on this Environmental Impact Statement (EIS) for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work included Phase I Environmental Site Assessments for the properties within the site boundaries, and estimates for a Subsurface (Phase II) Investigation of the entire development area. The firm's Hazardous Materials group performed over 30 individual Phase I Environmental Site Assessments for properties within the development area. In addition, a Preliminary Environmental Site Assessment (PESA) was completed in conjunction with the Environmental Impact Statement (EIS). Based on the Phase I studies, AKRF conducted a subsurface (Phase II) investigation in accordance with a New York City Department of Environmental Protection (NYCDEP) approved investigative work plan and health and safety plan. Subsurface activities included the advancement of soil borings, groundwater monitor wells, and the collection of soil and groundwater samples for laboratory analysis. This study was used to estimate costs to remediate contaminated soil and groundwater, and underground storage tanks and hazardous building materials, including lead-based paint and asbestos-containing materials.

DPR Soundview Park Playgrounds and Open Space, Bronx, NY

AKRF is part of a team working on the reconstruction of this 212-acre NYCDPR public park located along the Bronx River in the Bronx, New York. The park was identified as an underutilized park and is being improved in accordance with the goals of PlaNYC. Ms. Lapin is overseeing AKRF's hazardous materials investigations including environmental and remediation-related work. AKRF prepared the Environmental Assessment Statement (EAS) and the project has moved into the design and construction phase. The remediation/construction of multiple phases of the development is currently underway.

Rego Park Home Depot, Queens, NY

Solvent contamination was encountered during retail development of a former industrial property in Rego Park, Queens, New York. The site work included an extensive investigation and a multi-phase remediation performed under the NYSDEC Voluntary Cleanup Program (BCP). Remediation included removal of aboveground and underground storage tanks (ASTs and USTs) and hotspot soil removal. An Air Sparging/Soil Vapor Extraction (AS/SVE) groundwater remediation system designed by AKRF was installed as part of the building construction. Continued remediation work included upgrading and expanding the AS/SVE system after the store was opened. AKRF prepared the Final Engineering Report and obtained closure with a Release and Covenant Not to Sue issued by NYSDEC in 2013. AKRF continues operations, maintenance, and monitoring under the NYSDEC-approved Site Management Plan. Ms. Lapin is the Professional Engineer (P.E.) of record for the remediation design and implementation in accordance with the NYSDEC Brownfield Cleanup Program (BCP).

STEPHEN T. MALINOWSKI, QEP

VICE PRESIDENT

Stephen Malinowski is a Vice President with more than 20 years of professional experience in assessment, investigation, and remediation of environmental contamination-related issues. Steve has managed all aspects of environmental projects with multi-disciplinary teams, including public agencies, developers, property owners, architects, and construction managers to navigate regulatory programs efficiently and achieve project objectives. His projects fall under the regulatory oversight of the USEPA, NYSDEC, NYCDEP and NYCOER including the Federal and New York State Superfund, New York State Brownfield Cleanup Program (BCP) and petroleum spills, RCRA/IUC closures, New York City Voluntary Cleanup Program (VCP) and E-Designation program, and Nassau and Suffolk County regulatory programs. His proficiency in the development of custom scopes of work and accurate cost estimates coupled with his field-experience, knowledge of regulations, and excellent rapport with regulatory personnel allow him to provide turnkey environmental consulting for remediation, development, infrastructure improvement, and coastal resiliency projects.

Mr. Malinowski's experience includes the design, implementation, and management of environmental assessment, investigation and remediation projects in the New York Metropolitan Area including soil groundwater investigation, monitoring, and sampling programs, Brownfield and hazardous waste site investigations; underground storage tank studies, including soil contamination delineation, classification, waste removal and disposal. He has overseen and conducted hundreds of Phase I Environmental Site Assessments (ESAs) and Phase II investigations in a variety of environmental settings ranging from industrial sites to sites in challenging urban areas, many of them in conjunction with site redevelopment and property transaction related activities. In addition, Steve has designed and implemented indoor air and soil vapor intrusion surveys at industrial, commercial and residential properties in accordance with NYSDOH protocols, some requiring sub-slab depressurization or soil vapor extraction systems.

BACKGROUND

Education

B.A., Environmental Science, State University of New York at Plattsburgh

Licenses/Certifications

Qualified Environmental Professional from the Institute of Professional Environmental Practice (IPEP)

New York State Professional Geologist -000422

Certified Brownfield Professional by New York City Office of Environmental Remediation

Health and Safety Operations at Hazardous Materials Sites 29 CFR 1910.120

OSHA 10 Hour Occupational Construction Safety and Health

Professional Memberships

Member, Long Island Association of Professional Geologists (LIAPG)

Member, Institute of Professional Environmental Practice (IPEP)

Awards

Big Apple Brownfield Award recipient as part of the Cornerstone B1 (LaTerraza) redevelopment team 2011

Big Apple Brownfield Award recipient as part of the Flushing Commons redevelopment team 2017

Big Apple Brownfield Award recipient as part of the Jamaica 94th Avenue redevelopment team 2017

Years of Experience

Year started in company: 2013

Year started in industry: 1992

RELEVANT EXPERIENCE

NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION (NYCDDC) FEASIBILITY AND PRE-SCOPING SERVICES FOR EAST SIDE COASTAL RESILIENCY, NEW YORK, NY

Mr. Malinowski lead the subsurface exploration program for a multidisciplinary design team selected by the New York City agency partnership of NYCDDC, New York City Department of Parks and Recreation (NYCDPR), New York City Department of Transportation, and the Mayor's Office of Recovery and Resiliency (ORR) or the Feasibility Study and Pre-Scoping Services for East Side Coastal Resiliency (ESCR) project. AKRF provided technical analysis and pre-scoping services, including complex conceptual design services, for 100+ year storm protection with anticipated sea level rise along the east side of Lower Manhattan. The ESCR subsurface exploration program involved a review of available utility plans and environmental reports involving manufactured gas plant (MGP) and petroleum-related contamination along a 2.5 mile study area from Montgomery Street to East 23rd Street to develop a Subsurface Investigation Work Plan for approval by the NYCDEP. The program included both public and private utility mark-out services across vast areas of the project containing critical infrastructure to enable the installation of 81 deep borings, 515 shallow borings, and 10 temporary groundwater wells.

Mr. Malinowski was in charge of all aspects of the management and implementation of the field investigation including access coordination, permitting, and reporting. He was also responsible for interpretation of a wide-range of data, providing critical cost and health/safety advice to the design team, and preparation of technical reports for NYCDEP in order to satisfy City Environmental Quality Review (CEQR) requirements.

NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION (NYCDDC) PRELIMINARY AND FINAL DESIGN SERVICES FOR EAST SIDE COASTAL RESILIENCY, NEW YORK, NY.

AKRF is leading a multidisciplinary design team that was selected by the New York City agency partnership of NYCDDC, New York City Department of Parks and Recreation (NYCDPR), New York City Department of Transportation, and the Mayor's Office of Recovery and Resiliency (ORR) to provide engineering, planning, landscape architecture, urban design and community engagement services for the Preliminary and Final Design Services for East Side Coastal Resiliency (ESCR).

Mr. Malinowski worked with the design team to identify additional data needs based on advances in the design and developed a Supplemental Subsurface Investigation Work Plan for NYCDEP-approval. Mr. Malinowski leads all aspects of the management and implementation of the supplemental field investigation including access coordination, utility locating, permitting and reporting. He is responsible for the interpretation of a wide-range of data, and to provide critical cost and health/safety direction to the design team. He is also responsible for preparation of all reports (EIS, cost reports, Soil and Groundwater Management Plan, and presentations to the NYC team.)

Mr. Malinowski has led extensive geology and hydrogeological studies to evaluate the impacts of the flood protection structure on the groundwater flow and transport of MGP-related wastes. He is currently supporting the City team with the coordination of remedial efforts pertains to MGP contaminants with NYSDEC, Con Ed and the various public and private entities that have a stake in the project. Once the preliminary design is released, Steve will prepare environmental specifications for the project to be used during the procurement of contractor bids.

REMEDIAL DESIGN, GOWANUS CANAL FIRST STREET TURNING BASIN, NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION

Mr. Malinowski is the Project Manager for the remedial design for restoration of the Filled-in Former First Street Turning Basin adjacent to the Gowanus Canal in Brooklyn, New York. The remediation is being conducted as part of an Order of Consent between the City of New York and USEPA for the Gowanus Canal Superfund Site. Steve is responsible for coordination of a multidisciplinary team to evaluate existing structure and environmental conditions associated with the site and the immediate surrounding area. Steve is overseeing the implementation of underwater bulkhead inspections and multi-beam sounding surveys in the Gowanus Canal, environmental and geotechnical investigations, surveys, structural and existing condition evaluations of nearby properties and is responsible for all reporting and communications for the project. He is working with nearby property owners to initiate access agreements for work on their properties. Steve is also assisting the DDC with presentations at the Gowanus Community Action Group and is working closely with the USEPA to implement an archaeology monitoring plan during subsurface disturbance activities

The remedial design will include removal of fill and sediment within the filled-in turning basin in an approximately 475-foot by 50-foot area and the creation of a wetland shelf. Design considerations include geotechnical concerns related to adjacent buildings and new and existing bulkheads; soil and water management; landscape design; and access/construction logistics. The project design in anticipated to be completed in early 2018.

13TH AND 14TH STREET REALTY, NYS BROWNFIELD REDEVELOPMENT, NEW YORK, NY

Mr. Malinowski directed all Phases of this NYS Brownfield project including the initial investigation, submittal of a BCP Application simultaneously with a Remedial Investigation Work Plan and an Interim Remedial Measures Work Plan, which enabled the investigation and remediation to be implemented concurrently with planned site redevelopment activities. The site consisted of an approximately 20,000 square foot property in Manhattan comprised of 100 year old dilapidated buildings. The presence of perchloroethene (PCE) contamination associated with a former dry cleaner prevented the property owner from selling. The developer applied to the New York State Brownfield Cleanup Program (BCP) as a "Volunteer" to eliminate off-site liability. Prior to the client securing its construction loan all plans were approved by NYSDEC and a detailed remedial estimate was approved for financing by the client's lending institutions.

The investigation included soil and soil vapor testing as well as the installation and sampling of groundwater monitoring wells. The remediation activities included the removal of underground oil tanks, soil waste classification testing, and removal of approximately 15,000 tons of non-hazardous petroleum and lead contaminated soil as well as 200 tons of hazardous soil containing PCE. A water-proofing membrane was installed beneath the entire building to eliminate the exposure pathway for PCE into the new 8-story residential building. The investigation and remedial work was performed under a construction health and safety plan that included a community air monitoring program. The client received approximately $6,000,000 in tax credits from NYS for the Track 2 cleanup of this underutilized contaminated property.

CONFIDENTIAL CLIENT – LITIGATION SUPPORT SERVICES, GREENPOINT, BROOKLYN, NY

AKRF was contracted by a private land owner of a 17-acre site along the Newtown Creek waterfront located above the 55-acre 20-million gallon underground petroleum plume. The site is located on property formerly utilized for petroleum refining and storage, and the property owner requested assistance understanding the impacts, negotiating investigation and cleanup activities with ExxonMobil and NYSDEC, to protect employees and limit disturbances to business operations. Mr. Malinowski's initial role in 1999 involved the review of work plans, investigation and remediation reports and acting as a liaison between the Site Owner, ExxonMobil, and NYSDEC to mitigate seepage of petroleum through the bulkhead into Newtown Creek. In 2005, ChevronTexaco's predecessor, Texaco, Inc. assumed responsibility for an approximate 11-acre portion of the property situated along the waterfront and initiated a site characterization which identified soil, groundwater and soil vapor concerns beneath the property. Mr. Malinowski was responsible for evaluating the impacts and assessing the alternative analysis evaluation to select a remedy that protected site personnel and cleaned up the property. Since ExxonMobil was remediating a portion of the property and the surrounding neighborhood and Texaco, Inc. was responsible for the waterfront parcel, Mr. Malinowski's role also involved discussions with ExxonMobil, Texaco, and NYSDEC to ensure the cleanup strategies were coordinated to address the potential of additional petroleum migrating onto the property.

In addition to reviewing, overseeing and advising on the investigation and cleanup activities, Mr. Malinowski has prepared Phase I Environmental Site Assessments for the property, reviewed historic maps and documents on the refining history of Newtown Creek, initiated indoor air monitoring programs, arranged for the removal of underground oil tanks, designed and installed sub-slab depressurization systems, and responded to ongoing work inquiries by the oil companies. He also managed the development of and implementation of a Stormwater Pollution Prevention Plan to comply with a NYSDEC Order on Consent and conducted waste classification and disposal for hazardous fill material encountered during construction of the stormwater treatment system. Mr. Malinowski's work for this client remains ongoing.

EMPIRE STATE VARNISH CORPORATION - RCRA CLOSURE, GREENPOINT, BROOKLYN, NY

Mr. Malinowski orchestrated the Closure of a varnish company with a host of RCRA problems situated over our Nation's largest underground oil spill by negotiating an investigation and cleanup with NYSDEC and the property purchaser ExxonMobil. The $750,000 remedial cost estimate was utilized to create an escrow account to finance the investigation and remediation. The remediation included the disposal of more than 1,000 drums of hazardous/flammable waste, 17 underground storage tanks, and a vast inventory of small containers of hazardous material, off-site disposal of approximately 700 tons of non-hazardous soil, abatement of asbestos containing material and construction health and safety monitoring. The work was performed under the oversight of NYSDEC's RCRA unit as well as Albany's Bureau of Environmental Remediation overseeing the regional ExxonMobil Off-site Spill aka the Greenpoint Oil Spill. The completed project provided ExxonMobil with a strategically located property to greatly increase their remediation efforts of the regional petroleum spill and avoided the property being listed on the New York State's list of inactive hazardous waste sites.

LITIGATION SUPPORT SERVICES, LONG ISLAND CITY, QUEENS, NY

AKRF was contracted by two separate litigation groups to identify historic ownership, waterfront landfilling activities, and land use practices from the earliest period of development through the present for an approximately 300,000-squarefoot area along the Newtown Creek waterfront. The project site had a long history of industrial activity including coal and petroleum refining, chemical storage and manufacturing, and petroleum recycling. Mr. Malinowski worked with AKRF's historians to review data gathered from various resources, such as historic maps, historic photographs, historic conveyance records, newspaper articles, local histories, and readily available records such as historic aerial photographs, Sanborn fire insurance maps, historic topographical maps, historic city directories, and transcripts and exhibits from depositions conducted in litigation. The data collected was used to prepare a summary of the development and industrial history for the project area detailing ownership, property uses, and landfilling activities along the Newtown Creek waterfront.

WATERVIEW AT GREENPOINT, LLC, NYC OER VCP, 77 COMMERCIAL STREET BROOKLYN, NY

AKRF provided environmental consulting services in connection with the proposed affordable housing development at 77 Commercial Street as part of ongoing revitalization of the Greenpoint waterfront. The project comprises the redevelopment of an approximately 110,000-squarefoot former industrial parcel into a mixed-use commercial/residential development including public waterfront esplanade, affordable housing, and three interconnected buildings ranging from 2 to 40 stories. The site is being remediated under the New York City Mayor's Office of Environmental Remediation (OER), and is listed with an E-Designation for Hazardous Materials, Air Quality, and Noise.

Mr. Malinowski oversaw the preparation of a Remedial Investigation Work Plan and implementation of a Remedial Investigation (RI) which included 38 soil samples, 6 groundwater samples, and 11 soil vapor samples. Based on the results of the RI, he oversaw the preparation of a Remedial Action Work Plan (RAWP) that included excavation of approximately 90,000 tons of soil, removal of underground oil tanks, installation of a vapor barrier beneath the entire building, and design drawings for a sub-slab depressurization system. Upon approval of the RAWP, Mr. Malinowski helped enroll the project into OER's Voluntary Cleanup Program (VCP) to enable an exemption from hazardous waste disposal taxes and to capitalize on additional community involvement provided by OER. AKRF, OER, and community leaders developed proactive measures to limit the potential disturbances from construction and to help keep concerned community members informed of planned activities. He also designed and conducted an extensive in-situ testing of soil to pre-classify the material for disposal.

Mr. Malinowski managed the associated E-Designation work for Air Quality and Noise (E-138) to render the site protective of Air Quality and Noise impacts. The work included a site-specific noise study and evaluation of proposed fuel types, mechanical equipment, and emission stack locations to prepare an Air Quality and Noise Remedial Action Plan (RAP). All documents were approved by OER and the project is awaiting groundbreaking and start of construction.

FLUSHING COMMONS DEVELOPMENT, NYC OER VCP SITE, 38-18 UNION STREET, QUEENS, NY

AKRF prepared an Environmental Impact Statement (EIS) under New York City Environmental Quality Review (CEQR) for Flushing Commons, LLC, a 2-million-square-foot mixed-use, private-public development in Flushing, Queens. The project was sponsored by EDC and developed in partnership with Flushing-based TDC Development and Construction (TDC), and Rockefeller Group Development. As a result of the environmental review process a Restrictive Declaration was assigned to the property. Due to the scale of the project, the project development was divided into two Phases.

Flushing Commons Phase I included a 67,600-square-foot automotive parking area at 38-18 Union Street. Mr. Malinowski prepared a Remedial Investigation Work Plan and oversaw the implementation of a Remedial Investigation (RI), which included soil, groundwater, and soil vapor samples. Based on the results of the RI, AKRF prepared a Remedial Action Work Plan (RAWP) including excavation of approximately 178,000 tons of soil and a vapor barrier beneath the entire building. Upon approval of the RAWP, Mr. Malinowski helped enroll the project into OER's Voluntary Cleanup Program (VCP) to capitalize on additional community involvement provided by NYCOER. AKRF also conducted extensive waste characterization testing of the soil to pre-classify the material for disposal, provided construction oversight, and implemented a Community Air Monitoring Program (CAMP) during 11 months of excavation.

Steve received a Big Apple Brownfield awards from the NYC Brownfield Partnership for employing sustainable remediation practices during the excavation. Steve coordinated participation in NYCOER's Clean Soil Bank program, which led to a the reuse of approximately 14,000 cubic yards of material to nearby local areas affected by Super Storm Sandy and 20,000 cubic yards of soil to a recycling plant for reuse as concrete mix. These efforts eliminated more than 1,500 trucks trips to regional disposal locations outside of NYC.s effectively reducing the carbon footprint of the redevelopment, and provided for the reuse of material on-site and elsewhere in NYC. To complete the project, AKRF prepared a Remedial Action Report documenting the Track 1 cleanup of the site which was approved by NYCOER.

BRICKENS CONSTRUCTION, 121ST PRECINCT, 970 RICHMOND AVENUE, STATEN ISLAND, NY

Mr. Malinowski assisted Brickens Construction with the pre-characterization of approximately 15,000 tons of soil requiring excavation under a NYC DDC contract for the construction of the 121st Precinct on Staten Island. Mr. Malinowski designed a waste classification testing program, obtained approval from suitable disposal facilities and prepared an Excavated Materials Disposal Plan (EMDP) for review by NYC DDC. Upon approval of the EMDP, Mr. Malinowski coordinated the direct loading, transportation and disposal of the material while staff working under his direction initiated a community air monitoring program, and tracked each shipment for reporting purposes. As the excavation advanced, Mr. Malinowski arranged groundwater testing and worked with the project engineering team to design a dewatering scheme and obtain a permit from the NYCDEP to discharge dewatering fluids to the combined sewer system.

2264-2772 MORRIS AVENUE, NYCDEP CEQR, BRONX, NY

AKRF is providing environmental hazardous materials and consulting services in connection with the proposed affordable housing development at 2264-2272 Morris Avenue. The proposed 11-story building is expected to include 94 much-needed units of new affordable and supportive housing. Mr. Malinowski oversaw the preparation of hazardous materials reports for the project site including a Phase I ESA and Phase II site investigation for pre-purchase due diligence purposes. As part of the CEQR review, a Phase II Work Plan and Supplemental Phase II Investigation were performed under the regulatory oversight of the New York City Department of Environmental Protection (NYCDEP). Mr. Malinowski oversaw the preparation of a Remedial Action Plan (RAP) for NYCDEP approval which includes the removal of underground storage tanks (USTs), characterization and disposal of approximately 5,000 tons of soil, and the installation of a vapor barrier. AKRF is currently overseeing the implementation of the RAP and under Mr. Malinowski's direction has removed the USTs, cleaned up a petroleum spill to the satisfaction of the NYSDEC, and is conducting community air monitoring during the foundation excavation.

3363-3365 THIRD AVENUE, NYC OER VCP SITE, BRONX, NY

AKRF is providing environmental consulting services in connection with the proposed affordable housing development at 3363-3365 Third Avenue. The proposed project consists of a residential building with a basement and approximately 30 affordable housing units. Mr. Malinowski oversaw the preparation of Phase I ESA for due diligence purposes and to support an application to the New York City Acquisition Fund. The Phase I identified recognized environmental conditions as well as an E- Designation from the Morrisania Rezoning Action. Mr. Malinowski is assisting the client with satisfying the E –Designation and has prepared and implemented a Remedial Investigation Work Plan under the regulatory oversight of the New York City Mayor's Office of Environmental Remediation (NYCOER). The Remedial Investigation included soil, soil vapor, groundwater and ambient air sampling. AKRF also prepared a Remedial Action Work Plan (RAWP) and conducted which includes the design of a sub-slab depressurization system (SSDS) and vapor barrier system to prevent potential soil vapor intrusion. AKRF conducted waste disposal testing to characterization approximately 4,500 tons of soil for off-site disposal and is currently conducting environmental monitoring during excavation of the site soils and installation of the SSDS and vapor barrier. The site is enrolled in NYCOER's Voluntary Cleanup Program and the client is anticipating receiving the maximum allowable Brownfield Incentive Grant for this affordable housing project.

ENVIRONMENTAL CONSULTING SERVICES FOR NYCOER E-DESIGNATED AND VCP SITES, VARIOUS LOCATIONS, NY

Mr. Malinowski has provided environmental services required to satisfy hazardous materials-related E-designations on various locations in New York City, including 3363-3365 Third Avenue in the Bronx for Bronx Pro Real Estate Management, Flushing Commons in Queens, NY for the Rockefeller Group Development Corp., Manhattan West for Brookfield Properties, 432 East 14th Street in Manhattan for Urban Development Partners, 77 Commercial Street in Brooklyn, NY for Clipper Equities, and 260 West 26th Street in Manhattan and 94-02 148th Street in Queens, NY for Artimus Construction. These services included Phase I environmental site assessments, remedial investigations, preparation of Sampling Protocols, Remedial Action Plans and Health and Safety Plans based on identified hazardous materials issues, correspondence with the New York City Mayor's Office of Environmental Remediation (OER), remediation oversight as required by identified conditions, and preparation of Remedial Investigation and Remedial Closure Reports. He initiated pre-disposal soil classification programs and assisted with the disposal of large volumes of soil displaying characteristics from clean to hazardous containing to facilitate the installation of the new building foundations.

ENVIRONMENTAL CONSULTING SERVICES FOR NYCDEP SITES, VARIOUS LOCATIONS, NY

Mr. Malinowski has provided environmental services required to satisfy hazardous materials-related requirements on various locations in New York City, 23-25 Wooster Street and 325-329 West Broadway and 98 Franklin Street in Manhattan, NY for DDG Partners, 48-21 5thAvenue in Queens, NY for the Milestone Group, 2264-2272 Morris Avenue and 1070 Washington Avenue and 2264-2272 Morris Avenue in the Bronx, NY for the Bronx Pro Group, 1734 St. John's Place in Brooklyn, NY for MDG Design and Construction, LLC, and 20 West 40th Street in Manhattan for HFZ Capital. These services included Phase I environmental site assessments, remedial investigations, preparation of Sampling Protocols, Remedial Action Plans and Health and Safety Plans based on identified hazardous materials issues, correspondence with the New York City Department of Environmental, remediation oversight as required by identified conditions, and preparation of Site Investigation and Closure Reports. He has also initiated pre-disposal soil classification programs and assisted with the disposal of large volumes of soil to facilitate the installation of the new building foundations. Many of the projects with NYCDEP also involved the New York City Housing and Preservation Department (NYCHPD).

875 TENANT CORP., OIL SPILL INVESTIGATION AND REMEDIATION, NEW YORK, NY

Mr. Malinowski assisted one of the most prestigious real estate organizations in the northeast to investigate and remediate a petroleum spill in the basement of one of their high-rise residential properties along central park east in Manhattan. The source of the spill was a petroleum storage tank containing #6 fuel oil located in an exterior vault beneath the adjoining sidewalk. The contamination was located beneath the tank vault and adjacent to the foundation wall. The location of the oil and the viscous nature of the oil necessitated the need for innovative technology to remediate the spill with the least amount of disruption to this fully occupied and active residential building.

Mr. Malinowski performed a subsurface investigation to determine the extent of the impacts and assisted with the design and installation of a multi-phase extraction system in the building's sub-basement. The extraction system was fabricated on-site and consisted of eight extraction points to remove petroleum and groundwater pooled outside the foundation of the buildings' subbasement. The treatment system operated under a Stipulation Agreement with NYSDEC and required a NYCDEP sewer discharge permit. To mobilize the viscous oil steam was injected outside the foundation wall beneath the tank vault at nine locations. Formal spill closure was received by NYSDEC after a surfactant application was applied to the wells to eliminate the dissolved petroleum constituents and the subbasement walls were sealed with a chemical grout to prevent exposure to building occupants. Mr. Malinowski was responsible for all project activities, prepared all plans and reports and maintained communications with NYSDEC and the Tenant Board.

SITE INVESTIGATION, ALBANESE ORGANIZATION, WYANDANCH, NY

AKRF performed a Phase II subsurface investigation for the Albanese Organization to support the Wyandanch Rising project located on the Long Island Rail Road (LIRR) and Town of Babylon parking areas immediately located north of the Wyandanch train station. Prior to beginning the work, AKRF obtained a rail road protective liability insurance policy for the project and a Site Entry Permit from LIRR. The work consisted of the installation of soil and groundwater borings as well as the inspection and sampling of 13 stormwater drywells and five sanitary leaching structures under the oversight of the Suffolk County Department of Health Services (SCDHS). Based on these results, the SCDHS issued a "no further action" letter and the client was able to obtain financing for the project.

GAS STATION CLOSURE AND PROPERTY TRANSFER, HEWLETT, NY

On behalf of a private property owner, AKRF provided third party oversight for closure of a filling station by a major national gasoline retailer and assisted with environmental matters which complicated the sale of the property to a commercial developer. The remedial work conducted by the gasoline retailer included the removal of three active and five improperly abandoned underground storage tanks and pump islands and the three hydraulic lifts. AKRF maintained direct communication with the New York State Department of Environmental Conservation (NYSDEC) to ensure that the on-site soil was excavated to the furthest extent possible and that a post-remedial groundwater monitoring plan was promptly initiated so the property could be promptly redeveloped. Additional investigation activities conducted by the purchaser revealed the presence of chlorinated solvents in the groundwater above NYSDEC groundwater standards which further complicated the pending transaction. AKRF conducted research of the surrounding area and contacted the United States Environmental Protection Agency (EPA) regarding a well-documented nearby solvent plume. AKRF's efforts expedited the closure of the fuel spill and our communications with NYSDEC and EPA provided a level of comfort to the Purchaser that allowed the property transaction to proceed.

DRYWELL REMEDIATION, ABCO REFRIGERATION COMPANY, HAUPPAUGE, NEW YORK

Mr. Malinowski assisted the ABCO Refrigeration Company with a real estate transaction complicated by stormwater drywells contaminated with semi-volatile organic compounds. AKRF notified the Suffolk County Department of Health Services (SCDHS) and performed further investigation activities to test the sanitary system for contamination and utilized a remote camera to locate additional drywells buried beneath the asphalt pavement.

The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation was conducted using a high-powered vacuum truck under the oversight of SCDHS and included the disposal of approximately 5,000 gallons of liquid and 42 tons of soil from four drywells servicing the property. Post-remedial sediment samples were collected from the base of the drainage structures to document the soil quality. Based on these results, the SCDHS issued a "no further action" letter and the property transaction proceeded on schedule.

ISLAND REALTY, HOLBROOK AND RONKONKOMA, NEW YORK

During the pre-purchase environmental due diligence process for the purchase of an eight multi-tenant industrial building in a four property portfolio, the Purchaser's consultant identified contamination in five separate sanitary systems and approximately 20 stormwater drywells. The property transaction was terminated, and Mr. Malinowski acted as turnkey for the requisite reporting of the contamination to Suffolk County Department of Health Services (SCDHS). Following notification, Mr. Malinowski participated in inspections of each property with SCDHS and the preparation of four separate work plans to remediate each property. The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation activities utilized high-powered vacuum trucks to remove approximately 30,000 gallons of liquid and 300 tons of sludge and soil from the septic tanks, leaching pools and storm drains servicing the properties. The work was performed under the regulatory oversight of the SCDHS and a No Further Action letter was received for each property from the SCDHS.

SANITARY SYSTEM REMEDIATION, SMITHTOWN, NEW YORK

Mr. Malinowski performed inspection, testing, and remediation services for a commercial property owner in Smithtown, New York. As the property was undergoing pre-sale environmental assessment and investigation, perchloroethylene (PCE) was identified in the sanitary system above Suffolk County Department of Health Services (SCDHS) action levels. Mr. Malinowski developed a strategy to remediate the property under the oversight of the SCDHS. The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation activities utilized high-powered vacuum trucks to remove approximately 8,000 gallons of liquid and 20 tons of sludge from the septic tank and two leaching pools servicing the property. All work was expedited by Mr. Malinowski to meet the 30-day deadline of the pending real estate transaction. The work was performed under the regulatory oversight of the SCDHS, and a No Further Action letter was received from the SCDHS with 30 days.

TARGET ROCK CORP., FARMINGDALE, NEW YORK

The Target Rock Corp. was issued violations from the Suffolk County Department of Health Services (SCDHS) for an illegal industrial discharge of trichloroethylene (TCA) to an abandoned sanitary system and multiple bulk storage tank infractions. Under the supervision of SCDHS, Mr. Malinowski supervised dye tests of the suspect discharge as well as numerous additional floor drains to confirm their discharge outflow. Prior to beginning excavation activities, a subsurface investigation was performed to delineate soil and groundwater impacts and profile the soil for waste disposal purposes. Under his direction, approximately 300 tons of soil was excavated and transported as hazardous waste to the Stablex facility in Canada from the sanitary system and nearby area. In addition to the remediation, Mr. Malinowski worked closely with the project engineer to register and prepare plans to upgrade several chemical and petroleum bulk storage tanks to comply with SCDHS Article 12. He work also included a chemical inventory of the entire 250,000-square foot facility.

AIR TESTING NEAR GROUND ZERO FOLLOWING 911, NEW YORK, NY

The dust cloud generated during the catastrophic collapse of the former World Trade Center and the buried fires that continued to smolder caused many local area businesses and residents to become increasingly concerned about air quality. Mr. Malinowski led a sampling team to evaluate the quality of indoor air and the adequacy of interior cleaning inside several privately-owned buildings in close proximity to Ground Zero. Mr. Malinowski worked with a Certified Industrial Hygienist to develop and determine an appropriate testing program to evaluate the indoor air quality at five mixed-use commercial properties that were in various stages of tenant reoccupation. The specifically-designed sampling protocols included testing for asbestos, volatile & semi-volatile classes of organics, dust, mercury, PCBs, lead, and carbon monoxide. The air sampling teams collected interior and exterior air samples, both at street level and on the building rooftops for background purposes.

The initial review and design of the recommended sampling protocols, as well as implementation of the air tests, laboratory analyses, quality control, and reporting to the Client were all expedited and completed within six weeks after 9/11. The results were compared to the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) indoor air quality levels, the OSHA permissible exposure limits (PELs) divided by a safety factor of 10 and EPA's Asbestos Hazard Emergency Response Act (AHERA). The results showed that the cleaning of the building interior and ventilation ducts eliminated any health concerns within the buildings and the client could allow occupants to safely reoccupy the buildings.

STANLEY COMMONS AND STANLEY SENIOR HOUSING, EAST NEW YORK, BROOKLYN, NY

AKRF, Inc. prepared a Part 58 Environmental Assessment (EA) and a NYC CEQR Technical Memorandum for the Stanley Commons project in East New York, Brooklyn. This project will result in the development of 240 affordable housing units on the site of an underutilized parking lot within the NYCHA Linden and Boulevard Houses. AKRF worked with both HPD and NYCHA on the environmental review documentation. Prior to joining AKRF, Mr. Malinowski conducted a Phase I ESA, remedial investigation and prepared a Remedial Action Plan for both the townhouse portion and adjacent senior housing parcel.

TENANT ENVIRONMENTAL INSPECTION PROGRAM, MULTIPLE LOCATIONS, NY

Mr. Malinowski directed a Tenant Inspection Program for a landlord who owned 1.2 million square feet of multi-tenanted industrial and commercial properties located in Queens, Nassau, and Suffolk counties for nearly a decade. The Tenant Inspection Program was a compliance program established to address concerns that certain tenant's operations may have been negatively impacting the property. The program included an annual inspection of each tenant space to determine their processes, chemical usage, waste disposal habits, current permits, and fire safety procedures. In addition, each sanitary system was sampled for chemical constituents identified during the inspections and approximately 300 exterior storm drains were inspected for evidence of illegal discharges or dumping. Based on the results of the inspection and sampling, letter reports were sent to the tenants informing them of any issues and educating them on best practices. Each tenant was assisted with regulatory compliance, permitting, and health and safety. The landlord received a report for each building detailing the findings of the inspection and sampling, and any follow-up actions. The landlord became educated on environmental issues and was able to incorporate the cost for this program and environmental compliance requirements into their leases as common area maintenance (CAM) charges. This resulted in a direct improvement in tenant housekeeping practices and enabled the landlord to obtain a comprehensive environmental insurance policy covering the entire property portfolio.

NYCDEP DEWATERING PERMITS, VARIOUS LOCATIONS, NY

Mr. Malinowski has provided environmental services to support dewatering design and obtain permits to discharge effluent to the NYC sewer system at various locations, including 1070 Washington Avenue in the Bronx for Bronx Pro Real Estate Management, 260 West 26th Street in Manhattan for Artimus Construction, 23-25 Wooster Street, 325-329 West Broadway, and 180 East 88th Street in Manhattan for DDG Partners, 100 Greenwich Street in Manhattan and 172 Montague in Brooklyn for Cava Construction, 970 Richmond Avenue in Staten Island for Brickens Construction, and 5-49 Borden Avenue in Queens for Pav-Lak Contracting. The work included designing sampling programs to obtain representative samples, assisting the constructions teams with the design of treatment systems sediment and volatile organic compounds, and preparation of permit packages for NYCDEP review/approval. In addition, Mr. Malinowski has worked with NYCDEP to conduct dye testing of sewer system to confirm stormwater flow to the combined sewer system and rule-out the possibly of outflow to a water body of the New York State. Mr. Malinowski has also assisted with the discharge of effluent from a pressure test for a major utility transmission in Brooklyn to the water of New York State. Permission for the discharge was obtained after Mr. Malinowksi and AKRF's engineers provided information to NYSDEC regarding the use of settling tanks and a duel polymer system of Storm Lear Liqui-Floc™ and HaloKlear LBP-210 to reduce discoloration before discharge.

Adrianna Bosco

Professional II

Adrianna Bosco is a Professional II in AKRF's Hazardous Materials Department. She has experience in Phase I and Phase II site investigations and remediation/construction monitoring and oversight, as well as project management and reporting. Ms. Bosco is a 2011 graduate of Manhattan College, where she studied Environmental Engineering. She worked as an Environmental Scientist for PS&S Engineering, Inc. prior to joining AKRF.

Background

Education

B.S., Environmental Engineering, Manhattan College, Bronx, New York, 2011

Licenses/Certifications

40 Hour OSHA HAZWOPER Certified, September 2011

10 Hour OSHA Construction Program Certified, October 2013

Years of Experience

Year started in company: 2014

Year started in industry: 2011

Relevant Experience

East Side Coastal Resiliency, Manhattan, NY

DDC has proposed plans to construct a flood protection system for 100+ year storm protection with anticipated sea level rise along the east side of Lower Manhattan. To support the design and construction of the proposed flood protection structures and supporting utility conveyances, subsurface environmental investigations were performed.

A supplemental investigation was performed in 2016 to further evaluate areas identified during the 2015 investigation. Ms. Bosco conducted a portion of the 2016 subsurface investigation of the 2.5 mile study area from Montgomery Street to East 23rd Street. The ESCR subsurface exploration program involved a review of available utility plans and environmental reports involving manufactured gas plant (MGP) and petroleum-related contamination. Responsibilities included groundwater sampling, soil boring and temporary well installation, and compliance with the Supplemental Subsurface Investigation Work Plan.

541 West 37th Street, Manhattan, NY

Ms. Bosco conducted a Phase I Environmental Site Assessment (ESA) and Subsurface (Phase II) Investigation for this vacant property in the Hell's Kitchen section of Manhattan. The investigation has been conducted under OER as the site lots have an E Designation for hazardous materials. Ms. Bosco prepared the Remedial Action Work Plan for the proposed remediation of the site for the anticipated future use as a hotel and residential building.

Elton Crossing, Bronx, NY

This project consists of the remediation of an approximately 0.73-acre site formerly utilized for various industrial and automotive uses under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). Ms. Bosco provided remedial oversight during soil excavation, which consisted of confirmatory endpoint sampling, sub-slab depressurization system (SSDS) inspections, vapor barrier installation inspections, and air monitoring for particulates and volatile organic compounds (VOCs).

145 West Street, Greenpoint, Brooklyn, NY

The investigation and remediation of this site for the proposed redevelopment for a high-rise residential building on the Greenpoint waterfront has been conducted under the NYSDEC BCP, and remediation for redevelopment was also conducted under New York City Office of Environmental Remediation (OER) as the site lots have an E Designation for hazardous materials. For this project, Ms. Bosco conducted a supplemental remedial investigation, including soil and groundwater sampling, and several rounds of waste characterization soil sampling. Ms. Bosco also performed remedial oversight during activities such as soil excavation for off-site disposal, underground storage tank (UST) removal, SSDS piping installation and testing, and routine Community Air Monitoring Program (CAMP) air monitoring. Ms. Bosco also aided in the preparation of the Final Engineering Report (FER) and Site Management Plan (SMP).

Soundview Park, Bronx, NY

This project consists of reconstruction and enhancement of a 205-acre park in the Bronx. The site was historically a landfill and later backfilled with sanitation fill material prior to park construction. Remediation of this site included the excavation and disposal of contaminated soil and placement of clean fill. Ms. Bosco performed environmental monitoring in compliance with the Construction Health and Safety Plan (CHASP) and Remedial Action Plan (RAP) during the excavation and disposal of historic fill and solid waste. Ms. Bosco was also responsible for conducting air quality monitoring for VOCs and particulates during all soil disturbance activities.

Former Laundry/Dry Cleaning Plant, Harlem, New York

This former dry cleaning property, now a privately owned commercial facility, is the only NYSDEC listed hazardous waste site in Manhattan. The final Remedial Action Work Plans (RAWP) for the site were approved in 2012 and 2013. Remedial work includes removal of contaminated building materials, installation of a soil vapor extraction (SVE) system and SSDS, and in-situ soil and groundwater treatment with chemical-oxidation injection. Ms. Bosco performed remedial action oversight, including SSDS piping installation inspections and Health and Safety Plan (HASP) air monitoring for volatiles and particulates.

PS&S Engineering, Inc. (PS&S), Yonkers, NY

Before joining AKRF, Ms. Bosco was an Environmental Scientist I in the Environmental Department at PS&S. She was responsible for conducting site investigations and providing construction oversight for remediation projects in New York and New Jersey. As a staff scientist, she was responsible for the on-site supervision of subcontractors and interacting with project managers and client representatives. Ms. Bosco also prepared technical reports, work plans, field documentation, and Phase I Environmental Site Assessments.

JACOB MENKEN

FIELD TECHNICIAN

Mr. Menken has a Master of Science in Geology, Bachelor of Arts in Geology, and Bachelor of Science in Environmental Science from the University of Vermont. He is familiar with the following professional techniques: powder and single crystal x-ray diffraction; field geology; remote sensing of natural resources using airborne and satellite imagery; geophysical survey using ground penetrating radar, electromagnetic induction and seismic refraction; optical and hand sample identification of minerals; aseptic laboratory techniques; and stable isotope geochemistry. Mr. Menken's familiarity with hardware includes the following: Crystallography: APEX II Single Crystal X-Ray Diffractometer, Rigaku Powder X- Ray Diffractometer; Geophysical: Ground Penetrating Radar: GSSI SIR 3000 with 400 and 200MHz antennas, Electromagnetic Induction: SSI Profiler EMP-400; Stable Isotope: VG/Fisons SIRA Series II Stable Isotope Ratio Mass Spectrometer Honeywell Photoionization Detector; HACH Portable Water Quality Meter. Mr. Menken is familiar with the following software: X-Ray Crystallography: PDXL, Standard Measurement, APEX 2, ATOMS; Statistical Software: R, SPSS, Geophysical, Geogiga Pro, GSSI Radan 7, GSSI Profiler; Microsoft Office Suite, Adobe Creative Suite; Geospatial: ENVI 5.0, 4.0 and Classic ArcGIS.

BACKGROUND

Education

M.S., Geology, University of Vermont, 2014

B.A., Geology, University of Vermont, 2012

B.S., Environmental Science, University of Vermont, 2012

Certifications

OSHA 40-Hour Health & Safety Training for Hazardous Waste Operations, May 2011

OSHA 8-Hour Health & Safety Training for Hazardous Waste Operations, September, 2016

OSHA 10-Hour Health & Safety Training for Hazardous Waste Operations, August, 2016

Professional Memberships

Mineralogical Society of America

Mineralogical Society of Canada

Geological Society of America

The Society of Sigma Gamma Epsilon, Eta Kappa, National Honor Society in the Earth Sciences

Burlington Gem and Mineral Club

Years of Experience

Year started in company: 2016

Year started in industry: 2012

RELEVANT EXPERIENCE - AKRF

3200 Jerome Ave, Bronx, NY 10468 – Groundwater and Soil Vapor Sampling

AKRF provided groundwater and soil vapor testing for the NYCSCA at the former P.S. 51X. Mr. Menken assisted with the collection of groundwater and soil vapor sampling for waste characterization purposes. Groundwater was sampled from wellheads and soil vapor was sampled from a Sub-Slab Depressurization System (SSDS). All samples were collected in accordance with existing protocol.

112 Atlantic Ave, Brooklyn, NY 11201 – Construction Oversite and Community Air Monitoring

AKRF provided community air monitoring on this site for dust and volatile organic compounds (VOCs) in accordance with existing community air quality standards. Additionally, AKRF provided onsite oversite to ensure additional discovered soil contamination was left in place for determination of the extent of soil. AKRF was also responsible for logging any incoming or outgoing soil or fill laden trucks. For this project Mr. Menken provided on-site monitoring.

285 East 138th Street, Bronx, NY 10454 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the NYSDEC-approved RAWP and Site Management Plan (SMP) for this BCP site in the Bronx. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management, conducts community air monitoring, and prepares daily reports for submittal to the AKRF and NYSDEC project managers. For this project Mr. Menken provided on-site monitoring.

4950 Arthur Kill Road, Staten Island, NY 10309 – Groundwater and Soil Vapor Sampling and Subsurface Characterization Phase II

AKRF provided Phase II services for a wooded site in Staten Island. AKRF characterized eight drill bores drilled by a contractor. Groundwater and soil vapor samples from four of the sites. Additionally, AKRF provided oversite for the excavation of six test pits on the site to characterize the surficial materials and explore subsurface anomalies as detected by previously conducted ground penetrating radar (GPR).

32 N. Main Street, New City, NY – Wastewater Drum Disposal

Mr. Menken oversaw the disposal of two wastewater drums by a contractor. Mr. Menken ensured that the contractor completed the appropriate documented, the wastewater was properly transferred from a damaged to undamaged drum and that the appropriate drums were removed from the site.

158th Street and Brooks Ave, Bronx, NY – Wastewater Drum Disposal

Mr. Menken oversaw the disposal of two wastewater drums by a contractor. Mr. Menken ensured that the contractor completed the appropriate documented, the wastewater was properly transferred from a damaged to undamaged drum and that the appropriate drums were removed from the site.

3610 Glenwood Rd, Brooklyn, NY 11210 – Drinking Water Sampling Oversight

AKRF provided oversight of water quality testing for the NYCSCA at K042. AKRF oversaw the drinking water sampling of a newly installed pluming at a Brooklyn, NY pre-kindergarten for compliance with drinking water bacteria level guidelines. Sampling was observed to ensure compliance with pre-existing water disinfecting and testing standard operating procedures (SOPs) for total coliform, E. Coli bacteria and heterotrophic plate count analysis.

34 Berry Street, Williamsburg, NY

AKRF was retained to prepare close-out documentation for this former industrial/warehouse facility in Williamsburg, which was remediated under the New York City Office of Environmental Remediation (OER) E-designation and NYSDEC Spills programs. The closure report, which was based on documentation provided by the environmental contractor, was prepared on an expedited basis so that the developer could obtain a Certificate of Occupancy in time for the scheduled opening of the new building. AKRF is currently providing on-going remediation monitoring services to fulfill NYSDEC Spill closure requirements. For this project, Mr. Menken performed monthly/quarterly groundwater monitoring.

11 Greene Street, Manhattan, NY 10013 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the approved RAWP and Site Management Plan (SMP) for this OER site in Manhattan. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management and conducts community air monitoring and completes daily reports for submittal to the AKRF and NYCDEP project managers. For this project Mr. Menken provided on-site monitoring.

SCA City Wide Portable Water Lead Sampling – Drinking Water Sampling

As part of an on-call contract with the SCA, AKRF provided water sampling services at various public schools in New York City. AKRF sampled potable water fixtures for lead concentration at public schools in all five boroughs. Work was performed at night or when school was not in session and coordinated with the SCA, custodial engineers and various contractors.

Staten Island Wheel, Staten Island, New York 10301 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the approved RAWP and Site Management Plan (SMP) for this site in the Staten Island. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management, conducts community air monitoring, and prepares daily reports for submittal to the AKRF. For this project Mr. Menken provided on-site monitoring.

Adelaar/Concord Resort, 219 Concord Road, Monticello, New York 12751 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the NYSDEC-approved RAWP and Site Management Plan (SMP) for this BCP site in the Catskills. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management and conducts community air monitoring for submittal to the AKRF and NYSDEC project managers. For this project Mr. Menken provided on-site monitoring.

APPENDIX G

HEALTH AND SAFETY PLAN AND COMMUNITY AIR MONITORING PLAN

147-25 94TH AVENUE

QUEENS, NEW YORK

Health and Safety Plan

AKRF Project Number: 170340
NYSDEC BCP Site Number: TBD

Prepared for:

J2 147-07 94th Avenue LLC
316 West 118th Street
New York, NY 10026

Prepared by:

AKRF, Inc.
440 Park Avenue South
New York, New York 10016
(212) 696-0670

JUNE 2018

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Attachment D – Emergency Hand Signals

1.0 INTRODUCTION

This Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) were prepared by AKRF, Inc. (AKRF) on behalf of J2 147-07 94th Avenue LLC (the Applicant) for the 147-25 94th Avenue site located in the Jamaica section of Queens, New York, hereafter referred to as "the Site." The Site is identified on the New York City Tax Map as Tax Block 9998, Lot 25. The Site is applying for entry into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP).

The Site is composed of three vacant, interconnected warehouse buildings, a concrete-paved loading dock, and asphalt-paved parking areas. The buildings vary in height from one- to three-stories and only the westernmost building contains a basement. The Site was formerly occupied by cold food storage and a frozen food supplier. The Site is abutted to the north by Long Island Rail Road (LIRR) tracks; to the east by a scaffolding sales and installation facility; to the south by 94th Avenue, followed by a vacant lot and an active construction site; and to the west by commercial uses. The surrounding area is primarily commercial and industrial, with residential uses to the north and south.

Historic records indicated that the Site was developed with low-rise dwellings as early as 1901. By 1925, the Site was identified as Armour & Co. Beef and Provisions and also included a storage yard for the N.Y. Telephone Co. until approximately 1942. By 1951 and until sometime after 2006, the Site contained a produce warehouse and meat storage facilities. A refrigeration sales and service facility was identified in the eastern portion of the Site between approximately 1967 and 2006. The Site became unoccupied in September 2017.

Based on an evaluation of the data and information from AKRF's October 2017 Remedial Investigation, there is contaminated soil, groundwater, and soil vapor present at the Site, which is likely attributable to historic on- and off-site usage and fill material observed throughout the Site subsurface. The elevated metals and polycyclic aromatic hydrocarbons (PAHs) concentrations are most likely attributable to historical fill rather than past operations at the Site. The presence of chlorinated solvents in soil vapor, including tetrachloroethene (PCE) and trichloroethene (TCE), are likely related to historical operations at the Site or off-site locations.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Table 1
Hazards of Concern

X	Organic Chemicals	X	Inorganic Chemicals		Radiological
	Biological	X	Explosive/Flammable		Oxygen Deficient Atm.
X	Heat Stress	X	Cold Stress		Carbon Monoxide
Comment: No personnel without confined space entry permits may to enter confined spaces.					

2.1.2 Physical Characteristics

Table 2
Physical Characteristics

X	Liquid	X	Solid		Sludge
X	Vapors		Unknown		Other

2.1.3 Hazardous Materials

Table 3
Hazardous Materials

Chemicals		Solids		Solvents		Oils	
	Acids	X	Ash		Halogens		Transformer
	Caustics	X	Asbestos		Petroleum		Motor
X	Pesticides		Tailings	X	Chlorinated Solvents	X	Hydraulic
X	Petroleum	X	Fill			X	Gasoline
	Inks					X	Fuel
X	PCBs						Waste
X	Metals						
X	SVOCs						
	Ammonia						

2.1.4 Chemicals of Concern

Table 4
Chemicals Of Concern

Chemicals	REL/PEL/STEL	Health Hazards
Copper	REL = 0.1 mg/m^3 PEL = 0. 1 mg/m^3	Irritation eyes, upper respiratory system; metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough, lassitude (weakness, exhaustion); metallic or sweet taste; discoloration skin, hair.
Fuel Oil	REL = 350 mg/m^3 PEL = 400 ppm	Nausea, irritation – eyes, hypertension, headache, light-headedness, loss of appetite, poor coordination; long-term exposure – kidney damage, blood clotting problems; potential carcinogen.
Lead	REL = 0.05 mg/m^3 PEL = 0.05 mg/m^3	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.
Manganese	REL = 1 mg/m^3 PEL = 5 mg/m^3	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage.
Mercury	REL = 0.1 mg/m^3 PEL = 0.05 mg/m^3	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria.
Nickel	REL = 0.015 mg/m^3 PEL = 1 mg/m^3	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen].
Polycyclic Aromatic Hydrocarbons (PAHs)	PEL = 5 mg/m^3	Harmful effects to skin, bodily fluids, and ability to fight disease, reproductive problems; [potential occupational carcinogen].
DDT, DDE, DDD (pesticides)	REL = 0.5 mg/m^3 PEL = 1 mg/m^3	Irritation eyes, skin; paresthesia tongue, lips face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; potential carcinogen.
Hexavalent Chromium	REL = 0.0002 mg/m^3 PEL = 0.005 mg/m^3	Irritation respiratory system; nasal septum perforation; liver, kidney damage; leukocytosis (increased blood leukocytes), leukopenia (reduced blood leukocytes), eosinophilia; eye injury, conjunctivitis; skin ulcer, sensitization dermatitis; [potential occupational carcinogen].
Polychlorinated Biphenyls (PCBs)	REL = 0.001 mg/m^3 PEL = 0.5 mg/m^3 (skin)	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen].
Trichloroethene (TCE)	PEL = 100 ppm	Lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen].
Tetrachloroethene (PCE)	PEL = 100 ppm STEL = 200 ppm	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, poor coordination; headache, drowsiness; skin erythema (skin redness); liver damage; potential

Table 4
Chemicals Of Concern

Chemicals	REL/PEL/STEL	Health Hazards
		occupational carcinogen.
Toluene	REL = 100 ppm PEL = 200 ppm STEL = 300 ppm	Irritation eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia (skin tingling or numbness); dermatitis; liver, kidney damage.
Xylenes	REL = 100 ppm PEL = 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, poor coordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Zinc	REL = 5 mg/m^3 PEL = 5 mg/m^3	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function.
Particulates	PEL = 15 mg/m^3 (total) PEL = 5 mg/m^3 (respirable)	Irritation eyes, skin, throat, upper respiratory system.
Notes: REL = National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit ppm = parts per million mg/m^3 = milligrams per cubic meter		

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of this HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel is outlined in Section 2.3 of this HASP.

2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make them aware of the purpose and limitations of safety equipment; and

- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before he/she goes onto the Site. A Site safety meeting will be conducted at the start of the project. Additional meetings shall be conducted, as necessary, for new personnel working at the Site.

2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin Site activities. The medical release shall consider the type of work to be performed and the required personal protective equipment (PPE). The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste Site work.

2.5 Site Work Zones

During any activities involving subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may change by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Appropriate barriers will be set up to secure the area and prevent any unauthorized personnel from approaching within 15 feet of the work area.

Table 5
Site Work Zones

Task	Exclusion Zone	CRZ	Support Zone
Soil Excavation and Storage Tank Removal Areas	15 feet from excavation border and excavation equipment or vehicles	15 feet from excavation border and excavation equipment or vehicles	As Needed

2.6 Air Monitoring Program

The purpose of the air monitoring program is to identify any exposure of the field personnel to potential environmental hazards in the soil and soil vapor. Results of the air monitoring will be used to determine the appropriate response action, if needed.

2.6.1 Work Zone Air Monitoring

Real time air monitoring of volatile organic compounds (VOCs) and particulates will be performed in the work zone during all intrusive Site activities. Work zone air monitoring for VOCs will be performed with a photoionization detector (PID). The PID will be calibrated with 100 parts per million (ppm) isobutylene standard in accordance with the manufacturer's instructions at the start of each work day. Work zone air monitoring for particulates will be conducted using a MIE 1000 Personal DataRam or equivalent to measure the concentration of airborne respirable particulates less than 10 micrometers in size (PM_{10}).

The SSO shall set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. Measurements will be taken prior to commencement of work and continuously during the work. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The action levels and required responses are listed in the following table:

Table 6
Work Zone Air Monitoring Action Levels

Instrument	Action Level	Response Action
PID	Less than 5 ppm in breathing zone	Level D or D-Modified
	Between 5 ppm and 50 ppm	Level C
	More than 50 ppm	Stop work. Resume work when readings are less than 50 ppm
Particulate Monitor (MIE 1000 Personal DataRam™ or equivalent)	Less than 0.150 mg/m^3 above background in breathing zone	Level D or D-Modified
	More than 0.150 mg/m^3 above background in breathing zone	Stop work. Resume work when readings are less than 0.150 mg/m^3 above background.
Notes: mg/m^3 = micrograms per cubic meter; ppm = parts per million		

2.6.2 Community Air Monitoring Plan

Community air monitoring will be conducted during all intrusive Site activities in compliance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). Real-time air monitoring for volatile compounds and dust at the perimeter of the exclusion zone will be performed as described below.

2.6.2.1. Roving Air Monitoring

VOC Monitoring

Periodic monitoring for VOCs will be conducted during non-intrusive activities such as the collection of excavation endpoint soil samples. Periodic monitoring may include obtaining measurements upon arrival at a location and upon leaving the location.

Continuous monitoring for VOCs will be conducted during all ground intrusive activities, including excavation and tank removal (if any) activities. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a PID equipped with a 10.6 eV lamp capable of calculating 15-minute running average concentrations.

More frequent intervals of monitoring will be conducted if required as determined by the SSO. All PID readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Dust Monitoring

Continuous monitoring for particulates will be conducted during all ground intrusive activities, which will involve the measurement of respirable dust. Community air monitoring for dust particulates will be conducted using a MIE 1000 Personal DataRam or equivalent to measure the concentration of airborne respirable particulates less than 10 micrometers in size (PM_{10}). The dust monitor will be capable of calculating 15-minute running average concentrations and equipped with an audible alarm to indicate exceedance of action levels. Background readings and any readings that trigger response actions will be recorded in the project logbook, which will be available on site for NYSDOH and/or NYSDEC review.

2.6.2.2. Fixed Air Monitoring Stations

Fixed air monitoring stations will be set up at the upwind and downwind perimeters of the exclusion zone during all ground intrusive activities and will continuously log VOC and particulate levels. Each fixed monitoring station will be fully enclosed and equipped with the following:

- A PID equipped with a 10.6 eV lamp capable of calculating 15-minute running average VOC concentrations;
- A TSI 8530 DustTrak II or equivalent dust monitor capable of measuring the concentration of airborne respirable particulates less than 10 micrometers in size (PM_{10}) and calculating 15-minute running average particulate concentrations; and
- A Netronix™ Thiamus™ ICU-820 or equivalent Global System for Mobile Communication (GSM)/Global Positioning System (GPS) device capable of recording air monitoring and location data.

Each monitoring station will be capable of sending e-mail alerts to the SSO to indicate an exceedance of action levels. Additionally, the SSO will conduct an inspection of the monitoring stations on at least an hourly basis. Upon completion of Site activities, all air monitoring data will be available to download via the iEnvironet® website. All air monitoring data recorded at the fixed monitoring stations will be available for NYSDOH and/or NYSDEC review and will be included in the Final Engineering Report (FER).

2.6.2.3. Community Air Monitoring Action Levels

VOC Action Levels

The following actions will be taken based on organic vapor levels measured:

- If total organic vapor levels exceed 5 ppm above background for the 15-minute average at the exclusion zone perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the exclusion zone persist at levels in excess of 5 ppm above background, but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet – is below 5 ppm above background for the 15-minute average.
- If the total organic vapor level is above 25 ppm at the perimeter of the exclusion zone, activities will be shutdown.

Particulate Action Levels

The following actions will be taken based on particulate levels measured:

- If the downwind particulate concentrations are greater than 100 micrograms per cubic meter ($\mu g/m^3$) above background (upwind concentrations), and no other obvious source is apparent, then it will be assumed that the elevated particulate concentrations are a result of site activities. In such instances, dust suppression measures will be implemented and monitoring will be continued. Work will be allowed to continue with dust suppression if downwind particulate levels do not exceed 150 $\mu g/m^3$ above the background (upwind concentration) and provided that no visible dust is migrating from the work area.
- If particulate levels persist at 150 $\mu g/m^3$ above the background, work must be stopped until dust suppression measures bring particulate levels to below 150 $\mu g/m^3$ above background.

Major Vapor Emission Response Plan

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work Site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or vapor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the exclusion zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented:

- Sustained organic vapor levels approaching 1 ppm above background for a period of more than 30 minutes; or

- Organic vapor levels greater than 5 ppm above background for any time period.

Upon activation, the following activities shall be undertaken as part of the Major Vapor Emission Response Plan:

- The NYSDEC, NYSDOH, and local police authorities will be immediately contacted by the SSO and advised of the situation;
- Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Site Health and Safety Officer; and
- All Emergency contacts will go into effect as appropriate.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review.

2.6.3 Personal Protection Equipment (PPE)

The PPE required for various kinds of Site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Appendix B, “General Description and Discussion of the Levels of Protection and Protective Gear.”

AKRF field personnel and other Site personnel shall wear, at a minimum, Level D PPE. The protection will be based on the air monitoring described in this section.

Table 7
Personal Protection Equipment Requirements

LEVEL OF PROTECTION & PPE		**All Tasks**
Level D (**X**) Steel Toe Shoes (**X**) Hard Hat (within 25 ft. of excavator) (**X**) Work Gloves	(**X**) Safety Glasses ( ) Face Shield (**X**) Ear Plugs (within 25 ft. of excavator) (**X**) Nitrile Gloves (**X**) Tyvek for tank contractor if NAPL present	Yes
Level C ***(in addition to Level D)*** (**X**) Half-Face Respirator (**X**) Full Face Respirator ( ) Full-Face PAPR	( ) Particulate Cartridge ( ) Organic Cartridge (**X**) Dual Organic/ Particulate Cartridge	If PID > 5 ppm or particulate > 150 µg/m^3 above the background in breathing zone
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected). PAPR = powered air purifying respirator		

2.7 General Work Practices

To protect their health and safety, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited except in designated areas on the Site. These areas will be designated by the SSO.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the Site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to the Jamaica Hospital Medical Center by on-site personnel. Directions to the hospital are provided below, and a hospital route map is provided as Figure 1.

3.1 Hospital Directions

Table 8
Hospital Directions

Hospital Name:	Jamaica Hospital Medical Center
Phone Number:	718-206-6066 (emergency department)
Address/Location:	8900 Van Wyck Expressway, Queens, NY 11418
Directions:	1. Turn RIGHT on 94th Avenue toward Sutphin Boulevard 2. Turn RIGHT onto Van Wyck Expressway 3. Turn LEFT onto Jamaica Avenue 4. Turn LEFT onto Van Wyck Expressway Emergency Department will be on the RIGHT between 89th Avenue and 91st Avenue.

3.2 Emergency Contacts

Table 9
Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF	Stephen Malinowski	Project Manager	631-574-3724 (office)
	Adrianna Bosco	Project Manager Alternate	646-388-9576 (office) 914-874-3358 (cell)
	Jacob Menken	Site Safety Officer (SSO)	914-922-2373 (office) 914-552-7694 (cell)
	Tara Simmons	Site Safety Officer (SSO) Alternates	646-388-9833 (office) 828-550-2612 (cell)
	Mark Candelario		646-388-9843 (office) 646-233-9307 (cell)
J2 147-07 94th Avenue LLC	Evan Kashanian	Client Representative	646-834-9380 (office)
Ambulance, Fire Department, & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

Signed: ________________________________ Date: ________________________________

AKRF Project Manager

Signed: ________________________________ Date: ________________________________

AKRF Health and Safety Officer

Below is an affidavit that must be signed by all workers who enter the site. A copy of the HASP must be on-site at all times and will be kept by the SSO.

AFFIDAVIT

I,_________________________(name), of_______________________________(company name), have read the HASP for the 147-25 94th Avenue Site located at 147-25 94th Avenue in Queens, New York. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the Site.

Signed: ________________________ Company: ________________________ Date: __________

Signed: ________________________ Company: ________________________ Date: __________

Signed: ________________________ Company: ________________________ Date: __________

Signed: ________________________ Company: ________________________ Date: __________

Signed: ________________________ Company: ________________________ Date: __________

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ATTACHMENT A

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

CHROMIUM

CAS # 7440-47-3

Division of Toxicology and Environmental Medicine ToxFAQs™ **September 2008**

This fact sheet answers the most frequently asked health questions (FAQs) about chromium. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to chromium occurs from ingesting contaminated food or drinking water or breathing contaminated workplace air. Chromium(VI) at high levels can damage the nose and cause cancer. Ingesting high levels of chromium(VI) may result in anemia or damage to the stomach or intestines. Chromium(III) is an essential nutrient. Chromium has been found in at least 1,127 of the 1,669 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is chromium?

Chromium is a naturally occurring element found in rocks, animals, plants, and soil. It can exist in several different forms. Depending on the form it takes, it can be a liquid, solid, or gas. The most common forms are chromium(0), chromium(III), and chromium(VI). No taste or odor is associated with chromium compounds.

The metal chromium, which is the chromium(0) form, is used for making steel. Chromium(VI) and chromium(III) are used for chrome plating, dyes and pigments, leather tanning, and wood preserving.

What happens to chromium when it enters the environment?

❑ Chromium can be found in air, soil, and water after release from the manufacture, use, and disposal of chromium-based products, and during the manufacturing process.
❑ Chromium does not usually remain in the atmosphere, but is deposited into the soil and water.
❑ Chromium can easily change from one form to another in water and soil, depending on the conditions present.
❑ Fish do not accumulate much chromium in their bodies from water.

How might I be exposed to chromium?

❑ Eating food containing chromium(III).
❑ Breathing contaminated workplace air or skin contact during use in the workplace.
❑ Drinking contaminated well water.
❑ Living near uncontrolled hazardous waste sites containing chromium or industries that use chromium.

How can chromium affect my health?

Chromium(III) is an essential nutrient that helps the body use sugar, protein, and fat.

Breathing high levels of chromium(VI) can cause irritation to the lining of the nose, nose ulcers, runny nose, and breathing problems, such as asthma, cough, shortness of breath, or wheezing. The concentrations of chromium in air that can cause these effects may be different for different types of chromium compounds, with effects occurring at much lower concentrations for chromium(VI) compared to chromium(III).

The main health problems seen in animals following ingestion of chromium(VI) compounds are irritation and ulcers in the stomach and small intestine and anemia. Chromium(III) compounds are much less toxic and do not appear to cause these problems.

Sperm damage and damage to the male reproductive system have also been seen in laboratory animals exposed to chromium(VI).

Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

How likely is chromium to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Reseach on Cancer (IARC), and the EPA have determined that chromium(VI) compounds are known human carcinogens. In workers, inhalation of chromium(VI) has been shown to cause lung cancer. Chromium(VI) also causes lung cancer in animals. An increase in stomach tumors was observed in humans and animals exposed to chromium(VI) in drinking water.

How can chromium affect children?

It is likely that health effects seen in children exposed to high amounts of chromium will be similar to the effects seen in adults.

We do not know if exposure to chromium will result in birth defects or other developmental effects in people. Some developmental effects have been observed in animals exposed to chromium(VI).

How can families reduce the risks of exposure to chromium?

❑ Children should avoid playing in soils near uncontrolled hazardous waste sites where chromium may have been discarded.
❑ Chromium is a component of tobacco smoke. Avoid smoking in enclosed spaces like inside the home or car in order to limit exposure to children and other family members.
❑ Although chromium(III) is an essential nutrient, you should avoid excessive use of dietary supplements containing chromium.

Is there a medical test to determine whether I've been exposed to chromium?

Since chromium(III) is an essential element and naturally occurs in food, there will always be some level of chromium in your body. Chromium can be measured in hair, urine, and blood.

Higher than normal levels of chromium in blood or urine may indicate that a person has been exposed to chromium. However, increases in blood and urine chromium levels cannot be used to predict the kind of health effects that might develop from that exposure.

Has the federal government made recommendations to protect human health?

The EPA has determined that exposure to chromium in drinking water at concentrations of 1 mg/L for up to 10 days is not expected to cause any adverse effects in a child.

The FDA has determined that the chromium concentration in bottled drinking water should not exceed 1 mg/L.

The Occupational Health and Safety Administration (OSHA) has limited workers' exposure to an average of 0.0005 mg/m^3 chromium(VI), 0.5 mg/m^3 chromium(III), and 1.0 mg/m^3 chromium(0) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Chromium (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

COPPER

CAS # 7440-50-8

Division of Toxicology ToxFAQs™ **September 2002**

This fact sheet answers the most frequently asked health questions (FAQs) about copper. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Copper is a reddish metal that occurs naturally in the environment. It also occurs naturally in plants and animals. Low levels of copper are essential for maintaining good health. High levels can cause harmful effects such as irritation of the nose, mouth and eyes, vomiting, diarrhea, stomach crumps, and nausea. Copper has been found in at least 884 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is copper?

Copper is a reddish metal that occurs naturally in rocks, soil, water, and air. Copper also occurs naturally in plants and animals.

Metallic copper can be easily molded or shaped. Metallic copper can be found in the U.S. penny, electrical wiring, and some water pipes. Metallic copper is also found in mixtures (called alloys) with other metals such as brass and bronze.

Copper is also found as part of other compounds forming salts. Copper salts occur naturally, but are also manufactured. The most common copper salt is copper sulfate. Most copper compounds are blue-green in color.

Copper compounds are commonly used in agriculture to treat plant diseases like mildew, for water treatment and, as preservatives for wood, leather, and fabrics.

What happens to copper when it enters the environment?

- ❑ Copper can enter the environment from the mining of copper and other metals and from factories that make or use metallic copper or copper compounds.
- ❑ It can also enter the environment through domestic waste water, combustion of fossil fuels and wastes, wood production, phosphate fertilizer production, and natural sources (e.g., windblown dust from soils, volcanoes, decaying vegetation, forest fires, and sea spray).
- ❑ Copper in soil strongly attaches to organic material and minerals.
- ❑ Copper that dissolves in water becomes rapidly bound to particles suspended in the water.
- ❑ Copper does not typically enter groundwater.
- ❑ Copper carried by particles emitted from smelters and ore processing plants is carried back to the ground by gravity or in rain or snow.
- ❑ Copper does not break down in the environment.

How might I be exposed to copper?

- ❑ Breathing air, drinking water, eating food, and by skin contact with soil, water, or other copper-containing substances.
- ❑ Some copper in the environment can be taken up by plants and animals.
- ❑ Higher exposure may occur if your water is corrosive and you have copper plumbing and brass water fixtures. ❑ You may be exposed to higher amounts of copper if you drink water or swim in lakes or reservoirs recently treated with copper to control algae or receive cooling water from a power plant that may have high amounts of dissolved copper.
- ❑ Using some garden products (e.g., fungicides) to control plant diseases.
- ❑ Living near bronze and brass production facilities may expose you to higher copper levels in soil.
- ❑ You may breathe copper-containing dust or have skin contact if you work in the industry of mining copper or

processing the ore. You may breathe high levels if you grind or weld copper metal.

How can copper affect my health?

Copper is essential for good health, but high amounts can be harmful. Long-term exposure to copper dust can irritate your nose, mouth, and eyes, and cause headaches, dizziness, nausea, and diarrhea.

Drinking water with higher than normal levels of copper may cause vomiting, diarrhea, stomach cramps, and nausea. Intentionally high intakes of copper can cause liver and kidney damage and even death.

How likely is copper to cause cancer?

We do not know whether copper can cause cancer in humans. The EPA has determined that copper is not classifiable as to carcinogenicity.

How can copper affect children?

Exposure to high levels of copper will result in the same type of effects in children and adults. Studies in animals suggest that the young children may have more severe effects than adults; we do not know if this would also be true in humans. There is a very small percentage of infants and children who are unusually sensitive to copper.

We do not know if copper can cause birth defects or other developmental effects in humans. Studies in animals suggest that ingestion of high levels of copper may cause a decrease in fetal growth.

How can families reduce the risk of exposure to copper?

❑ The greatest potential source of copper exposure is through drinking water, especially in water that is first drawn in the morning after sitting in copper pipes and brass faucets overnight.

❑ To reduce exposure, run the water for at least 15-30 seconds before using it.

❑ If you are exposed to copper at work, you may carry copper home on your skin, clothes, or tools. You can avoid this by showering, and changing clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

Is there a medical test to show whether I've been exposed to copper?

Copper is normally found in all tissues of the body, blood, urine, feces, hair, and nails. High levels of copper in these samples can show that you have been exposed to higher than normal levels of copper. Tests to measure copper levels in the body are not routinely available at the doctor's office because they require special equipment. These tests cannot tell the extent of exposure or whether you will experience harmful effects.

Has the federal government made recommendations to protect human health?

The EPA has determined that drinking water should not contain more than 1.3 milligrams of copper per liter of water (1.3 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.1 mg per cubic meter (0.1 mg/m^3) of copper fumes (vapor generated from heating copper) and 1 mg/m^3 of copper dusts (fine metallic copper particles) and mists (aerosol of soluble copper) in workroom air during an 8-hour work shift, 40-hour workweek.

The Food and Nutrition Board of the Institute of Medicine recommends dietary allowances (RDAs) of 340 micrograms (340 µg) of copper per day for children aged 1-3 years, 440 µg/day for children aged 4-8 years, 700 µg/day for children aged 9-13 years, 890 µg/day for children aged 14-18 years, and 900 µg/day for adults.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Copper (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

DDT, DDE, AND DDD

CAS # 50-29-3, 72-55-9, 72-54-8

Division of Toxicology ToxFAQs™ **September 2002**

This fact sheet answers the most frequently asked health questions (FAQs) about DDT, DDE, and DDD. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to DDT, DDE, and DDD occurs mostly from eating foods containing small amounts of these compounds, particularly meat, fish and poultry. High levels of DDT can affect the nervous system causing excitability, tremors and seizures. In women, DDE can cause a reduction in the duration of lactation and an increased chance of having a premature baby. DDT, DDE, and DDD have been found in at least 441 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are DDT, DDE, and DDD?

DDT (dichlorodiphenyltrichloroethane) is a pesticide once widely used to control insects in agriculture and insects that carry diseases such as malaria. DDT is a white, crystalline solid with no odor or taste. Its use in the U.S. was banned in 1972 because of damage to wildlife, but is still used in some countries.

DDE (dichlorodiphenyldichloroethylene) and DDD (dichlorodiphenyldichloroethane) are chemicals similar to DDT that contaminate commercial DDT preparations. DDE has no commercial use. DDD was also used to kill pests, but its use has also been banned. One form of DDD has been used medically to treat cancer of the adrenal gland.

What happens to DDT, DDE, and DDD when they enter the environment?

❏ DDT entered the environment when it was used as a pesticide; it still enters the environment due to current use in other countries.
❏ DDE enters the environment as contaminant or breakdown product of DDT; DDD also enters the environment as a breakdown product of DDT.
❏ DDT, DDE, and DDD in air are rapidly broken down by sunlight. Half of what's in air breaks down within 2 days.
❏ They stick strongly to soil; most DDT in soil is broken down slowly to DDE and DDD by microorganisms; half the DDT in soil will break down in 2-15 years, depending on the type of soil.
❏ Only a small amount will go through the soil into groundwater; they do not dissolve easily in water.
❏ DDT, and especially DDE, build up in plants and in fatty tissues of fish, birds, and other animals.

How might I be exposed to DDT, DDE, and DDD?

❏ Eating contaminated foods, such as root and leafy vegetables, fatty meat, fish, and poultry, but levels are very low.
❏ Eating contaminated imported foods from countries that still allow the use of DDT to control pests.
❏ Breathing contaminated air or drinking contaminated water near waste sites and landfills that may contain higher levels of these chemicals.
❏ Infants fed on breast milk from mothers who have been exposed.
❏ Breathing or swallowing soil particles near waste sites or landfills that contain these chemicals.

How can DDT, DDE, and DDD affect my health?

DDT affects the nervous system. People who accidentally swallowed large amounts of DDT became excitable and had tremors and seizures. These effects went away after the exposure stopped. No effects were seen in people who took small daily doses of DDT by capsule for 18 months.

A study in humans showed that women who had high amounts of a form of DDE in their breast milk were unable to breast feed their babies for as long as women who had little DDE in the breast milk. Another study in humans showed that women who had high amounts of DDE in breast milk had an increased chance of having premature babies.

In animals, short-term exposure to large amounts of DDT in food affected the nervous system, while long-term exposure to smaller amounts affected the liver. Also in animals, short-term oral exposure to small amounts of DDT or its breakdown products may also have harmful effects on reproduction.

How likely are DDT, DDE, and DDD to cause cancer?

Studies in DDT-exposed workers did not show increases in cancer. Studies in animals given DDT with the food have shown that DDT can cause liver cancer.

The Department of Health and Human Services (DHHS) determined that DDT may reasonable be anticipated to be a human carcinogen. The International Agency for Research on Cancer (IARC) determined that DDT may possibly cause cancer in humans. The EPA determined that DDT, DDE, and DDD are probable human carcinogens.

How can DDT, DDE, and DDD affect children?

There are no studies on the health effects of children exposed to DDT, DDE, or DDD. We can assume that children exposed to large amounts of DDT will have health effects similar to the effects seen in adults. However, we do not know whether children differ from adults in their susceptibility to these substances.

There is no evidence that DDT, DDE, or DDD cause birth defects in people. A study showed that teenage boys whose mothers had higher DDE amounts in the blood when they were pregnant were taller than those whose mothers had lower DDE levels. However, a different study found the opposite in preteen girls. The reason for the discrepancy between these studies is unknown.

Studies in rats have shown that DDT and DDE can mimic the action of natural hormones and in this way affect the development of the reproductive and nervous systems. Puberty was delayed in male rats given high amounts of DDE as juveniles. This could possibly happen in humans.

A study in mice showed that exposure to DDT during the first weeks of life may cause neurobehavioral problems later in life.

How can families reduce the risk of exposure to DDT,DDE, and DDE?

❑ Most families will be exposed to DDT by eating food or drinking liquids contaminated with small amounts of DDT.
❑ Cooking will reduce the amount of DDT in fish.
❑ Washing fruit and vegetables will remove most DDT from their surface.
❑ Follow health advisories that tell you about consumption of fish and wildlife caught in contaminated areas.

Is there a medical test to show whether I've been exposed to DDT, DDE, and DDD?

Laboratory tests can detect DDT, DDE, and DDD in fat, blood, urine, semen, and breast milk. These tests may show low, moderate, or excessive exposure to these compounds, but cannot tell the exact amount you were exposed to, or whether you will experience adverse effects. These tests are not routinely available at the doctor's office because they require special equipment.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) sets a limit of 1 milligram of DDT per cubic meter of air (1 mg/m^3) in the workplace for an 8-hour shift, 40-hour workweek.

The Food and Drug Administration (FDA) has set limits for DDT, DDE, and DDD in foodstuff at or above which the agency will take legal action to remove the products from the market.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for DDT/DDE/DDD (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

FUEL OILS

CAS # 8008-20-6, 70892-10-3, 68476-30-2, 68476-34-6, 68476-31-3

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1996**

This fact sheet answers the most frequently asked health questions (FAQs) about fuel oils. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Fuel oils are liquid mixtures produced from petroleum, and their use mostly involves burning them as fuels. Drinking or breathing fuel oils may cause nausea or nervous system effects. However, exposure under normal use conditions is not likely to be harmful. Fuel oils have been found in at least 26 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are fuel oils?

(Pronounced fyōō′əl oilz)

Fuel oils are a variety of yellowish to light brown liquid mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water.

Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as solvents.

Some commonly found fuel oils include kerosene, diesel fuel, jet fuel, range oil, and home heating oil. These fuel oils differ from one another by their hydrocarbon compositions, boiling point ranges, chemical additives, and uses.

What happens to fuel oils when they enter the environment?

- Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.
- Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- Some of the chemicals found in fuel oils may build up significantly in plants and animals.

How might I be exposed to fuel oils?

- Using a home kerosene heater or stove, or using fuel oils at work.
- Breathing air in home or building basements that has been contaminated with fuel oil vapors entering from the soil.
- Drinking or swimming in water that has been contaminated with fuel oils from a spill or a leaking underground storage tank.
- Touching soil contaminated with fuel oils.
- Using fuel oils to wash paint or grease from skin or equipment.

How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene stoves for cooking do not seem to have any health problems related to their exposure.

Breathing some fuel oils for short periods may cause nausea, eye irritation, increased blood pressure, headache, lightheadedness, loss of appetite, poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for long periods may cause kidney damage and lower your blood's ability to clot.

Drinking small amounts of kerosene may cause vomiting, diarrhea, coughing, stomach swelling and cramps, drowsiness, restlessness, painful breathing, irritability, and unconsciousness. Drinking large amounts of kerosene may cause convulsions, coma, or death. Skin contact with kerosene for short periods may cause itchy, red, sore, or peeling skin.

How likely are fuel oils to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that some fuel oils (heavy) may possibly cause cancer in humans, but for other fuel oils (light) there is not enough information to make a determination. IARC has also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic in humans.

Some studies with mice have suggested that repeated contact with fuel oils may cause liver or skin cancer. However, other mouse studies have found this not to be the case. No studies are available in other animals or in people on the carcinogenic effects of fuel oils.

Is there a medical test to show whether I've been exposed to fuel oils?

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) have set a permissible exposure level (PEL) of 400 parts of petroleum distillates per million parts of air (400 ppm) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m^3) for a 40-hour workweek.

The Department of Transportation (DOT) lists fuel oils as hazardous materials and, therefore, regulates their transportation.

Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for fuel oils. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

LEAD

CAS # 7439-92-1

Division of Toxicology and Environmental Medicine ToxFAQs™ **August 2007**

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,272 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

What happens to lead when it enters the environment?

❑ Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
❑ When lead is released to the air, it may travel long distances before settling to the ground.
❑ Once lead falls onto soil, it usually sticks to soil particles.
❑ Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.

How might I be exposed to lead?

❑ Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.
❑ Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.
❑ Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.
❑ Using health-care products or folk remedies that contain lead.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services

ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html

(DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead. Some of these effects may persist beyond childhood.

How can families reduce the risks of exposure to lead?

❏ Avoid exposure to sources of lead.

❏ Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint.

❏ If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.

❏ Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children

❏ If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to determine whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (μg/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3–6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a blood lead level of 10 μg/dL to be a level of concern for children.

EPA limits lead in drinking water to 15 μg per liter.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for lead (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

MANGANESE

CAS # 7439-96-5

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Division of Toxicology and Environmental Medicine ToxFAQs™ **September 2008**

This fact sheet answers the most frequently asked health questions (FAQs) about manganese. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Manganese is a trace element and eating a small amount from food or water is needed to stay healthy. Exposure to excess levels of manganese may occur from breathing air, particularly where manganese is used in manufacturing, and from drinking water and eating food. At high levels, it can cause damage to the brain. Manganese has been found in at least 869 of the 1,669 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is manganese?

Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese occurs naturally in most foods and may be added to some foods.

Manganese is used principally in steel production to improve hardness, stiffness, and strength. It may also be used as an additive in gasoline to improve the octane rating of the gas.

What happens to manganese when it enters the environment?

❑ Manganese can be released to the air, soil, and water from the manufacture, use, and disposal of manganese-based products.
❑ Manganese cannot break down in the environment. It can only change its form or become attached to or separated from particles.
❑ In water, manganese tends to attach to particles in the water or settle into the sediment.
❑ The chemical state of manganese and the type of soil determine how fast it moves through the soil and how much is retained in the soil.
❑ The manganese-containing gasoline additive may degrade in the environment quickly when exposed to sunlight, releasing manganese.

How might I be exposed to manganese?

❑ The primary way you can be exposed to manganese is by eating food or manganese-containing nutritional supplements. Vegetarians who consume foods rich in manganese such as grains, beans and nuts, as well as heavy tea drinkers, may have a higher intake of manganese than the average person.
❑ Certain occupations like welding or working in a factory where steel is made may increase your chances of being exposed to high levels of manganese.
❑ Manganese is routinely contained in groundwater, drinking water, and soil at low levels. Drinking water containing manganese or swimming or bathing in water containing manganese may expose you to low levels of this chemical.

How can manganese affect my health?

Manganese is an essential nutrient, and eating a small amount of it each day is important to stay healthy.

The most common health problems in workers exposed to high levels of manganese involve the nervous system. These health effects include behavioral changes and other nervous system effects, which include movements that may become slow and clumsy. This combination of symptoms when sufficiently severe is referred to as "manganism". Other less severe nervous system effects such as slowed hand movements have been observed in some workers exposed to lower concentrations in the work place.

Nervous system and reproductive effects have been observed in animals after high oral doses of manganese.

How likely is manganese to cause cancer?

The EPA concluded that existing scientific information cannot determine whether or not excess manganese can cause cancer.

How can manganese affect children?

Studies in children have suggested that extremely high levels of manganese exposure may produce undesirable effects on brain development, including changes in behavior and decreases in the ability to learn and remember. We do not know for certain that these changes were caused by manganese alone. We do not know if these changes are temporary or permanent. We do not know whether children are more sensitive than adults to the effects of manganese, but there is some indication from experiments in laboratory animals that they may be.

Studies of manganese workers have not found increases in birth defects or low birth weight in their offspring. No birth defects were observed in animals exposed to manganese.

How can families reduce the risks of exposure to manganese?

❏ Children are not likely to be exposed to harmful amounts of manganese in the diet. However, higher-than-usual amounts of manganese may be absorbed if their diet is low in iron. It is important to provide your child with a well-balanced diet.

❏ Workers exposed to high levels of airborne manganese in certain occupational settings may accumulate manganese dust on their work clothes. Manganese-contaminated work clothing should be removed before getting into your car or entering your home to help reduce the exposure hazard for yourself and your family.

Is there a medical test to determine whether I've been exposed to manganese?

Several tests are available to measure manganese in blood, urine, hair, or feces. Because manganese is normally present in our body, some is always found in tissues or fluids.

Because excess manganese is usually removed from the body within a few days, past exposures are difficult to measure with common laboratory tests.

Has the federal government made recommendations to protect human health?

The EPA has determined that exposure to manganese in drinking water at concentrations of 1 mg/L for up to 10 days is not expected to cause any adverse effects in a child.

The EPA has established that lifetime exposure to 0.3 mg/L manganese is not expected to cause any adverse effects.

The FDA has determined that the manganese concentration in bottled drinking water should not exceed 0.05 mg/L.

The Occupational Health and Safety Administration (OSHA) has established a ceiling limit (concentration that should not be exceeded at any time during exposure) of 5 mg/m^3 for manganese in workplace air.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Manganese (Draft for Public Comment). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs **April 1999**

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.

What is mercury?
(Pronounced mũr′kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- Eating fish or shellfish contaminated with methylmercury.
- Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- Release of mercury from dental work and medical treatments.
- Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m^3) and 0.05 mg/m^3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

NICKEL

CAS # 7440-02-0

Division of Toxicology ToxFAQs™ August 2005

This fact sheet answers the most frequently asked health questions (FAQs) about nickel. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Nickel is a naturally occurring element. Pure nickel is a hard, silvery-white metal used to make stainless steel and other metal alloys. Skin effects are the most common effects in people who are sensitive to nickel. Workers who breathed very large amounts of nickel compounds developed chronic bronchitis and lung and nasal sinus cancers. Nickel has been found in at least 882 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is nickel?

Nickel is a very abundant natural element. Pure nickel is a hard, silvery-white metal. Nickel can be combined with other metals, such as iron, copper, chromium, and zinc, to form alloys. These alloys are used to make coins, jewelry, and items such as valves and heat exchangers. Most nickel is used to make stainless steel.

Nickel can combine with other elements such as chlorine, sulfur, and oxygen to form nickel compounds. Many nickel compounds dissolve fairly easy in water and have a green color. Nickel compounds are used for nickel plating, to color ceramics, to make some batteries, and as substances known as catalysts that increase the rate of chemical reactions.

Nickel is found in all soil and is emitted from volcanoes. Nickel is also found in meteorites and on the ocean floor. Nickel and its compounds have no characteristic odor or taste.

What happens to nickel when it enters the environment?

❑ Nickel is released into the atmosphere by industries that make or use nickel, nickel alloys, or nickel compounds. It is also released into the atmosphere by oil-burning power plants, coal-burning power plants, and trash incinerators.

❑ In the air, it attaches to small particles of dust that settle to the ground or are taken out of the air in rain or snow; this usually takes many days.

❑ Nickel released in industrial waste water ends up in soil or sediment where it strongly attaches to particles containing iron or manganese.

❑ Nickel does not appear to accumulate in fish or in other animals used as food.

How might I be exposed to nickel?

❑ By eating food containing nickel, which is the major source of exposure for most people.

❑ By skin contact with soil, bath or shower water, or metals containing nickel, as well as by handling coins or touching jewelry containing nickel.

❑ By drinking water that contains small amounts of nickel.

❑ By breathing air or smoking tobacco containing nickel.

❑ Higher exposure may occur if you work in industries that process or use nickel.

How can nickel affect my health?

The most common harmful health effect of nickel in humans is an allergic reaction. Approximately 10-20% of the population is sensitive to nickel. People can become sensitive to nickel when jewelry or other things containing it are in direct contact with the skin for a long time. Once a person is sensitized to nickel, further contact with the metal may produce a reaction. The most common reaction is a skin rash at the site of contact. The skin rash may also occur at a site away from the site of contact. Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. Some sensitized people react when they consume food or water containing nickel or breathe dust containing it.

People working in nickel refineries or nickel-processing plants have experienced chronic bronchitis and reduced lung function. These persons breathed amounts of nickel much higher than levels found normally in the environment.

Workers who drank water containing high amounts of nickel had stomach ache and suffered adverse effects to their blood and kidneys.

Damage to the lung and nasal cavity has been observed in rats and mice breathing nickel compounds. Eating or drinking large amounts of nickel has caused lung disease in dogs and rats and has affected the stomach, blood, liver, kidneys, and immune system in rats and mice, as well as their reproduction and development.

How likely is nickel to cause cancer?

Cancers of the lung and nasal sinus have resulted when workers breathed dust containing high levels of nickel compounds while working in nickel refineries or nickel processing plants. The Department of Health and Human Services (DHHS) has determined that nickel metal may reasonably be anticipated to be a carcinogen and that nickel compounds are known human carcinogens. The International Agency for Research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined that nickel refinery dust and nickel subsulfide are human carcinogens.

How can nickel affect children?

It is likely that the health effects seen in children exposed to nickel will be similar to those seen in adults. We do not know whether children differ from adults in their susceptibility to nickel. Human studies that examined whether nickel can harm the fetus are inconclusive. Animal studies have found increases in newborn deaths and decreased newborn weight after ingesting very high amounts of nickel. Nickel can be transferred from the mother to an infant in breast milk and can cross the placenta.

How can families reduce the risks of exposure to nickel?

❏ Avoiding jewelry containing nickel will eliminate risks of exposure to this source of the metal.

❏ Exposures of the general population from other sources, such as foods and drinking water, are almost always too low to be of concern.

Is there a medical test to determine whether I've been exposed to nickel?

There are tests available to measure nickel in your blood, feces, and urine. More nickel was measured in the urine of workers who were exposed to nickel compounds that dissolve easily in water than in the urine of workers exposed to nickel compounds that are hard to dissolve. This means that it is easier to tell if you have been exposed to soluble nickel compounds than less-soluble compounds. The nickel measurements do not accurately predict potential health effects from exposure to nickel.

Has the federal government made recommendations to protect human health?

The EPA recommends that drinking water should contain no more than 0.1 milligrams of nickel per liter of water (0.1 mg/L). To protect workers, the Occupational Safety and Health Administration (OSHA) has set a limit of 1 mg of nickel per cubic meter of air (1 mg/m^3) for metallic nickel and nickel compounds in workplace air during an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Nickel (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl′ĭ-sī′klĭk ăr′ə-măt′ĭk hī′drə-kar′bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.

- Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m^3). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m^3 averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m^3 for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

POLYCHLORINATED BIPHENYLS

Division of Toxicology ToxFAQs™ **February 2001**

This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

What happens to PCBs when they enter the environment?

❏ PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.

❏ PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.

❏ PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.

❏ PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

How might I be exposed to PCBs?

❏ Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.

❏ Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.

❏ Breathing air near hazardous waste sites and drinking contaminated well water.

❏ In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breast-feeding outweigh any risks from exposure to PCBs in mother's milk.

How can families reduce the risk of exposure to PCBs?

❏ You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.

❏ Children should be told not play with old appliances, electrical equipment, or transformers, since they may contain PCBs.

❏ Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.

❏ If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

Is there a medical test to show whether I've been exposed to PCBs?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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TRICHLOROETHYLENE
CAS # 79-01-6

Division of Toxicology ToxFAQs™ July 2003

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- Trichloroethylene does not build up significantly in plants and animals.

How might I be exposed to trichloroethylene?

- Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is "probably carcinogenic to humans."

Is there a medical test to show whether I've been exposed to trichloroethylene?

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer.
CAS: Chemical Abstracts Service.
Evaporate: To change into a vapor or gas.
Milligram (mg): One thousandth of a gram.
Nonflammable: Will not burn.
ppm: Parts per million.
Sediment: Mud and debris that have settled to the bottom of a body of water.
Solvent: A chemical that dissolves other substances.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TETRACHLOROETHYLENE

CAS # 127-18-4

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1997**

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tĕt′rə-klôr′ ō-ĕth′ə-lēn′)

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- ❑ Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- ❑ Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- ❑ In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- ❑ It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- ❑ When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- ❑ When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethylene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be performed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TOLUENE
CAS # 108-88-3

Division of Toxicology ToxFAQs™ **February 2001**

This fact sheet answers the most frequently asked health questions (FAQs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency

What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

What happens to toluene when it enters the environment?

❑ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petrolieum products as well as from leasking underground storage tanks at gasoline stations and other facilities.

❑ When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

❑ Toluene does not usually stay in the environment long.

❑ Toluene does not concentrate or buildup to high levels in animals.

How might I be exposed to toluene?

❑ Breathing contaminated workplace air or automobile exhaust.

❑ Working with gasoline, kerosene, heating oil, paints, and lacquers.

❑ Drinking contaminated well-water.

❑ Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levles can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

How can toluene affect children?

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults.
Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

How can families reduce the risk of exposure to toluene?

❑ Use toluene-containing products in well-ventilated areas.

❑ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

Is there a medical test to show whether I've been exposed to toluene?

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 1 milligram per liter of drinking water (1 mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

XYLENE

CAS # 1330-20-7

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1996**

This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is xylene?

(Pronounced zī′lēn)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

What happens to xylene when it enters the environment?

- Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- It evaporates quickly from the soil and surface water into the air.
- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

- Breathing xylene in workplace air or in automobile exhaust.
- Breathing contaminated air.
- Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.
- Breathing cigarette smoke that has small amounts of xylene in it.
- Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.
- The amount of xylene in food is likely to be low.

How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

How likely is xylene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 10 ppm of xylene in drinking water.

The EPA requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Evaporate: To change from a liquid into a vapor or a gas.

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ZINC
CAS # 7440-66-6

Division of Toxicology ToxFAQs™ **August 2005**

This fact sheet answers the most frequently asked health questions (FAQs) about zinc. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Zinc is a naturally occurring element. Exposure to high levels of zinc occurs mostly from eating food, drinking water, or breathing workplace air that is contaminated. Low levels of zinc are essential for maintaining good health. Exposure to large amounts of zinc can be harmful. It can cause stomach cramps, anemia, and changes in cholesterol levels. Zinc has been found in at least 985 of the 1,662 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is zinc?

Zinc is one of the most common elements in the earth's crust. It is found in air, soil, and water, and is present in all foods. Pure zinc is a bluish-white shiny metal.

Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass, and bronze. A zinc and copper alloy is used to make pennies in the United States.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dyes, wood preservatives, and ointments.

What happens to zinc when it enters the environment?

❏ Some is released into the environment by natural processes, but most comes from human activities like mining, steel production, coal burning, and burning of waste.
❏ It attaches to soil, sediments, and dust particles in the air.
❏ Rain and snow remove zinc dust particles from the air.
❏ Depending on the type of soil, some zinc compounds can move into the groundwater and into lakes, streams, and rivers.
❏ Most of the zinc in soil stays bound to soil particles and does not dissolve in water.
❏ It builds up in fish and other organisms, but it does not build up in plants.

How might I be exposed to zinc?

❏ Ingesting small amounts present in your food and water.
❏ Drinking contaminated water or a beverage that has been stored in metal containers or flows through pipes that have been coated with zinc to resist rust.
❏ Eating too many dietary supplements that contain zinc.
❏ Working on any of the following jobs: construction, painting, automobile mechanics, mining, smelting, and welding; manufacture of brass, bronze, or other zinc-containing alloys; manufacture of galvanized metals; and manufacture of machine parts, rubber, paint, linoleum, oilcloths, batteries, some kind of glass, ceramics, and dyes.

How can zinc affect my health?

Zinc is an essential element in our diet. Too little zinc can cause problems, but too much zinc is also harmful.

Harmful effects generally begin at levels 10-15 times higher than the amount needed for good health. Large doses taken by mouth even for a short time can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia and decrease the levels of your good cholesterol. We do not know if high levels of zinc affect reproduction in humans. Rats that were fed large amounts of zinc became infertile.

Inhaling large amounts of zinc (as dusts or fumes) can cause a specific short-term disease called metal fume fever. We do not know the long-term effects of breathing high levels of zinc.

Putting low levels of zinc acetate and zinc chloride on the skin of rabbits, guinea pigs, and mice caused skin irritation. Skin irritation will probably occur in people.

How likely is zinc to cause cancer?

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified zinc for carcinogenicity. Based on incomplete information from human and animal studies, the EPA has determined that zinc is not classifiable as to its human carcinogenicity.

How can zinc affect children?

Zinc is essential for proper growth and development of young children. It is likely that children exposed to very high levels of zinc will have similar effects as adults. We do not know whether children are more susceptible to the effects of excessive intake of zinc than the adults.

We do not know if excess zinc can cause developmental effects in humans. Animal studies have found decreased weight in the offspring of animals that ingested very high amounts of zinc.

How can families reduce the risks of exposure to zinc?

❏ Children living near waste sites that contain zinc may be exposed to higher levels of zinc through breathing contaminated air, drinking contaminated drinking water, touching or eating contaminated soil.
❏ Discourage your children from eating soil or putting their hands in their mouths and teach them to wash their hands frequently and before eating.
❏ If you use medicines or vitamin supplements containing zinc, make sure you use them appropriately and keep them out of the reach of children.

Is there a medical test to determine whether I've been exposed to zinc?

There are tests available to measure zinc in your blood, urine, hair, saliva, and feces. These tests are not usually done in the doctor's office because they require special equipment. High levels of zinc in the feces can mean high recent zinc exposure. High levels of zinc in the blood can mean high zinc consumption and/or high exposure. Tests to measure zinc in hair may provide information on long-term zinc exposure; however, the relationship between levels in your hair and the amount of zinc you were exposed to is not clear.

Has the federal government made recommendations to protect human health?

The EPA recommends that drinking water should contain no more than 5 milligrams per liter of water (5 mg/L) because of taste. The EPA requires that any release of 1,000 pounds (or in some cases 5,000 pounds) into the environment be reported to the agency.

To protect workers, the Occupational Safety and Health Administration (OSHA) has set an average limit of 1 mg/m^3 for zinc chloride fumes and 5 mg/m^3 for zinc oxide (dusts and fumes) in workplace air during an 8-hour workday, 40-hour workweek.

Similarly, the National Institute for Occupational Safety and Health (NIOSH) has set the same standards for up to a 10-hour workday over a 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Zinc (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATTACHMENT B

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

West Nile Virus/St. Louis Encephalitis Prevention

The following section is based upon information provided by the Center for Disease Control (CDC) Division of Vector-Borne Infectious Diseases. Symptoms of West Nile Virus include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands, with most infections being mild. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death. Most infections of St. Louis encephalitis are mild without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially infants) and spastic (but rarely flaccid) paralysis. The only way to avoid infection of West Nile Virus and St. Louis Encephalitis is to avoid mosquito bites. To reduce the chance of mosquito contact:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET (N, N-diethyl-meta-toluamide), since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's directions for use, as printed on the product.

ATTACHMENT C

REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: ________________ Project Name/Number: 147-25 94th Avenue / 170340

Report Date: ________________ Project Manager Name: Stephen Malinowski/Adrianna Bosco

Summary of any violations of procedures occurring that week:

Summary of any job related injuries, illnesses, or near misses that week:

Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

Comments:

Name: ____________________________ Company: ____________________________

Signature: ____________________________ Title: ____________________________

INCIDENT REPORT FORM

Date of Report: ______________________________

Injured: ______________________________

Employer: ______________________________

Site: 147-25 94th Avenue

Site Location: 147-25 94th Avenue, Queens, NY

Report Prepared By: ______________________ ______________________

Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

___Injury	___ Illness	___ Near Miss
__ Property Damage	___ Fire	___ Chemical Exposure
__ On-site Equipment	___ Motor Vehicle	___ Electrical
__ Mechanical	___ Spill	___ Other

DATE AND TIME OF ACCIDENT/INCIDENT: Narrative report of accident/incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

WITNESS TO ACCIDENT/INCIDENT:

Name:	______________	Company:	______________
Address:	______________	Address:	______________
Phone No.:	______________	Phone No.:	______________
Name:	______________	Company:	______________
Address:	______________	Address:	______________
Phone No.:	______________	Phone No.:	______________

INJURED - ILL:

Name: ____________________ SSN: ____________________

Address: ____________________ Age: ____________________

Length of Service: ____________________ Time on Present Job: ____________________

Time/Classification: ____________________

SEVERITY OF INJURY OR ILLNESS:

____ Disabling ___ Non-disabling ___ Fatality

____ Medical Treatment ___ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: ____________________

NATURE OF INJURY OR ILLNESS: ____________________

____

____

CLASSIFICATION OF INJURY:

__	Abrasions	_____	Dislocations	____	Punctures
__	Bites	_____	Faint/Dizziness	____	Radiation Burns
__	Blisters	_____	Fractures	____	Respiratory Allergy
__	Bruises	_____	Frostbite	____	Sprains
__	Chemical Burns	_____	Heat Burns	____	Toxic Resp. Exposure
__	Cold Exposure	_____	Heat Exhaustion	____	Toxic Ingestion
__	Concussion	_____	Heat Stroke	____	Dermal Allergy
__	Lacerations				

Part of Body Affected: ____________________

Degree of Disability: ____________________

Date Medical Care was Received: ____________________

Where Medical Care was Received: ____________________

Address (if off-site): ____________________

(If two or more injuries, record on separate sheets)

PROPERTY DAMAGE:

Description of Damage: ______________________________

____

Cost of Damage: $ ______________________________

ACCIDENT/INCIDENT LOCATION: ______________________________

ACCIDENT/INCIDENT ANALYSIS: Causative agent most directly related to accident/incident (Object, substance, material, machinery, equipment, conditions)

____

____

____

____

Was weather a factor?:______________________________

____

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

____

____

____

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

____

____

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

____

____

Modifications:

____

Was injured using required equipment?:

____

____

If not, how did actual equipment use differ from plan?:

____

____

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?

ACCIDENT/INCIDENT REPORT REVIEWED BY:

SSO Name Printed

SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

Signature	Title
Signature	Title
Signature	Title

ACCIDENT/INCIDENT FOLLOW-UP: Date:

Outcome of accident/incident:

Physician's recommendations:

Date injured returned to work:

Follow-up performed by:

Signature

Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT D

EMERGENCY HAND SIGNALS

EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATH!

Hand gripping throat

LEAVE AREA IMMEDIATELY, NO DEBATE!

(No Picture) Grip partner's wrist or place both hands around waist

NEED ASSISTANCE!

Hands on top of head

OKAY! – I'M ALL RIGHT!

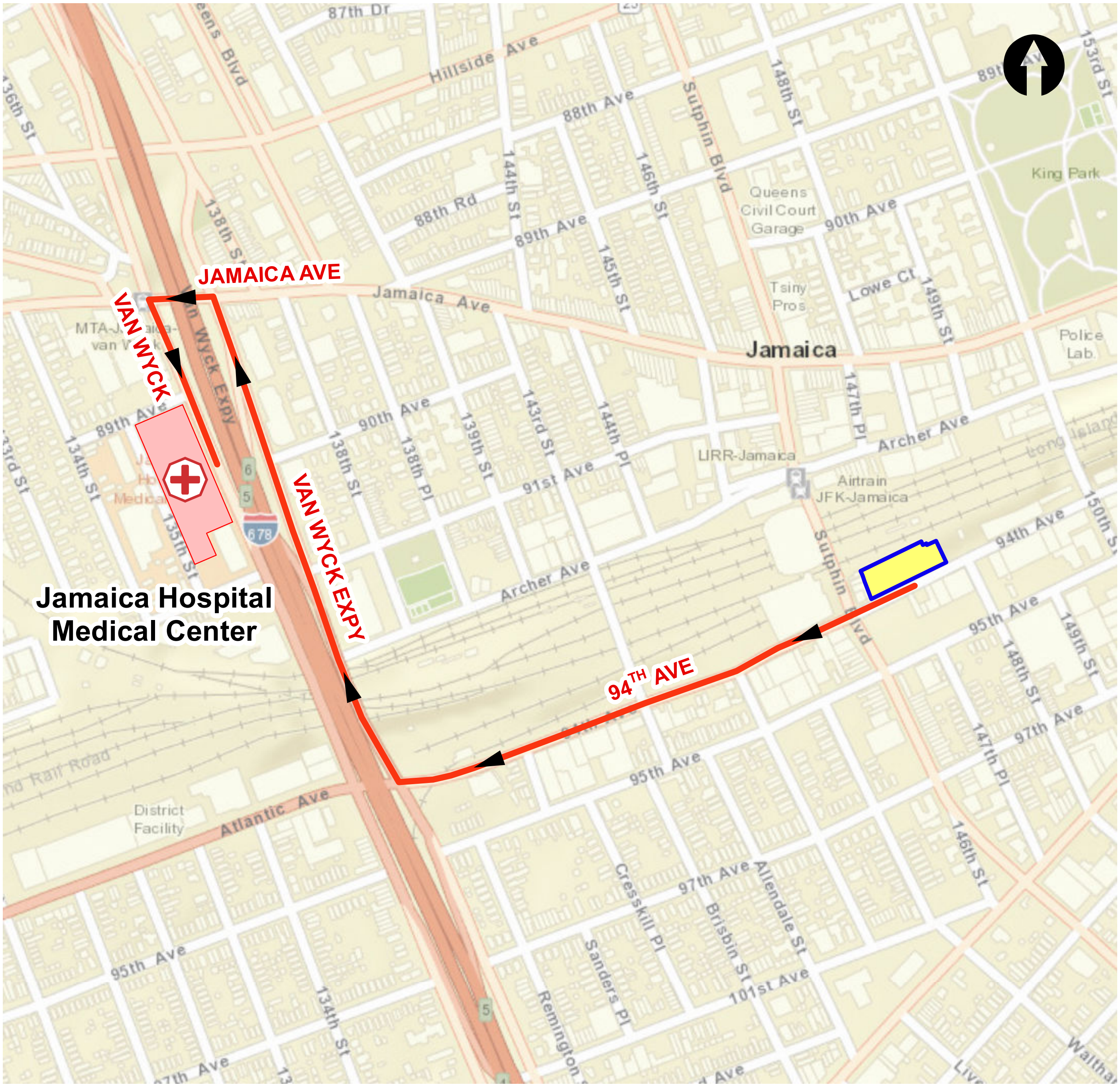
- I UNDERSTAND!

Thumbs up

NO! - NEGATIVE!

Thumbs down

FIGURE



Service Layer Credits: ESRC World Street Map 2016

LEGEND

PROJECT SITE BOUNDARY

ROUTE TO HOSPITAL

HOSPITAL LOCATION

Jamaica Hospital
8900 Van Wyck Expressway
Queens, NY 11418

0 600 1,200
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

147-25 94th Avenue
Queens, New York

HOSPITAL ROUTE MAP

DATE
9/21/2017

PROJECT NO.
170340

FIGURE
1

APPENDIX H

CONSTRUCTION QUALITY ASSURANCE PLAN

147-25 94TH AVENUE

QUEENS, NEW YORK

Construction Quality Assurance Project Plan

AKRF Project Number: 170340
NYSDEC BCP Site Number: TBD
OER Project Number: 18TMP0247Q
E-Designation: E-175

Prepared for:

J2 147-07 94th Avenue LLC
316 West 118th Street
New York, NY 10026

Prepared by:

AKRF, Inc.
440 Park Avenue South
New York, New York 10016
(212) 696-0670

JUNE 2018

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LIST OF ACRONYMS

Acronym	Definition
CQAP	Construction Quality Assurance Plan
FER	Final Engineering Report
NYSDEC	New York State Department of Environmental Conservation
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAWP	Remedial Action Work Plan

1.0 INTRODUCTION

This Construction Quality Assurance Plan (CQAP) has been prepared by AKRF, Inc. (AKRF) for remedial activities conducted in accordance with the Remedial Action Work Plan (RAWP) that will be performed at the 147-25 94th Avenue site located in the Jamaica neighborhood of Queens, New York (the Site). The Site is also identified as Queens Borough Tax Block 9998, Lot 25. The Site is currently applying for entry into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). This CQAP supplements the RAWP and provides monitoring, inspection, testing, and documentation protocols and procedures.

The following information is provided:

1. Responsibility, Authority and Qualifications – The responsibility, authority and qualifications of the key personnel involved in the project.
2. Inspection and Testing Activities – Inspections and tests that will be used to verify that construction activities meet or exceed all design criteria and federal, state, and local regulations and requirements.
3. Meetings – The requirements for project coordination meetings between the Volunteer and its representatives, the remedial or environmental Contractors, and other involved parties.
4. Documentation and Reporting – Field documentation and reporting requirements.

2.0 RESPONSIBILITY AND AUTHORITY

Measures will be implemented to ensure that a functional quality control (QC) organization is active during the project and to provide support for the construction QC system in conducting inspections, tests and retesting (in the event of failure of any item of work). This includes oversight of subcontractors and compliance with contract provisions. Construction QC includes, but is not limited to, the inspections and tests required in the RAWP and approved submittals and will cover all project operations. A consultant hired by the BCP Applicant (the Applicant) will manage field activities and coordinate the contractor's activities.

2.1 Applicant

J2 147-07 94th Avenue LLC (the Applicant) is responsible for coordinating the project, including activities of the Site consultant, contractor(s) and subcontractor(s), in order to comply with the requirements of the RAWP and regulatory agencies. The Applicant is also responsible for completing and submitting documentation required by the RAWP, the CQAP, and the Quality Assurance Project Plan (QAPP) and has the authority to accept or reject the materials and workmanship of any subcontractors at the Site.

2.2 Construction Quality Assurance (QA) Officer (Consultant/Contractor)

The Construction QA Officer will be an employee of the consultant/contractor (AKRF) hired by the Applicant and will perform activities that are necessary to assure the quality of construction. He/she will be on-site as required during construction activities and will have the authority to take any action necessary to maintain compliance with the RAWP and approved submittals and to monitor construction quality.

Specific responsibilities of the Construction QA Officer include:

- Supporting the Volunteer and the consultant's field staff;

- Evaluating construction activities and activities of the field staff;
- Verifying that remedial activities are performed in accordance with the RAWP, approved submittals, and with federal, state, and local regulations and requirements;
- Verifying that data are properly recorded, validated, reduced, summarized, and inspected;
- Evaluating sampling and monitoring activities;
- Educating the field staff on construction QC requirements and procedures; and
- Scheduling and coordinating inspections.

2.3 Field Team Leader (Consultant)

The Field Team Leader will be an employee of the consultant (AKRF) and will be on-site during construction activities. He/she will have authority to take any action necessary to maintain compliance with the RAWP and approved submittals and to maintain construction quality. The Field Team Leader will also manage the field staff discussed in this CQAP.

Specific responsibilities of the Field Team Leader include:

- Reviewing the RAWP for clarity and completeness so that the construction activities can be effectively implemented.
- Verifying that the contractor's work is in accordance with the RAWP, approved submittals, and this CQAP.
- Performing on-site inspection of the work in progress to assess compliance with the RAWP, approved submittals, and this CQAP.
- Scheduling and coordinating inspections.
- Reporting the results of all observations and tests as the work progresses and modifying materials and work to comply with the RAWP and approved submittals as noted below:
    1. Providing daily reports on field construction, material shipments, and inspection results.
    2. Review and interpretation of all data, drawings, and reports.
    3. Identification of all work that should be accepted, rejected, or uncovered for observation, or that may require special testing, inspection, or approval.
    4. Rejection of defective work and verification that corrective measures are implemented.
    5. Making observations and records that will aid in the preparation of a report on remedial activities.
- Inspecting each delivery of materials and/or equipment.
- Reporting to the Construction QA Officer the results of all inspections, including work that is not of acceptable quality or that fails to meet the requirements of the RAWP, approved submittals, and this CQAP.
- Verifying that testing equipment meets established requirements that the tests are conducted according to the proper standardized procedures.

- Confirming that testing equipment, personnel, and procedures do not change over time, or making sure that any changes do not adversely impact the inspection process.
- Confirming that regular calibration of testing equipment occurs and is properly recorded.
- Confirming that waste treatment or disposal is performed in accordance with applicable federal, state, and local laws and regulations.

2.4 Site Technician (Consultant)

A qualified scientist, geologist, or engineer from AKRF (supplemented by additional personnel, if necessary) will be on-site during remedial construction documenting site personnel, equipment, samples collected, contamination observations and any other observations of field activities. Specific responsibilities include:

- Calibration, operation, and maintenance of air monitoring instrumentation in accordance with the RAWP and approved submittals.
- Collecting, packaging, and shipping of environmental samples in accordance with the RAWP and QAPP.
- Documenting sample collection in a field notebook and identifying all sample locations in a field notebook or site drawing.
- Preparing and logging manifests for transportation of any non-hazardous and hazardous materials.
- Informing the Site Project Coordinator when (if) the concentrations of air contaminants exceed action levels specified in the RAWP.
- Maintaining and organizing the field equipment and supply storage area.

3.0 FIELD QUALITY CONTROL INSPECTIONS, TESTING, AND SAMPLING

The definable features of work are described in Sections 3 through 7 of the RAWP. This section describes the anticipated inspection, testing, and sampling requirements associated with these definable features of work.

3.1 Mobilization

Inspections will be performed to assure that site laydown areas, support facilities, surface water controls, and air monitoring systems are established in accordance with the RAWP and approved submittals. In addition, the stakeout of existing utilities in work areas and the maintenance of site security will be verified. There are no testing and sampling requirements associated with mobilization of the contractor(s).

Each delivery of materials and/or equipment will be inspected relative to approved submittals. Approved materials and/or equipment will be stored at a designated area of the Site.

Equipment will be set up and tested in accordance with the RAWP and approved submittals.

3.2 Soil Excavation

The Soil/Materials Management Plan (SMMP), Section 5.1.4 of the RAWP, outlines the procedures to be performed during the handling of soil/fill materials on-site during all intrusive work. Inspections will be performed during soil excavation activities including concrete removal, soil excavation, stockpiling, and load out, shoring, and re-use and backfilling (if any). Any impacts to building structural elements will be documented and assessed immediately. AKRF will confirm that all soil excavation related work will be conducted as specified in the RAWP, or are equivalent. Air monitoring will be conducted as outlined in the HASP, provided as Appendix I to the RAWP. Soil screening will be conducted as outlined in Sections 6.4.1 of the RAWP. Any corrective actions will be summarized in the Daily Reports.

3.3 Soil Sampling

Soil sampling activities at the Site include endpoint sampling and may include reuse sampling and/or backfill from off-site sources. Proposed endpoint sample locations are shown on Figure 8 of the RAWP. All soil sampling activities will be conducted in accordance with the Quality Assurance Project Plan (QAPP) and Section 5.1.2 of the RAWP.

The applicable Soil Cleanup Objectives (SCOs) for this Site are the Track 1 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Track 4 Site-Specific SCOs (SSSCOs). In the event the Track 1 UUSCOs cannot be achieved, a contingency for Track 2 Restricted Residential SCOs (RRSCOS) has been established.

Soil and materials management on-site and off-site will be conducted in accordance with the SMMP (Section 5.1.4 of the RAWP).

3.4 Loading of Waste Material for Transportation

Inspections will be conducted to verify that material removed from the Site is properly loaded for transfer to a permitted treatment/disposal facility. Manifests and bills of lading will be maintained and will be included as an Appendix in the FER.

3.5 Site Restoration

Site restoration will be observed and recorded to verify compliance with the RAWP and approved submittals. The surface will be restored to match the surrounding ground surface.

4.0 MEETINGS

A pre-construction meeting will be held with representatives of NYSDEC, the consultants, and contractor(s) performing the work prior to the start of major construction activities. Additional meetings will be called as necessary if work conditions change or deviations are necessary.

Project personnel and visitors will be given health and safety briefings periodically by the Site Technician or Field Team Leader to assist Site personnel in safely conducting their work activities. The safety 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.

5.0 DOCUMENTATION AND REPORTING REQUIREMENTS

The value of the CQAP will be assured by proper documentation. The inspectors will use data sheets, field reports, log forms, schedules, and checklists to document Site work and verify compliance with the RAWP and approved submittals. Documentation will include, at a minimum, the following reports and information:

- Daily field construction reports

- Photographs
- Sampling chains of custody
- Material disposition logs
- Variances to the RAWP and approved submittals

5.1 Daily Report

The Site Technician or Field Team Leader will prepare a daily report that identifies the following:

- Work force and visitors to the Site;
- An update of progress made during the reporting day;
- Locations of work and quantities of material imported and exported from the Site;
- References to alphanumeric grid map for Site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP findings, including excursions;
- Apparent deviations from the RAWP;
- Weather conditions;
- Photographs of the Site and pertinent work; and
- An explanation of notable Site conditions.

5.2 Photographic Log

The photographic log will be kept to document construction activities by still photographs. The photographic log may also be used to record activities recorded in the daily report. All photographs will be taken with a camera capable of producing date and timestamps.

5.3 Sampling Documentation

The project field book will be used to document all sampling activities and how they correspond to the RAWP. All observations and field and/or laboratory tests will be recorded in the project field book or on separate logs. Recorded field observations may take the form of notes, charts, sketches, or photographs.

5.4 Material Disposition Tracking

All materials that are taken off-site for disposal will be tracked and final disposition confirmed. Copies of all waste manifests and bills of lading will be maintained by the Project Manager.

5.5 Variances to Work Plan

Required changes to the RAWP will be documented as construction proceeds. Any material deviations from the NYSDEC-approved RAWP will be communicated to NYSDEC Project Manager. NYSDEC approval will be sought prior to proceeding with work deviating materially from the RAWP. In the event of an emergency change to the work plan, NYSDEC Project Manager will be consulted immediately.

5.6 Final Engineering Report (FER)

At the completion of the project the consultant (AKRF) will prepare an FER. This report will describe the implementation of the RAWP and will include a summary of the field work, as-built drawings for constructed elements, manifests, bills of lading, test results demonstrating that all mitigation and remedial systems are functioning properly, and photographic documentation. The FER will also include a description of the changes in the Remedial Action from the elements provided in the RAWP.

5.7 Document Storage

The Field Team Leader will maintain the current field book and all original field paperwork during the performance of work. The Project Manager will maintain the field paperwork after completion and will maintain all submittal document files.

APPENDIX I

RESUMES AND CERTIFICATIONS OF KEY PERSONNEL

MICHELLE LAPIN, P.E.

SENIOR VICE PRESIDENT

Michelle Lapin is a Senior Vice President with more than 29 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's Hazardous Materials group and offers extensive experience providing strategic planning and management for clients. Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, air and geotechnical problems. Her other duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes groundwater investigations, formulation and administration of groundwater monitoring programs and remediation throughout the Northeast. Her experience with groundwater contamination includes Level B hazardous waste site investigations; leaking underground storage tank studies, including hazardous soil removal and disposal and associated soil and water issues; soil gas/vapor intrusion surveys; and wetlands issues. Ms. Lapin is experienced in investigation and remediation concerning hazardous waste cell closures, and landfills. She has directed hundreds of Phase I, Phase II, and Phase III investigations and remediations, many of them in conjunction with developers, law firms, lending institutions, and national retail chains. She is also experienced in the cleanup of contaminated properties under Brownfield Cleanup Program (BCP) regulations.

BACKGROUND

Education

M.S., Civil Engineering, Syracuse University, 1985
B.S., Civil Engineering, Clarkson University, 1983

Professional Licenses/Certifications

New York State P.E.
State of Connecticut P.E.

Professional Memberships

Member, National Society of Professional Engineers (NSPE), National and CT Chapters
Member, American Society of Civil Engineers (ASCE), National and CT Chapters
Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council (EPC)
Member, Environmental Professionals' Organization of Connecticut (EPOC)
Board Member, New York City Brownfield Partnership
Member, NAIOP, a Commercial Real Estate Development Association

Years of Experience

Year started in company: 1994
Year started in industry: 1986

RELEVANT EXPERIENCE

Gedney Way Landfill, White Plains, NY

Ms. Lapin was the Engineer of Record for this closure of a former ash landfill, which is also utilized as a leaf and yard waste compost facility by the City of White Plains. The landfill closure required investigations to document the landfill's disposal history and the extent of the solvent contamination and methane. The investigation and closure of the landfill were completed to satisfy the requirements of a New York State Department of Environmental Conservation's (NYSDEC) consent order, were completed in compliance with NYSDEC DER-10 and 6NYCRR Part 360, and included placement of landfill cap, methane recovery system, and sealing of storm sewers traversing the landfill.

Roosevelt Union Free School District – District-wide Improvement Program, Roosevelt, NY

Ms. Lapin managed the hazardous materials investigation for the Draft and Final Environmental Impact Statements (EIS) for the improvement program, which included the demolition of three existing elementary schools and portions of the junior-senior high school, and the reconstruction of three replacement elementary schools, a separate replacement middle school, and renovations to the high school. Following the EIS, additional hazardous materials investigations were completed, including comprehensive asbestos and lead surveys; Phase I and Phase II Environmental Site Assessments; the preparation of asbestos, lead, hazardous materials and demolition specifications; and obtaining site-specific variances from the New York State Department of Labor (NYSDOL). The middle school remediation was conducted through coordination with the New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Health (NYSDOH), the New York State Education Department (NYSED) and the local school district. The project was approved, and construction/renovation for the new middle school completed such that the school opened for the Fall 2008 semester as planned.

Memorial Sloan Kettering Cancer Center-CUNY 74th Street EIS, New York, NY

AKRF was engaged by Memorial Sloan-Kettering Cancer Center (MSK) and CUNY-Hunter College (CUNY) to prepare an EIS for a proposed joint facility located on a New York City-owned parcel located between East 73rd Street and East 74th Street adjacent to the FDR Drive in Manhattan. The proposed facility was formerly occupied by the Department of Sanitation, and had included over 41 underground storage tanks, will include an ambulatory medical care center for MSK and educational and medical research facilities for CUNY.

Ms. Lapin is leading the hazardous materials work which includes the preparation of the Phase I and II environmental site assessments, remedial action work plans (RAWPs), and construction health and safety plans (CHASPs) for submission to the New York City Office of Environmental Remediation (OER) for the Voluntary Cleanup Program (VCP) and to the New York State Department of Environmental Conservation (NYSDEC) for remediation of a petroleum spill. The RAWPs and CHASPs included provisions for excavation of contaminated soil and rock, removal of tanks and environmental monitoring during the construction activities. AKRF also performed a pre-demolition asbestos survey of the remaining concrete foundation structures and prepared specifications for asbestos abatement, soil management and underground storage tank removal and disposal.

Brooklyn Bridge Park, Brooklyn, NY

AKRF prepared an Environmental Impact Statement (EIS) and is continuing to provide technical and planning support services for Brooklyn Bridge Park, which revitalizing the 1.3-mile stretch of the East River waterfront between Jay Street on the north and Atlantic Avenue on the south. The new park, allows public access to the water's edge, allowing people to enjoy the spectacular views of the Manhattan skyline and New York Harbor. It also provides an array of passive and active recreational opportunities, including lawns, pavilions, and a marina. As with many waterfront sites around New York City, the lands along the Brooklyn waterfront have a long history of industrial activities. Some of these industries used dangerous chemicals and generated toxic by-products that could have entered the soil and groundwater. In addition, landfilling activities along the shoreline also used ash and other waste materials from industrial processes. Based on site inspections, historical maps, government records, and other sources, AKRF has been investigating the potential for the presence for hazardous materials in the park. This information was compiled into a Phase 1 Environmental Site Assessment report. AKRF has also provided and continues to support to the design team related to designing the project to minimize costs related to remediating hazardous materials where possible. Ms. Lapin is serving as senior manager for the hazardous materials investigations.

East River Science Park, New York, NY

Originally, New York University School of Medicine (NYUSOM) retained the firm to prepare a full Environmental Impact Statement (EIS) for its proposed East River Science Park (ERSP). The proposed complex was to occupy an underutilized portion of the Bellevue Hospital campus between East 30th Street and approximately East 28th Street, immediately south of NYU's campus. As originally contemplated, Phase I was to include 618,000 square feet of development, including a clinical practice and research building, a biotech center, 220 housing units for post-doctorate staff, a child care center, and a conference center. This phase would include reuse of the former Bellevue Psychiatric Building, a historic structure on East 30th Street east of First Avenue. Phase II was to include a second biotech building with a library to serve NYU and Bellevue at the eastern end of the block between 29th and 30th Streets. Phase III was to include a third biotech building and parking. The project's EIS considered a full range of issues, including land use, socioeconomics, shadows, historic resources, open space, traffic and transportation, air quality, noise, and construction. The firm also prepared all of the traffic and transportation studies for the urban design and master planning efforts. Ms. Lapin managed the Phase I Environmental Site Assessment and other hazardous materials-related issues.

Events relating to September 11, 2001 put a hold on the project for a number of years. When the project resurfaced, it had a new developer and a decreased scope. Ms. Lapin updated the hazardous materials issues for the new developer and consulted with them regarding remediation strategies and involvement of regulatory agencies. For the actual remediation/development, the city requested oversight by AKRF to represent its interests (the city is retaining ownership of the land). Ms. Lapin completed directing the remediation oversight on behalf of the City of New York for the remediation of the former psychiatric hospital building, laundry building and parking areas associated with Bellevue Hospital. The new development includes a biotechnology center (Commercial Life Science Research and Office Park) comprising two buildings (combined 550,000 square feet), street level retail, and an elevated plaza.

New York City School Construction Authority (SCA), Environmental Consulting Hazardous Materials Services

The SCA was established by the New York State government to construct school facilities to reduce overcrowding and to provide new schools in growing neighborhoods. Focusing on the environmental consulting services, dating back to the 1980s and the days of the New York City Board of Education, the firm continues to provide broad support to SCA's effort, including environmental assessments in meeting the requirements of the State Environmental Quality Review Act (SEQRA), and site selection and property acquisition support for potential new sites. AKRF is currently serving under three individual on-call contracts for site acquisition and environmental consulting services, hazardous materials consulting services, and architectural and engineering services.

AKRF has undertaken various assignments under two consecutive hazardous materials on-call contract, including environmental assessment, remedial design, and plumbing disinfection consulting tasks. For potential new school sites, assignments include initial due diligence, Phase I environmental site assessments (ESAs) and multi-media subsurface investigation of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school, likely remediation requirements, and associated costs. For sites undergoing design and development, assignments include preparation of remediation plans, design of sub-slab depressurization systems (SSDS) and contract specifications, and construction oversight. The work has also included conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills for existing schools. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours. Ms. Lapin is the QA/QC officer for all of the SCA hazardous materials assignments and the Professional Engineer (P.E.) of record for the various remediation systems, including sub-slab depressurization systems (SSDS).

Hudson River Park, New York, NY

Ms. Lapin is directing AKRF's hazardous materials work during construction of Hudson River Park, a five-mile linear park along Manhattan's West Side. As the Hudson River Park Trust's (HRPT's) environmental consultant, AKRF has overseen preparation and implementation of additional soil and groundwater investigations [working with both the New York State Department of Environmental Conservation (NYSDEC) and the New York City Department of Environmental Protection (NYCDEP)], all health and safety activities, and removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the Environmental Impact Statement (EIS) process, including extensive database and historical research, and soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

Davids Island Site Investigations, New Rochelle, NY

Ms. Lapin managed the hazardous materials investigation of Davids Island, the largest undeveloped island on the Long Island Sound in Westchester County. The 80-acre island features pre- and post-Civil War military buildings and parade grounds, and is viewed as a major heritage, tourism, and recreational amenity. The island, formerly known as Fort Slocum, was used by the U.S. military, beginning in the 19th century, as an Army base, hospital, and training center. The island was planned for county park purposes. The investigation included a Phase I Environmental Site Assessment, with historical research going back to the 17th century, a Phase II (Subsurface) Investigation, underground storage tank investigations, asbestos surveys, and conditions surveys of all remaining structures. Cost estimates were submitted to Westchester County for soil remediation, asbestos abatement, and building demolition.

Yonkers Waterfront Redevelopment Project, Yonkers, NY

For this redevelopment along Yonkers' Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I Environmental Site Assessments of 12 parcels, investigations of underground storage tank removals and associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, which enabled construction of mixed-use retail, residential development, and parking.

Storage Deluxe, Various Locations, NY

Ms. Lapin manages the firm's ongoing work with Storage Deluxe, which includes Phase I Environmental Site Assessments and Phase II Subsurface Investigations, underground storage tank removals and associated remediation, asbestos surveys and abatement oversight, and contaminated soil removal and remediation for sites in Connecticut, the Bronx, Brooklyn, Manhattan, Queens, Westchester County, and Long Island.

Columbia University Manhattanville Academic Mixed-Use Development, New York, NY

Ms. Lapin served as Hazardous Materials Task Leader on this Environmental Impact Statement (EIS) for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work included Phase I Environmental Site Assessments for the properties within the site boundaries, and estimates for a Subsurface (Phase II) Investigation of the entire development area. The firm's Hazardous Materials group performed over 30 individual Phase I Environmental Site Assessments for properties within the development area. In addition, a Preliminary Environmental Site Assessment (PESA) was completed in conjunction with the Environmental Impact Statement (EIS). Based on the Phase I studies, AKRF conducted a subsurface (Phase II) investigation in accordance with a New York City Department of Environmental Protection (NYCDEP) approved investigative work plan and health and safety plan. Subsurface activities included the advancement of soil borings, groundwater monitor wells, and the collection of soil and groundwater samples for laboratory analysis. This study was used to estimate costs to remediate contaminated soil and groundwater, and underground storage tanks and hazardous building materials, including lead-based paint and asbestos-containing materials.

DPR Soundview Park Playgrounds and Open Space, Bronx, NY

AKRF is part of a team working on the reconstruction of this 212-acre NYCDPR public park located along the Bronx River in the Bronx, New York. The park was identified as an underutilized park and is being improved in accordance with the goals of PlaNYC. Ms. Lapin is overseeing AKRF's hazardous materials investigations including environmental and remediation-related work. AKRF prepared the Environmental Assessment Statement (EAS) and the project has moved into the design and construction phase. The remediation/construction of multiple phases of the development is currently underway.

Rego Park Home Depot, Queens, NY

Solvent contamination was encountered during retail development of a former industrial property in Rego Park, Queens, New York. The site work included an extensive investigation and a multi-phase remediation performed under the NYSDEC Voluntary Cleanup Program (BCP). Remediation included removal of aboveground and underground storage tanks (ASTs and USTs) and hotspot soil removal. An Air Sparging/Soil Vapor Extraction (AS/SVE) groundwater remediation system designed by AKRF was installed as part of the building construction. Continued remediation work included upgrading and expanding the AS/SVE system after the store was opened. AKRF prepared the Final Engineering Report and obtained closure with a Release and Covenant Not to Sue issued by NYSDEC in 2013. AKRF continues operations, maintenance, and monitoring under the NYSDEC-approved Site Management Plan. Ms. Lapin is the Professional Engineer (P.E.) of record for the remediation design and implementation in accordance with the NYSDEC Brownfield Cleanup Program (BCP).

Certificate Of Completion

This Certifies That

Michelle Lapin

has completed the **40** hour course:

OSHA 40 Hour Personnel Protection & Safety Course

Presented by

HAZCO

Spanning the Hazardous Materials
Health and Safety Horizons

April 24-27, 1987

Date

Training Director

AKRF, Inc.
440 Park Avenue South
New York, New York 10016
(212) 696-0670

Certificate of Completion

This is to certify that

Michelle Lapin

has successfully completed the course entitled
Annual Refresher Course on Health and Safety for
Hazardous Waste Site Investigation Personnel
8 Hour OSHA Refresher - Hazwoper Training Course
Per 29 CFR 1910.120

Presented

September 28, 2017

Marcus Simons
Safety Officer

STEPHEN T. MALINOWSKI, QEP

VICE PRESIDENT

Stephen Malinowski is a Vice President with more than 20 years of professional experience in assessment, investigation, and remediation of environmental contamination-related issues. Steve has managed all aspects of environmental projects with multi-disciplinary teams, including public agencies, developers, property owners, architects, and construction managers to navigate regulatory programs efficiently and achieve project objectives. His projects fall under the regulatory oversight of the USEPA, NYSDEC, NYCDEP and NYCOER including the Federal and New York State Superfund, New York State Brownfield Cleanup Program (BCP) and petroleum spills, RCRA/IUC closures, New York City Voluntary Cleanup Program (VCP) and E-Designation program, and Nassau and Suffolk County regulatory programs. His proficiency in the development of custom scopes of work and accurate cost estimates coupled with his field-experience, knowledge of regulations, and excellent rapport with regulatory personnel allow him to provide turnkey environmental consulting for remediation, development, infrastructure improvement, and coastal resiliency projects.

Mr. Malinowski's experience includes the design, implementation, and management of environmental assessment, investigation and remediation projects in the New York Metropolitan Area including soil groundwater investigation, monitoring, and sampling programs, Brownfield and hazardous waste site investigations; underground storage tank studies, including soil contamination delineation, classification, waste removal and disposal. He has overseen and conducted hundreds of Phase I Environmental Site Assessments (ESAs) and Phase II investigations in a variety of environmental settings ranging from industrial sites to sites in challenging urban areas, many of them in conjunction with site redevelopment and property transaction related activities. In addition, Steve has designed and implemented indoor air and soil vapor intrusion surveys at industrial, commercial and residential properties in accordance with NYSDOH protocols, some requiring sub-slab depressurization or soil vapor extraction systems.

BACKGROUND

Education

B.A., Environmental Science, State University of New York at Plattsburgh

Licenses/Certifications

Qualified Environmental Professional from the Institute of Professional Environmental Practice (IPEP)

New York State Professional Geologist -000422

Certified Brownfield Professional by New York City Office of Environmental Remediation

Health and Safety Operations at Hazardous Materials Sites 29 CFR 1910.120

OSHA 10 Hour Occupational Construction Safety and Health

Professional Memberships

Member, Long Island Association of Professional Geologists (LIAPG)

Member, Institute of Professional Environmental Practice (IPEP)

Awards

Big Apple Brownfield Award recipient as part of the Cornerstone B1 (LaTerraza) redevelopment team 2011

Big Apple Brownfield Award recipient as part of the Flushing Commons redevelopment team 2017

Big Apple Brownfield Award recipient as part of the Jamaica 94th Avenue redevelopment team 2017

Years of Experience

Year started in company: 2013

Year started in industry: 1992

RELEVANT EXPERIENCE

NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION (NYCDDC) FEASIBILITY AND PRE-SCOPING SERVICES FOR EAST SIDE COASTAL RESILIENCY, NEW YORK, NY

Mr. Malinowski lead the subsurface exploration program for a multidisciplinary design team selected by the New York City agency partnership of NYCDDC, New York City Department of Parks and Recreation (NYCDPR), New York City Department of Transportation, and the Mayor's Office of Recovery and Resiliency (ORR) or the Feasibility Study and Pre-Scoping Services for East Side Coastal Resiliency (ESCR) project. AKRF provided technical analysis and pre-scoping services, including complex conceptual design services, for 100+ year storm protection with anticipated sea level rise along the east side of Lower Manhattan. The ESCR subsurface exploration program involved a review of available utility plans and environmental reports involving manufactured gas plant (MGP) and petroleum-related contamination along a 2.5 mile study area from Montgomery Street to East 23rd Street to develop a Subsurface Investigation Work Plan for approval by the NYCDEP. The program included both public and private utility mark-out services across vast areas of the project containing critical infrastructure to enable the installation of 81 deep borings, 515 shallow borings, and 10 temporary groundwater wells.

Mr. Malinowski was in charge of all aspects of the management and implementation of the field investigation including access coordination, permitting, and reporting. He was also responsible for interpretation of a wide-range of data, providing critical cost and health/safety advice to the design team, and preparation of technical reports for NYCDEP in order to satisfy City Environmental Quality Review (CEQR) requirements.

NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION (NYCDDC) PRELIMINARY AND FINAL DESIGN SERVICES FOR EAST SIDE COASTAL RESILIENCY, NEW YORK, NY.

AKRF is leading a multidisciplinary design team that was selected by the New York City agency partnership of NYCDDC, New York City Department of Parks and Recreation (NYCDPR), New York City Department of Transportation, and the Mayor's Office of Recovery and Resiliency (ORR) to provide engineering, planning, landscape architecture, urban design and community engagement services for the Preliminary and Final Design Services for East Side Coastal Resiliency (ESCR).

Mr. Malinowski worked with the design team to identify additional data needs based on advances in the design and developed a Supplemental Subsurface Investigation Work Plan for NYCDEP-approval. Mr. Malinowski leads all aspects of the management and implementation of the supplemental field investigation including access coordination, utility locating, permitting and reporting. He is responsible for the interpretation of a wide-range of data, and to provide critical cost and health/safety direction to the design team. He is also responsible for preparation of all reports (EIS, cost reports, Soil and Groundwater Management Plan, and presentations to the NYC team.)

Mr. Malinowski has led extensive geology and hydrogeological studies to evaluate the impacts of the flood protection structure on the groundwater flow and transport of MGP-related wastes. He is currently supporting the City team with the coordination of remedial efforts pertains to MGP contaminants with NYSDEC, Con Ed and the various public and private entities that have a stake in the project. Once the preliminary design is released, Steve will prepare environmental specifications for the project to be used during the procurement of contractor bids.

REMEDIAL DESIGN, GOWANUS CANAL FIRST STREET TURNING BASIN, NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION

Mr. Malinowski is the Project Manager for the remedial design for restoration of the Filled-in Former First Street Turning Basin adjacent to the Gowanus Canal in Brooklyn, New York. The remediation is being conducted as part of an Order of Consent between the City of New York and USEPA for the Gowanus Canal Superfund Site. Steve is responsible for coordination of a multidisciplinary team to evaluate existing structure and environmental conditions associated with the site and the immediate surrounding area. Steve is overseeing the implementation of underwater bulkhead inspections and multi-beam sounding surveys in the Gowanus Canal, environmental and geotechnical investigations, surveys, structural and existing condition evaluations of nearby properties and is responsible for all reporting and communications for the project. He is working with nearby property owners to initiate access agreements for work on their properties. Steve is also assisting the DDC with presentations at the Gowanus Community Action Group and is working closely with the USEPA to implement an archaeology monitoring plan during subsurface disturbance activities

The remedial design will include removal of fill and sediment within the filled-in turning basin in an approximately 475-foot by 50-foot area and the creation of a wetland shelf. Design considerations include geotechnical concerns related to adjacent buildings and new and existing bulkheads; soil and water management; landscape design; and access/construction logistics. The project design in anticipated to be completed in early 2018.

13TH AND 14TH STREET REALTY, NYS BROWNFIELD REDEVELOPMENT, NEW YORK, NY

Mr. Malinowski directed all Phases of this NYS Brownfield project including the initial investigation, submittal of a BCP Application simultaneously with a Remedial Investigation Work Plan and an Interim Remedial Measures Work Plan, which enabled the investigation and remediation to be implemented concurrently with planned site redevelopment activities. The site consisted of an approximately 20,000 square foot property in Manhattan comprised of 100 year old dilapidated buildings. The presence of perchloroethene (PCE) contamination associated with a former dry cleaner prevented the property owner from selling. The developer applied to the New York State Brownfield Cleanup Program (BCP) as a "Volunteer" to eliminate off-site liability. Prior to the client securing its construction loan all plans were approved by NYSDEC and a detailed remedial estimate was approved for financing by the client's lending institutions.

The investigation included soil and soil vapor testing as well as the installation and sampling of groundwater monitoring wells. The remediation activities included the removal of underground oil tanks, soil waste classification testing, and removal of approximately 15,000 tons of non-hazardous petroleum and lead contaminated soil as well as 200 tons of hazardous soil containing PCE. A water-proofing membrane was installed beneath the entire building to eliminate the exposure pathway for PCE into the new 8-story residential building. The investigation and remedial work was performed under a construction health and safety plan that included a community air monitoring program. The client received approximately $6,000,000 in tax credits from NYS for the Track 2 cleanup of this underutilized contaminated property.

CONFIDENTIAL CLIENT – LITIGATION SUPPORT SERVICES, GREENPOINT, BROOKLYN, NY

AKRF was contracted by a private land owner of a 17-acre site along the Newtown Creek waterfront located above the 55-acre 20-million gallon underground petroleum plume. The site is located on property formerly utilized for petroleum refining and storage, and the property owner requested assistance understanding the impacts, negotiating investigation and cleanup activities with ExxonMobil and NYSDEC, to protect employees and limit disturbances to business operations. Mr. Malinowski's initial role in 1999 involved the review of work plans, investigation and remediation reports and acting as a liaison between the Site Owner, ExxonMobil, and NYSDEC to mitigate seepage of petroleum through the bulkhead into Newtown Creek. In 2005, ChevronTexaco's predecessor, Texaco, Inc. assumed responsibility for an approximate 11-acre portion of the property situated along the waterfront and initiated a site characterization which identified soil, groundwater and soil vapor concerns beneath the property. Mr. Malinowski was responsible for evaluating the impacts and assessing the alternative analysis evaluation to select a remedy that protected site personnel and cleaned up the property. Since ExxonMobil was remediating a portion of the property and the surrounding neighborhood and Texaco, Inc. was responsible for the waterfront parcel, Mr. Malinowski's role also involved discussions with ExxonMobil, Texaco, and NYSDEC to ensure the cleanup strategies were coordinated to address the potential of additional petroleum migrating onto the property.

In addition to reviewing, overseeing and advising on the investigation and cleanup activities, Mr. Malinowski has prepared Phase I Environmental Site Assessments for the property, reviewed historic maps and documents on the refining history of Newtown Creek, initiated indoor air monitoring programs, arranged for the removal of underground oil tanks, designed and installed sub-slab depressurization systems, and responded to ongoing work inquiries by the oil companies. He also managed the development of and implementation of a Stormwater Pollution Prevention Plan to comply with a NYSDEC Order on Consent and conducted waste classification and disposal for hazardous fill material encountered during construction of the stormwater treatment system. Mr. Malinowski's work for this client remains ongoing.

EMPIRE STATE VARNISH CORPORATION - RCRA CLOSURE, GREENPOINT, BROOKLYN, NY

Mr. Malinowski orchestrated the Closure of a varnish company with a host of RCRA problems situated over our Nation's largest underground oil spill by negotiating an investigation and cleanup with NYSDEC and the property purchaser ExxonMobil. The $750,000 remedial cost estimate was utilized to create an escrow account to finance the investigation and remediation. The remediation included the disposal of more than 1,000 drums of hazardous/flammable waste, 17 underground storage tanks, and a vast inventory of small containers of hazardous material, off-site disposal of approximately 700 tons of non-hazardous soil, abatement of asbestos containing material and construction health and safety monitoring. The work was performed under the oversight of NYSDEC's RCRA unit as well as Albany's Bureau of Environmental Remediation overseeing the regional ExxonMobil Off-site Spill aka the Greenpoint Oil Spill. The completed project provided ExxonMobil with a strategically located property to greatly increase their remediation efforts of the regional petroleum spill and avoided the property being listed on the New York State's list of inactive hazardous waste sites.

LITIGATION SUPPORT SERVICES, LONG ISLAND CITY, QUEENS, NY

AKRF was contracted by two separate litigation groups to identify historic ownership, waterfront landfilling activities, and land use practices from the earliest period of development through the present for an approximately 300,000-squarefoot area along the Newtown Creek waterfront. The project site had a long history of industrial activity including coal and petroleum refining, chemical storage and manufacturing, and petroleum recycling. Mr. Malinowski worked with AKRF's historians to review data gathered from various resources, such as historic maps, historic photographs, historic conveyance records, newspaper articles, local histories, and readily available records such as historic aerial photographs, Sanborn fire insurance maps, historic topographical maps, historic city directories, and transcripts and exhibits from depositions conducted in litigation. The data collected was used to prepare a summary of the development and industrial history for the project area detailing ownership, property uses, and landfilling activities along the Newtown Creek waterfront.

WATERVIEW AT GREENPOINT, LLC, NYC OER VCP, 77 COMMERCIAL STREET BROOKLYN, NY

AKRF provided environmental consulting services in connection with the proposed affordable housing development at 77 Commercial Street as part of ongoing revitalization of the Greenpoint waterfront. The project comprises the redevelopment of an approximately 110,000-squarefoot former industrial parcel into a mixed-use commercial/residential development including public waterfront esplanade, affordable housing, and three interconnected buildings ranging from 2 to 40 stories. The site is being remediated under the New York City Mayor's Office of Environmental Remediation (OER), and is listed with an E-Designation for Hazardous Materials, Air Quality, and Noise.

Mr. Malinowski oversaw the preparation of a Remedial Investigation Work Plan and implementation of a Remedial Investigation (RI) which included 38 soil samples, 6 groundwater samples, and 11 soil vapor samples. Based on the results of the RI, he oversaw the preparation of a Remedial Action Work Plan (RAWP) that included excavation of approximately 90,000 tons of soil, removal of underground oil tanks, installation of a vapor barrier beneath the entire building, and design drawings for a sub-slab depressurization system. Upon approval of the RAWP, Mr. Malinowski helped enroll the project into OER's Voluntary Cleanup Program (VCP) to enable an exemption from hazardous waste disposal taxes and to capitalize on additional community involvement provided by OER. AKRF, OER, and community leaders developed proactive measures to limit the potential disturbances from construction and to help keep concerned community members informed of planned activities. He also designed and conducted an extensive in-situ testing of soil to pre-classify the material for disposal.

Mr. Malinowski managed the associated E-Designation work for Air Quality and Noise (E-138) to render the site protective of Air Quality and Noise impacts. The work included a site-specific noise study and evaluation of proposed fuel types, mechanical equipment, and emission stack locations to prepare an Air Quality and Noise Remedial Action Plan (RAP). All documents were approved by OER and the project is awaiting groundbreaking and start of construction.

FLUSHING COMMONS DEVELOPMENT, NYC OER VCP SITE, 38-18 UNION STREET, QUEENS, NY

AKRF prepared an Environmental Impact Statement (EIS) under New York City Environmental Quality Review (CEQR) for Flushing Commons, LLC, a 2-million-square-foot mixed-use, private-public development in Flushing, Queens. The project was sponsored by EDC and developed in partnership with Flushing-based TDC Development and Construction (TDC), and Rockefeller Group Development. As a result of the environmental review process a Restrictive Declaration was assigned to the property. Due to the scale of the project, the project development was divided into two Phases.

Flushing Commons Phase I included a 67,600-square-foot automotive parking area at 38-18 Union Street. Mr. Malinowski prepared a Remedial Investigation Work Plan and oversaw the implementation of a Remedial Investigation (RI), which included soil, groundwater, and soil vapor samples. Based on the results of the RI, AKRF prepared a Remedial Action Work Plan (RAWP) including excavation of approximately 178,000 tons of soil and a vapor barrier beneath the entire building. Upon approval of the RAWP, Mr. Malinowski helped enroll the project into OER's Voluntary Cleanup Program (VCP) to capitalize on additional community involvement provided by NYCOER. AKRF also conducted extensive waste characterization testing of the soil to pre-classify the material for disposal, provided construction oversight, and implemented a Community Air Monitoring Program (CAMP) during 11 months of excavation.

Steve received a Big Apple Brownfield awards from the NYC Brownfield Partnership for employing sustainable remediation practices during the excavation. Steve coordinated participation in NYCOER's Clean Soil Bank program, which led to a the reuse of approximately 14,000 cubic yards of material to nearby local areas affected by Super Storm Sandy and 20,000 cubic yards of soil to a recycling plant for reuse as concrete mix. These efforts eliminated more than 1,500 trucks trips to regional disposal locations outside of NYC.s effectively reducing the carbon footprint of the redevelopment, and provided for the reuse of material on-site and elsewhere in NYC. To complete the project, AKRF prepared a Remedial Action Report documenting the Track 1 cleanup of the site which was approved by NYCOER.

BRICKENS CONSTRUCTION, 121ST PRECINCT, 970 RICHMOND AVENUE, STATEN ISLAND, NY

Mr. Malinowski assisted Brickens Construction with the pre-characterization of approximately 15,000 tons of soil requiring excavation under a NYC DDC contract for the construction of the 121st Precinct on Staten Island. Mr. Malinowski designed a waste classification testing program, obtained approval from suitable disposal facilities and prepared an Excavated Materials Disposal Plan (EMDP) for review by NYC DDC. Upon approval of the EMDP, Mr. Malinowski coordinated the direct loading, transportation and disposal of the material while staff working under his direction initiated a community air monitoring program, and tracked each shipment for reporting purposes. As the excavation advanced, Mr. Malinowski arranged groundwater testing and worked with the project engineering team to design a dewatering scheme and obtain a permit from the NYCDEP to discharge dewatering fluids to the combined sewer system.

2264-2772 MORRIS AVENUE, NYCDEP CEQR, BRONX, NY

AKRF is providing environmental hazardous materials and consulting services in connection with the proposed affordable housing development at 2264-2272 Morris Avenue. The proposed 11-story building is expected to include 94 much-needed units of new affordable and supportive housing. Mr. Malinowski oversaw the preparation of hazardous materials reports for the project site including a Phase I ESA and Phase II site investigation for pre-purchase due diligence purposes. As part of the CEQR review, a Phase II Work Plan and Supplemental Phase II Investigation were performed under the regulatory oversight of the New York City Department of Environmental Protection (NYCDEP). Mr. Malinowski oversaw the preparation of a Remedial Action Plan (RAP) for NYCDEP approval which includes the removal of underground storage tanks (USTs), characterization and disposal of approximately 5,000 tons of soil, and the installation of a vapor barrier. AKRF is currently overseeing the implementation of the RAP and under Mr. Malinowski's direction has removed the USTs, cleaned up a petroleum spill to the satisfaction of the NYSDEC, and is conducting community air monitoring during the foundation excavation.

3363-3365 THIRD AVENUE, NYC OER VCP SITE, BRONX, NY

AKRF is providing environmental consulting services in connection with the proposed affordable housing development at 3363-3365 Third Avenue. The proposed project consists of a residential building with a basement and approximately 30 affordable housing units. Mr. Malinowski oversaw the preparation of Phase I ESA for due diligence purposes and to support an application to the New York City Acquisition Fund. The Phase I identified recognized environmental conditions as well as an E- Designation from the Morrisania Rezoning Action. Mr. Malinowski is assisting the client with satisfying the E –Designation and has prepared and implemented a Remedial Investigation Work Plan under the regulatory oversight of the New York City Mayor's Office of Environmental Remediation (NYCOER). The Remedial Investigation included soil, soil vapor, groundwater and ambient air sampling. AKRF also prepared a Remedial Action Work Plan (RAWP) and conducted which includes the design of a sub-slab depressurization system (SSDS) and vapor barrier system to prevent potential soil vapor intrusion. AKRF conducted waste disposal testing to characterization approximately 4,500 tons of soil for off-site disposal and is currently conducting environmental monitoring during excavation of the site soils and installation of the SSDS and vapor barrier. The site is enrolled in NYCOER's Voluntary Cleanup Program and the client is anticipating receiving the maximum allowable Brownfield Incentive Grant for this affordable housing project.

ENVIRONMENTAL CONSULTING SERVICES FOR NYCOER E-DESIGNATED AND VCP SITES, VARIOUS LOCATIONS, NY

Mr. Malinowski has provided environmental services required to satisfy hazardous materials-related E-designations on various locations in New York City, including 3363-3365 Third Avenue in the Bronx for Bronx Pro Real Estate Management, Flushing Commons in Queens, NY for the Rockefeller Group Development Corp., Manhattan West for Brookfield Properties, 432 East 14th Street in Manhattan for Urban Development Partners, 77 Commercial Street in Brooklyn, NY for Clipper Equities, and 260 West 26th Street in Manhattan and 94-02 148th Street in Queens, NY for Artimus Construction. These services included Phase I environmental site assessments, remedial investigations, preparation of Sampling Protocols, Remedial Action Plans and Health and Safety Plans based on identified hazardous materials issues, correspondence with the New York City Mayor's Office of Environmental Remediation (OER), remediation oversight as required by identified conditions, and preparation of Remedial Investigation and Remedial Closure Reports. He initiated pre-disposal soil classification programs and assisted with the disposal of large volumes of soil displaying characteristics from clean to hazardous containing to facilitate the installation of the new building foundations.

ENVIRONMENTAL CONSULTING SERVICES FOR NYCDEP SITES, VARIOUS LOCATIONS, NY

Mr. Malinowski has provided environmental services required to satisfy hazardous materials-related requirements on various locations in New York City, 23-25 Wooster Street and 325-329 West Broadway and 98 Franklin Street in Manhattan, NY for DDG Partners, 48-21 5thAvenue in Queens, NY for the Milestone Group, 2264-2272 Morris Avenue and 1070 Washington Avenue and 2264-2272 Morris Avenue in the Bronx, NY for the Bronx Pro Group, 1734 St. John's Place in Brooklyn, NY for MDG Design and Construction, LLC, and 20 West 40th Street in Manhattan for HFZ Capital. These services included Phase I environmental site assessments, remedial investigations, preparation of Sampling Protocols, Remedial Action Plans and Health and Safety Plans based on identified hazardous materials issues, correspondence with the New York City Department of Environmental, remediation oversight as required by identified conditions, and preparation of Site Investigation and Closure Reports. He has also initiated pre-disposal soil classification programs and assisted with the disposal of large volumes of soil to facilitate the installation of the new building foundations. Many of the projects with NYCDEP also involved the New York City Housing and Preservation Department (NYCHPD).

875 TENANT CORP., OIL SPILL INVESTIGATION AND REMEDIATION, NEW YORK, NY

Mr. Malinowski assisted one of the most prestigious real estate organizations in the northeast to investigate and remediate a petroleum spill in the basement of one of their high-rise residential properties along central park east in Manhattan. The source of the spill was a petroleum storage tank containing #6 fuel oil located in an exterior vault beneath the adjoining sidewalk. The contamination was located beneath the tank vault and adjacent to the foundation wall. The location of the oil and the viscous nature of the oil necessitated the need for innovative technology to remediate the spill with the least amount of disruption to this fully occupied and active residential building.

Mr. Malinowski performed a subsurface investigation to determine the extent of the impacts and assisted with the design and installation of a multi-phase extraction system in the building's sub-basement. The extraction system was fabricated on-site and consisted of eight extraction points to remove petroleum and groundwater pooled outside the foundation of the buildings' subbasement. The treatment system operated under a Stipulation Agreement with NYSDEC and required a NYCDEP sewer discharge permit. To mobilize the viscous oil steam was injected outside the foundation wall beneath the tank vault at nine locations. Formal spill closure was received by NYSDEC after a surfactant application was applied to the wells to eliminate the dissolved petroleum constituents and the subbasement walls were sealed with a chemical grout to prevent exposure to building occupants. Mr. Malinowski was responsible for all project activities, prepared all plans and reports and maintained communications with NYSDEC and the Tenant Board.

SITE INVESTIGATION, ALBANESE ORGANIZATION, WYANDANCH, NY

AKRF performed a Phase II subsurface investigation for the Albanese Organization to support the Wyandanch Rising project located on the Long Island Rail Road (LIRR) and Town of Babylon parking areas immediately located north of the Wyandanch train station. Prior to beginning the work, AKRF obtained a rail road protective liability insurance policy for the project and a Site Entry Permit from LIRR. The work consisted of the installation of soil and groundwater borings as well as the inspection and sampling of 13 stormwater drywells and five sanitary leaching structures under the oversight of the Suffolk County Department of Health Services (SCDHS). Based on these results, the SCDHS issued a "no further action" letter and the client was able to obtain financing for the project.

GAS STATION CLOSURE AND PROPERTY TRANSFER, HEWLETT, NY

On behalf of a private property owner, AKRF provided third party oversight for closure of a filling station by a major national gasoline retailer and assisted with environmental matters which complicated the sale of the property to a commercial developer. The remedial work conducted by the gasoline retailer included the removal of three active and five improperly abandoned underground storage tanks and pump islands and the three hydraulic lifts. AKRF maintained direct communication with the New York State Department of Environmental Conservation (NYSDEC) to ensure that the on-site soil was excavated to the furthest extent possible and that a post-remedial groundwater monitoring plan was promptly initiated so the property could be promptly redeveloped. Additional investigation activities conducted by the purchaser revealed the presence of chlorinated solvents in the groundwater above NYSDEC groundwater standards which further complicated the pending transaction. AKRF conducted research of the surrounding area and contacted the United States Environmental Protection Agency (EPA) regarding a well-documented nearby solvent plume. AKRF's efforts expedited the closure of the fuel spill and our communications with NYSDEC and EPA provided a level of comfort to the Purchaser that allowed the property transaction to proceed.

DRYWELL REMEDIATION, ABCO REFRIGERATION COMPANY, HAUPPAUGE, NEW YORK

Mr. Malinowski assisted the ABCO Refrigeration Company with a real estate transaction complicated by stormwater drywells contaminated with semi-volatile organic compounds. AKRF notified the Suffolk County Department of Health Services (SCDHS) and performed further investigation activities to test the sanitary system for contamination and utilized a remote camera to locate additional drywells buried beneath the asphalt pavement.

The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation was conducted using a high-powered vacuum truck under the oversight of SCDHS and included the disposal of approximately 5,000 gallons of liquid and 42 tons of soil from four drywells servicing the property. Post-remedial sediment samples were collected from the base of the drainage structures to document the soil quality. Based on these results, the SCDHS issued a "no further action" letter and the property transaction proceeded on schedule.

ISLAND REALTY, HOLBROOK AND RONKONKOMA, NEW YORK

During the pre-purchase environmental due diligence process for the purchase of an eight multi-tenant industrial building in a four property portfolio, the Purchaser's consultant identified contamination in five separate sanitary systems and approximately 20 stormwater drywells. The property transaction was terminated, and Mr. Malinowski acted as turnkey for the requisite reporting of the contamination to Suffolk County Department of Health Services (SCDHS). Following notification, Mr. Malinowski participated in inspections of each property with SCDHS and the preparation of four separate work plans to remediate each property. The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation activities utilized high-powered vacuum trucks to remove approximately 30,000 gallons of liquid and 300 tons of sludge and soil from the septic tanks, leaching pools and storm drains servicing the properties. The work was performed under the regulatory oversight of the SCDHS and a No Further Action letter was received for each property from the SCDHS.

SANITARY SYSTEM REMEDIATION, SMITHTOWN, NEW YORK

Mr. Malinowski performed inspection, testing, and remediation services for a commercial property owner in Smithtown, New York. As the property was undergoing pre-sale environmental assessment and investigation, perchloroethylene (PCE) was identified in the sanitary system above Suffolk County Department of Health Services (SCDHS) action levels. Mr. Malinowski developed a strategy to remediate the property under the oversight of the SCDHS. The remedial work included characterizing the sediments for disposal approval at a New York State-approved disposal facility and obtaining liquid waste disposal approval from the Suffolk County Department of Public Works (SCDPW). The remediation activities utilized high-powered vacuum trucks to remove approximately 8,000 gallons of liquid and 20 tons of sludge from the septic tank and two leaching pools servicing the property. All work was expedited by Mr. Malinowski to meet the 30-day deadline of the pending real estate transaction. The work was performed under the regulatory oversight of the SCDHS, and a No Further Action letter was received from the SCDHS with 30 days.

TARGET ROCK CORP., FARMINGDALE, NEW YORK

The Target Rock Corp. was issued violations from the Suffolk County Department of Health Services (SCDHS) for an illegal industrial discharge of trichloroethylene (TCA) to an abandoned sanitary system and multiple bulk storage tank infractions. Under the supervision of SCDHS, Mr. Malinowski supervised dye tests of the suspect discharge as well as numerous additional floor drains to confirm their discharge outflow. Prior to beginning excavation activities, a subsurface investigation was performed to delineate soil and groundwater impacts and profile the soil for waste disposal purposes. Under his direction, approximately 300 tons of soil was excavated and transported as hazardous waste to the Stablex facility in Canada from the sanitary system and nearby area. In addition to the remediation, Mr. Malinowski worked closely with the project engineer to register and prepare plans to upgrade several chemical and petroleum bulk storage tanks to comply with SCDHS Article 12. He work also included a chemical inventory of the entire 250,000-square foot facility.

AIR TESTING NEAR GROUND ZERO FOLLOWING 911, NEW YORK, NY

The dust cloud generated during the catastrophic collapse of the former World Trade Center and the buried fires that continued to smolder caused many local area businesses and residents to become increasingly concerned about air quality. Mr. Malinowski led a sampling team to evaluate the quality of indoor air and the adequacy of interior cleaning inside several privately-owned buildings in close proximity to Ground Zero. Mr. Malinowski worked with a Certified Industrial Hygienist to develop and determine an appropriate testing program to evaluate the indoor air quality at five mixed-use commercial properties that were in various stages of tenant reoccupation. The specifically-designed sampling protocols included testing for asbestos, volatile & semi-volatile classes of organics, dust, mercury, PCBs, lead, and carbon monoxide. The air sampling teams collected interior and exterior air samples, both at street level and on the building rooftops for background purposes.

The initial review and design of the recommended sampling protocols, as well as implementation of the air tests, laboratory analyses, quality control, and reporting to the Client were all expedited and completed within six weeks after 9/11. The results were compared to the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) indoor air quality levels, the OSHA permissible exposure limits (PELs) divided by a safety factor of 10 and EPA's Asbestos Hazard Emergency Response Act (AHERA). The results showed that the cleaning of the building interior and ventilation ducts eliminated any health concerns within the buildings and the client could allow occupants to safely reoccupy the buildings.

STANLEY COMMONS AND STANLEY SENIOR HOUSING, EAST NEW YORK, BROOKLYN, NY

AKRF, Inc. prepared a Part 58 Environmental Assessment (EA) and a NYC CEQR Technical Memorandum for the Stanley Commons project in East New York, Brooklyn. This project will result in the development of 240 affordable housing units on the site of an underutilized parking lot within the NYCHA Linden and Boulevard Houses. AKRF worked with both HPD and NYCHA on the environmental review documentation. Prior to joining AKRF, Mr. Malinowski conducted a Phase I ESA, remedial investigation and prepared a Remedial Action Plan for both the townhouse portion and adjacent senior housing parcel.

TENANT ENVIRONMENTAL INSPECTION PROGRAM, MULTIPLE LOCATIONS, NY

Mr. Malinowski directed a Tenant Inspection Program for a landlord who owned 1.2 million square feet of multi-tenanted industrial and commercial properties located in Queens, Nassau, and Suffolk counties for nearly a decade. The Tenant Inspection Program was a compliance program established to address concerns that certain tenant's operations may have been negatively impacting the property. The program included an annual inspection of each tenant space to determine their processes, chemical usage, waste disposal habits, current permits, and fire safety procedures. In addition, each sanitary system was sampled for chemical constituents identified during the inspections and approximately 300 exterior storm drains were inspected for evidence of illegal discharges or dumping. Based on the results of the inspection and sampling, letter reports were sent to the tenants informing them of any issues and educating them on best practices. Each tenant was assisted with regulatory compliance, permitting, and health and safety. The landlord received a report for each building detailing the findings of the inspection and sampling, and any follow-up actions. The landlord became educated on environmental issues and was able to incorporate the cost for this program and environmental compliance requirements into their leases as common area maintenance (CAM) charges. This resulted in a direct improvement in tenant housekeeping practices and enabled the landlord to obtain a comprehensive environmental insurance policy covering the entire property portfolio.

NYCDEP DEWATERING PERMITS, VARIOUS LOCATIONS, NY

Mr. Malinowski has provided environmental services to support dewatering design and obtain permits to discharge effluent to the NYC sewer system at various locations, including 1070 Washington Avenue in the Bronx for Bronx Pro Real Estate Management, 260 West 26th Street in Manhattan for Artimus Construction, 23-25 Wooster Street, 325-329 West Broadway, and 180 East 88th Street in Manhattan for DDG Partners, 100 Greenwich Street in Manhattan and 172 Montague in Brooklyn for Cava Construction, 970 Richmond Avenue in Staten Island for Brickens Construction, and 5-49 Borden Avenue in Queens for Pav-Lak Contracting. The work included designing sampling programs to obtain representative samples, assisting the constructions teams with the design of treatment systems sediment and volatile organic compounds, and preparation of permit packages for NYCDEP review/approval. In addition, Mr. Malinowski has worked with NYCDEP to conduct dye testing of sewer system to confirm stormwater flow to the combined sewer system and rule-out the possibly of outflow to a water body of the New York State. Mr. Malinowski has also assisted with the discharge of effluent from a pressure test for a major utility transmission in Brooklyn to the water of New York State. Permission for the discharge was obtained after Mr. Malinowksi and AKRF's engineers provided information to NYSDEC regarding the use of settling tanks and a duel polymer system of Storm Lear Liqui-Floc™ and HaloKlear LBP-210 to reduce discoloration before discharge.

THE UNIVERSITY OF THE STATE OF NEW YORK

EDUCATION DEPARTMENT

EXCELSIOR

BE IT KNOWN THAT

STEPHEN THOMAS MALINOWSKI

HAVING GIVEN SATISFACTORY EVIDENCE OF THE COMPLETION OF PROFESSIONAL AND OTHER REQUIREMENTS PRESCRIBED BY LAW IS QUALIFIED TO PRACTICE AS A

PROFESSIONAL GEOLOGIST

IN THE STATE OF NEW YORK

IN WITNESS WHEREOF THE EDUCATION DEPARTMENT GRANTS THIS LICENSE
UNDER ITS SEAL AT ALBANY, NEW YORK
THIS TWENTIETH DAY OF NOVEMBER, 2017.

COMMISSIONER OF EDUCATION

LICENSE NUMBER
000422

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
EXCELSIOR
1784

DEPUTY COMMISSIONER
FOR THE PROFESSIONS

EXECUTIVE SECRETARY
STATE BOARD FOR
ENGINEERING, LAND SURVEYING AND GEOLOGY

9964388

Wilson Technological Center

BOARD OF COOPERATIVE EDUCATIONAL SERVICES
OF WESTERN SUFFOLK COUNTY

Be it known that

Stephen Malinowski

has satisfactorily completed a course consisting of **40** *hours in training in*

Hazwoper - 40 Hours

on this ***27th*** *day of* ***April*** *,* ***1998***

4.0 CEU's

Michael J. Meneal
Deputy Superintendent

Kenneth R. Burr
Executive Director, Career & Technical Education

Peter R. Wunsch
President
Board of Cooperative Educational Services

Delia Montanelli
Principal
Adult Career & Technical Education

Nicholas Conzo
Chairperson
Career & Technical Education Advisory Committee

WILSON TECH

Awarded at, Dix Hills, New York

BOCES Western Suffolk

AKRF, Inc.
440 Park Avenue South
New York, New York 10016
(212) 696-0670

Certificate of Completion

This is to certify that

Stephen Malinowski

has successfully completed the course entitled
Annual Refresher Course on Health and Safety for
Hazardous Waste Site Investigation Personnel
8 Hour OSHA Refresher - Hazwoper Training Course
Per 29 CFR 1910.120

Presented

September 28, 2017

Marcus Simons
Safety Officer

ADRIANNA BOSCO

PROFESSIONAL II

Adrianna Bosco is a Professional II in AKRF's Hazardous Materials Department. She has experience in Phase I and Phase II site investigations and remediation/construction monitoring and oversight, as well as project management and reporting. Ms. Bosco is a 2011 graduate of Manhattan College, where she studied Environmental Engineering. She worked as an Environmental Scientist for PS&S Engineering, Inc. prior to joining AKRF.

BACKGROUND

Education

B.S., Environmental Engineering, Manhattan College, Bronx, New York, 2011

Licenses/Certifications

40 Hour OSHA HAZWOPER Certified, September 2011

10 Hour OSHA Construction Program Certified, October 2013

Years of Experience

Year started in company: 2014

Year started in industry: 2011

RELEVANT EXPERIENCE

East Side Coastal Resiliency, Manhattan, NY

DDC has proposed plans to construct a flood protection system for 100+ year storm protection with anticipated sea level rise along the east side of Lower Manhattan. To support the design and construction of the proposed flood protection structures and supporting utility conveyances, subsurface environmental investigations were performed.

A supplemental investigation was performed in 2016 to further evaluate areas identified during the 2015 investigation. Ms. Bosco conducted a portion of the 2016 subsurface investigation of the 2.5 mile study area from Montgomery Street to East 23rd Street. The ESCR subsurface exploration program involved a review of available utility plans and environmental reports involving manufactured gas plant (MGP) and petroleum-related contamination. Responsibilities included groundwater sampling, soil boring and temporary well installation, and compliance with the Supplemental Subsurface Investigation Work Plan.

541 West 37th Street, Manhattan, NY

Ms. Bosco conducted a Phase I Environmental Site Assessment (ESA) and Subsurface (Phase II) Investigation for this vacant property in the Hell's Kitchen section of Manhattan. The investigation has been conducted under OER as the site lots have an E Designation for hazardous materials. Ms. Bosco prepared the Remedial Action Work Plan for the proposed remediation of the site for the anticipated future use as a hotel and residential building.

Elton Crossing, Bronx, NY

This project consists of the remediation of an approximately 0.73-acre site formerly utilized for various industrial and automotive uses under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). Ms. Bosco provided remedial oversight during soil excavation, which consisted of confirmatory endpoint sampling, sub-slab depressurization system (SSDS) inspections, vapor barrier installation inspections, and air monitoring for particulates and volatile organic compounds (VOCs).

145 West Street, Greenpoint, Brooklyn, NY

The investigation and remediation of this site for the proposed redevelopment for a high-rise residential building on the Greenpoint waterfront has been conducted under the NYSDEC BCP, and remediation for redevelopment was also conducted under New York City Office of Environmental Remediation (OER) as the site lots have an E Designation for hazardous materials. For this project, Ms. Bosco conducted a supplemental remedial investigation, including soil and groundwater sampling, and several rounds of waste characterization soil sampling. Ms. Bosco also performed remedial oversight during activities such as soil excavation for off-site disposal, underground storage tank (UST) removal, SSDS piping installation and testing, and routine Community Air Monitoring Program (CAMP) air monitoring. Ms. Bosco also aided in the preparation of the Final Engineering Report (FER) and Site Management Plan (SMP).

Soundview Park, Bronx, NY

This project consists of reconstruction and enhancement of a 205-acre park in the Bronx. The site was historically a landfill and later backfilled with sanitation fill material prior to park construction. Remediation of this site included the excavation and disposal of contaminated soil and placement of clean fill. Ms. Bosco performed environmental monitoring in compliance with the Construction Health and Safety Plan (CHASP) and Remedial Action Plan (RAP) during the excavation and disposal of historic fill and solid waste. Ms. Bosco was also responsible for conducting air quality monitoring for VOCs and particulates during all soil disturbance activities.

Former Laundry/Dry Cleaning Plant, Harlem, New York

This former dry cleaning property, now a privately owned commercial facility, is the only NYSDEC listed hazardous waste site in Manhattan. The final Remedial Action Work Plans (RAWP) for the site were approved in 2012 and 2013. Remedial work includes removal of contaminated building materials, installation of a soil vapor extraction (SVE) system and SSDS, and in-situ soil and groundwater treatment with chemical-oxidation injection. Ms. Bosco performed remedial action oversight, including SSDS piping installation inspections and Health and Safety Plan (HASP) air monitoring for volatiles and particulates.

PS&S Engineering, Inc. (PS&S), Yonkers, NY

Before joining AKRF, Ms. Bosco was an Environmental Scientist I in the Environmental Department at PS&S. She was responsible for conducting site investigations and providing construction oversight for remediation projects in New York and New Jersey. As a staff scientist, she was responsible for the on-site supervision of subcontractors and interacting with project managers and client representatives. Ms. Bosco also prepared technical reports, work plans, field documentation, and Phase I Environmental Site Assessments.

EEA

ENVIRONMENTAL EDUCATION ASSOCIATES

888 4 ENV EDU *environmentaleducation.com*

CERTIFICATION OF COMPLETION FOR

Hazardous Waste Operations and Emergency Response Training

This certifies that

Adrianna Bosco

attended and satisfactorily completed all training requirements for the
40 Hour Hazardous Waste Training in compliance with 29 CFR 1910.120
as required by the Occupational Safety and Health Administration.

The course was completed on

September 16, 2011

Certificate Number: 11091216-02

Andrew McLellan, Training Director

Herbert W. Dohr, Training Manager

Headquarters
346 Austin St., Buffalo, NY 14207

AKRF, Inc.
440 Park Avenue South
New York, New York 10016
(212) 696-0670

Certificate of Completion

This is to certify that

Adrianna Bosco

has successfully completed the course entitled
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Hazardous Waste Site Investigation Personnel
8 Hour OSHA Refresher - Hazwoper Training Course
Per 29 CFR 1910.120

Presented

September 28, 2017

Marcus Simons
Safety Officer

JACOB MENKEN

FIELD TECHNICIAN

Mr. Menken has a Master of Science in Geology, Bachelor of Arts in Geology, and Bachelor of Science in Environmental Science from the University of Vermont. He is familiar with the following professional techniques: powder and single crystal x-ray diffraction; field geology; remote sensing of natural resources using airborne and satellite imagery; geophysical survey using ground penetrating radar, electromagnetic induction and seismic refraction; optical and hand sample identification of minerals; aseptic laboratory techniques; and stable isotope geochemistry. Mr. Menken's familiarity with hardware includes the following: Crystallography: APEX II Single Crystal X-Ray Diffractometer, Rigaku Powder X- Ray Diffractometer; Geophysical: Ground Penetrating Radar: GSSI SIR 3000 with 400 and 200MHz antennas, Electromagnetic Induction: SSI Profiler EMP-400; Stable Isotope: VG/Fisons SIRA Series II Stable Isotope Ratio Mass Spectrometer Honeywell Photoionization Detector; HACH Portable Water Quality Meter. Mr. Menken is familiar with the following software: X-Ray Crystallography: PDXL, Standard Measurement, APEX 2, ATOMS; Statistical Software: R, SPSS, Geophysical, Geogiga Pro, GSSI Radan 7, GSSI Profiler; Microsoft Office Suite, Adobe Creative Suite; Geospatial: ENVI 5.0, 4.0 and Classic ArcGIS.

BACKGROUND

Education

M.S., Geology, University of Vermont, 2014

B.A., Geology, University of Vermont, 2012

B.S., Environmental Science, University of Vermont, 2012

Certifications

OSHA 40-Hour Health & Safety Training for Hazardous Waste Operations, May 2011

OSHA 8-Hour Health & Safety Training for Hazardous Waste Operations, September, 2016

OSHA 10-Hour Health & Safety Training for Hazardous Waste Operations, August, 2016

Professional Memberships

Mineralogical Society of America

Mineralogical Society of Canada

Geological Society of America

The Society of Sigma Gamma Epsilon, Eta Kappa, National Honor Society in the Earth Sciences

Burlington Gem and Mineral Club

Years of Experience

Year started in company: 2016

Year started in industry: 2012

RELEVANT EXPERIENCE - AKRF

3200 Jerome Ave, Bronx, NY 10468 – Groundwater and Soil Vapor Sampling

AKRF provided groundwater and soil vapor testing for the NYCSCA at the former P.S. 51X. Mr. Menken assisted with the collection of groundwater and soil vapor sampling for waste characterization purposes. Groundwater was sampled from wellheads and soil vapor was sampled from a Sub-Slab Depressurization System (SSDS). All samples were collected in accordance with existing protocol.

112 Atlantic Ave, Brooklyn, NY 11201 – Construction Oversite and Community Air Monitoring

AKRF provided community air monitoring on this site for dust and volatile organic compounds (VOCs) in accordance with existing community air quality standards. Additionally, AKRF provided onsite oversite to ensure additional discovered soil contamination was left in place for determination of the extent of soil. AKRF was also responsible for logging any incoming or outgoing soil or fill laden trucks. For this project Mr. Menken provided on-site monitoring.

285 East 138th Street, Bronx, NY 10454 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the NYSDEC-approved RAWP and Site Management Plan (SMP) for this BCP site in the Bronx. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management, conducts community air monitoring, and prepares daily reports for submittal to the AKRF and NYSDEC project managers. For this project Mr. Menken provided on-site monitoring.

4950 Arthur Kill Road, Staten Island, NY 10309 – Groundwater and Soil Vapor Sampling and Subsurface Characterization Phase II

AKRF provided Phase II services for a wooded site in Staten Island. AKRF characterized eight drill bores drilled by a contractor. Groundwater and soil vapor samples from four of the sites. Additionally, AKRF provided oversite for the excavation of six test pits on the site to characterize the surficial materials and explore subsurface anomalies as detected by previously conducted ground penetrating radar (GPR).

32 N. Main Street, New City, NY – Wastewater Drum Disposal

Mr. Menken oversaw the disposal of two wastewater drums by a contractor. Mr. Menken ensured that the contractor completed the appropriate documented, the wastewater was properly transferred from a damaged to undamaged drum and that the appropriate drums were removed from the site.

158th Street and Brooks Ave, Bronx, NY – Wastewater Drum Disposal

Mr. Menken oversaw the disposal of two wastewater drums by a contractor. Mr. Menken ensured that the contractor completed the appropriate documented, the wastewater was properly transferred from a damaged to undamaged drum and that the appropriate drums were removed from the site.

3610 Glenwood Rd, Brooklyn, NY 11210 – Drinking Water Sampling Oversight

AKRF provided oversight of water quality testing for the NYCSCA at K042. AKRF oversaw the drinking water sampling of a newly installed pluming at a Brooklyn, NY pre-kindergarten for compliance with drinking water bacteria level guidelines. Sampling was observed to ensure compliance with pre-existing water disinfecting and testing standard operating procedures (SOPs) for total coliform, E. Coli bacteria and heterotrophic plate count analysis.

34 Berry Street, Williamsburg, NY

AKRF was retained to prepare close-out documentation for this former industrial/warehouse facility in Williamsburg, which was remediated under the New York City Office of Environmental Remediation (OER) E-designation and NYSDEC Spills programs. The closure report, which was based on documentation provided by the environmental contractor, was prepared on an expedited basis so that the developer could obtain a Certificate of Occupancy in time for the scheduled opening of the new building. AKRF is currently providing on-going remediation monitoring services to fulfill NYSDEC Spill closure requirements. For this project, Mr. Menken performed monthly/quarterly groundwater monitoring.

11 Greene Street, Manhattan, NY 10013 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the approved RAWP and Site Management Plan (SMP) for this OER site in Manhattan. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management and conducts community air monitoring and completes daily reports for submittal to the AKRF and NYCDEP project managers. For this project Mr. Menken provided on-site monitoring.

SCA City Wide Portable Water Lead Sampling – Drinking Water Sampling

As part of an on-call contract with the SCA, AKRF provided water sampling services at various public schools in New York City. AKRF sampled potable water fixtures for lead concentration at public schools in all five boroughs. Work was performed at night or when school was not in session and coordinated with the SCA, custodial engineers and various contractors.

Staten Island Wheel, Staten Island, New York 10301 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the approved RAWP and Site Management Plan (SMP) for this site in the Staten Island. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management, conducts community air monitoring, and prepares daily reports for submittal to the AKRF. For this project Mr. Menken provided on-site monitoring.

Adelaar/Concord Resort, 219 Concord Road, Monticello, New York 12751 – Construction Oversite and Community Air Monitoring

AKRF is overseeing implementation of the NYSDEC-approved RAWP and Site Management Plan (SMP) for this BCP site in the Catskills. AKRF serves as the on-site contact who conducts waste characterization sampling, oversees soil management and conducts community air monitoring for submittal to the AKRF and NYSDEC project managers. For this project Mr. Menken provided on-site monitoring.

The UNIVERSITY of VERMONT

Jacob Menken

has completed

40 hour HAZWOPER training for General Site Workers

in accordance with the requirements of the
OSHA Hazardous Waste Operations and Emergency Response Standard, 29 CFR 1910.120.

Presented

May 04, 2011

by

Environmental Safety Facility
University of Vermont, 667 Spear Street, Burlington, VT 05405
802 656 5400

Francis Churchill, CHMM
Environmental Safety Compliance Manager

Ralph Stuart, CIH
Environmental Safety Program Manager

AKRF, Inc.
440 Park Avenue South
New York, New York 10016
(212) 696-0670

Certificate of Completion

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Jacob Menken

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Hazardous Waste Site Investigation Personnel
8 Hour OSHA Refresher - Hazwoper Training Course
Per 29 CFR 1910.120

Presented

September 28, 2017

Marcus Simons
Safety Officer

APPENDIX J

VAPOR BARRIER SPECIFICATIONS

Preprufe® 300R & 160R

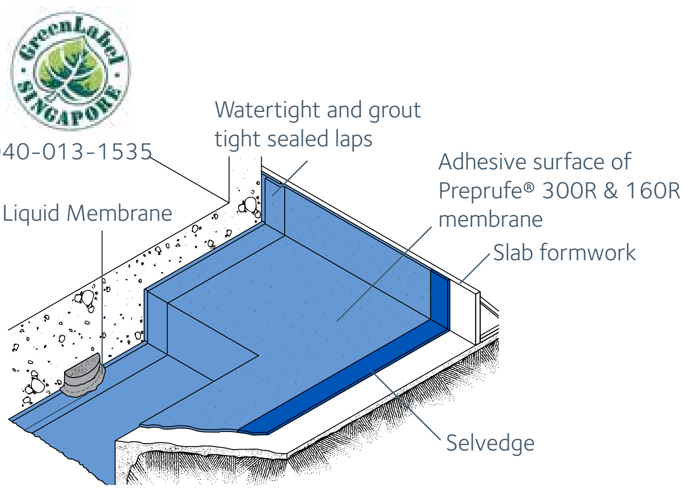
Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

Product Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive, pressure-sensitive adhesive and a weather-resistant protective coating. Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe seal to concrete prevents any ingress or migration of water around the structure.

Product Advantages

- Forms a unique, integral seal to concrete poured against it. This prevents water migration and makes it unaffected by ground settlement beneath slabs.
- Fully-adhered watertight laps and detailing.
- Provides a barrier to water, moisture and gas — physically isolates the structure from the surrounding ground.
- BBA Certified for basement Grades 1, 2 & 3 as per BS 8102: 2009.
- Methane, carbon dioxide and radon gas protection in excess of the standard membrane requirements in BRE Reports 211 (Radon) and 212 (Methane and Carbon Dioxide).
- Independent Assessments
  - BBA Certificate No. 97/3325.
  - Mott MacDonald Special Services Report May 2001.
  - International Certifications.
- Zero permeance to moisture.
- Solar reflective — reduced temperature gain.
- Simple and quick to install, requiring no priming or fillets.
- Can be applied to permanent formwork — allows maximum use of confined sites.
- Self protecting — can be trafficked immediately after application and ready for immediate placing of reinforcement.
- Unaffected by wet conditions — cannot activate prematurely.
- Inherently waterproof, non-reactive system:
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling.
- Chemically resistant, effective in all types of soils and waters - protects structure from salt or sulphate attack.



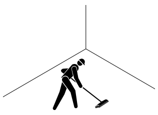
The Preprufe R System includes:

- Preprufe 300R — heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- Preprufe 160R — thinner grade for lighter applications and reverse tanking (i.e. blindside zero property line) applications against permanent formwork such as soil retention systems.
- Preprufe Tape LT — for covering cut edges, roll ends, penetrations and detailing (temperatures between -4°C and +30°C).
- Preprufe Tape HC — as above for use in Hot Climates (minimum 10°C).
- Liquid Membrane — for sealing around penetrations, etc.
- Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete or well rolled and compacted sand or crushed stone blinding; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.
- Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene® self-adhesive membrane or Silcor® membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

Installation

Preprufe® 300R & 160R membranes are supplied in rolls 1.2m wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation



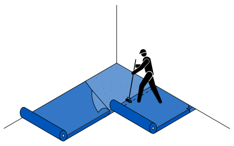
All Surfaces — It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 12mm. Grout around all penetrations such as utility conduits, etc. for stability.

Horizontal Blinding — Monolithic concrete blinding or mud slab is preferred. The blinding must be free of loose aggregate and sharp protrusions. An angular profiled blinding is recommended rather than a sloping or rounded substrate. The surface does not need to be dry, but standing water must be removed.

Vertical Sheet Piling — Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 12mm out of alignment.

Membrane Installation

Preprufe can be applied at temperatures of -4ºC or above. During cold or damp conditions, the selvedge and tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.



Horizontal Substrates — Place the membrane HDPE film side to the substrate with printed coated side up facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed. Accurately position succeeding sheets to overlap the previous sheet 75mm along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Vertical Substrates — Mechanically fasten the membrane vertically using fixings (i.e. fasteners) appropriate to the substrate with the printed coated side facing towards the concrete pour. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or fixing 50mm below the top edge. Fixings can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fixings must be covered with a patch of Preprufe Tape. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal. Roll Ends and Cut Edges - Overlap all roll ends and cut edges by a minimum 75mm and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.

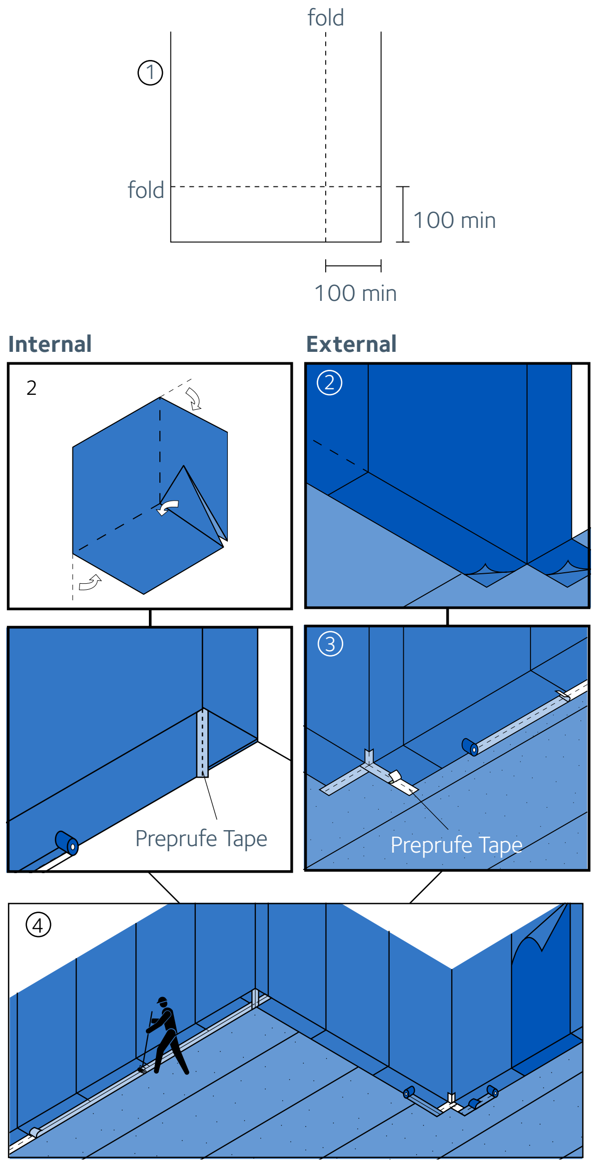
Penetrations

Use the following steps to seal around penetrations such as service pipes, piles, lightning conductors, etc. Grout around the penetration if the penetration is not stable. Scribe membrane tight to the penetration. If the membrane is not within 12mm of the penetration, apply Preprufe Tape to cover the gap. Wrap the penetration with Preprufe Tape by positioning the tape 12mm above the membrane.

Mix and apply Bituthene Liquid Membrane around the penetrations using a fillet to provide a watertight seal between the Preprufe membrane and Preprufe Tape.

Corners

Internal and external corners should be formed as shown in the diagrams returning the membrane a minimum of 100mm and sealing with Preprufe Tape. Ensure that the apex of the corner is covered and sealed with tape and roll firmly. Crease and fold the membrane to ensure a close fit to the substrate profile and avoid hollows.



Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Apply Preprufe® Tape centered over the damaged area and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

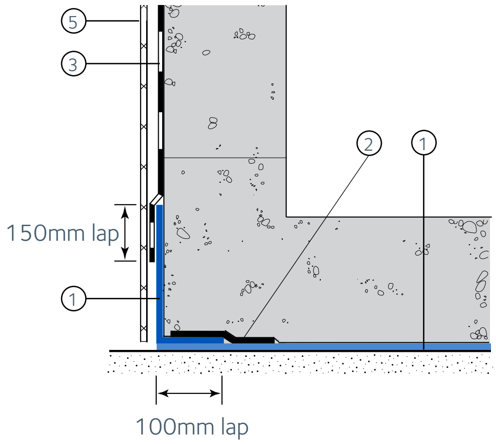
Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe 300R & 160R membrane and Tape. It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

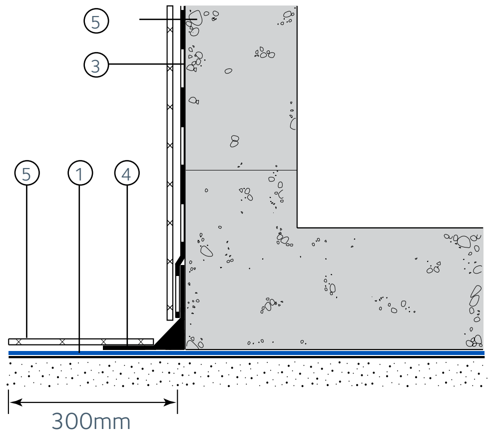
Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop

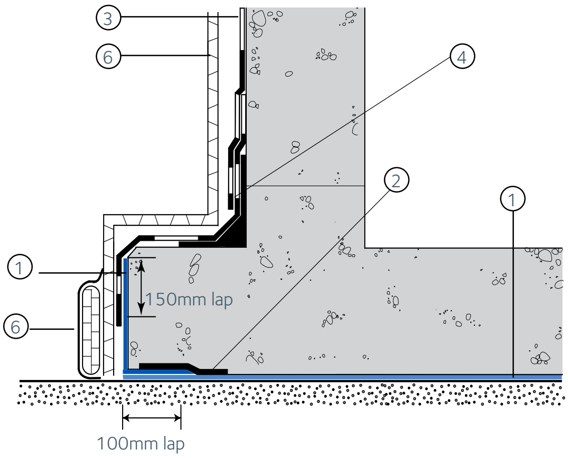
Wall base detail



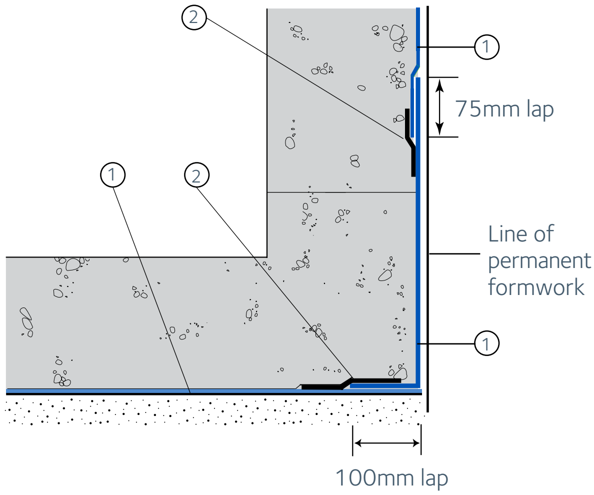
Alternative wall base detail for early shutter removal



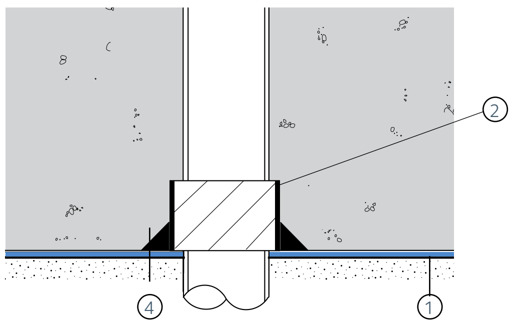
Wall base with toe detail showing drainage option



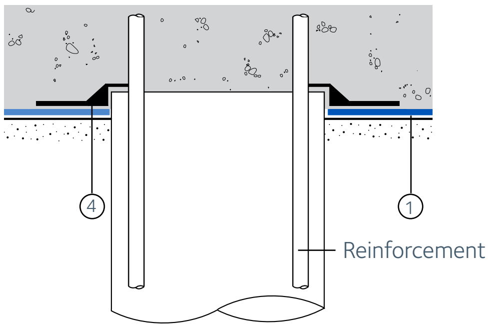
Wall base detail against permanent shutter



Pipe penetration



Pile detail



1 Preprufe®
2 Preprufe® Tape
3 Bituthene®/Silcor®
4 Liquid Membrane
5 Protection
6 Hydroduct®

Details shown are typical illustrations and not working details. For assistance with detailing and problem solving please contact the Technical Department.

Physical Properties

Property	Typical Value		Test Method
	300R	160R	
Colour	White		
Thickness	1.2mm	0.8mm	ASTM D3767
Peel Adhesion to Concrete	880N/m		ASTM D903 modified
Resistance to Hydrostatic Head	>70m		ASTM D5385 modified
Low Temperature Flexibility	<-23°C		ASTM D1970
Puncture Resistance	1000N	445N	ASTM E 154
Elongation	300% minimum		ASTM D412 modified
Tensile Strength, Film	27.6Mpa		ASTM D412
Crack Cycling @ -23°C	Pass		ASTM C 836

Typical test values represent average values from samples tested. Test methods noted may be modified.

Supply

Preprufe	300R	160R	Tape LT or HC*
Thickness (Nominal)	1.2mm	0.8mm	-
Roll Size	1.2 x 30.0m	1.2 x 35.0m	100mm x 15.0m
Roll Area	36.0m²	42m²	-
Roll Weight	50kg	42kg	2kg
Min. Edge/ End Laps	75mm	75mm	75mm
* LT denotes Low Temperature (between -4˚C and +30˚C) HC denotes Hot Climates (>+10˚C)			
Ancillary Products Liquid Membrane, 5.7L			

the surface bond. Preprufe® membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 10N/mm² (1500 psi) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

As a guide, to reach the minimum compressive strength stated above, a structural concrete mix with an ultimate strength of 40N / mm² (6000psi) will typically require a cure time of approximately 6 days at an average ambient temperature of 4ºC, or 2 days at 21ºC.

Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only GCP Applied Technologies approved membranes shall be bonded to Preprufe 300R &160R. All Preprufe 300R &160R system materials shall be supplied by GCP Applied Technologies, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

Health and Safety

Refer to relevant Material Safety Data Sheet. Complete rolls should be handled by a minimum of two persons.

Technical Services

For assistance with working drawings for projects and additional technical advice, please contact your local GCP representative.

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