HALEY ALDRICH

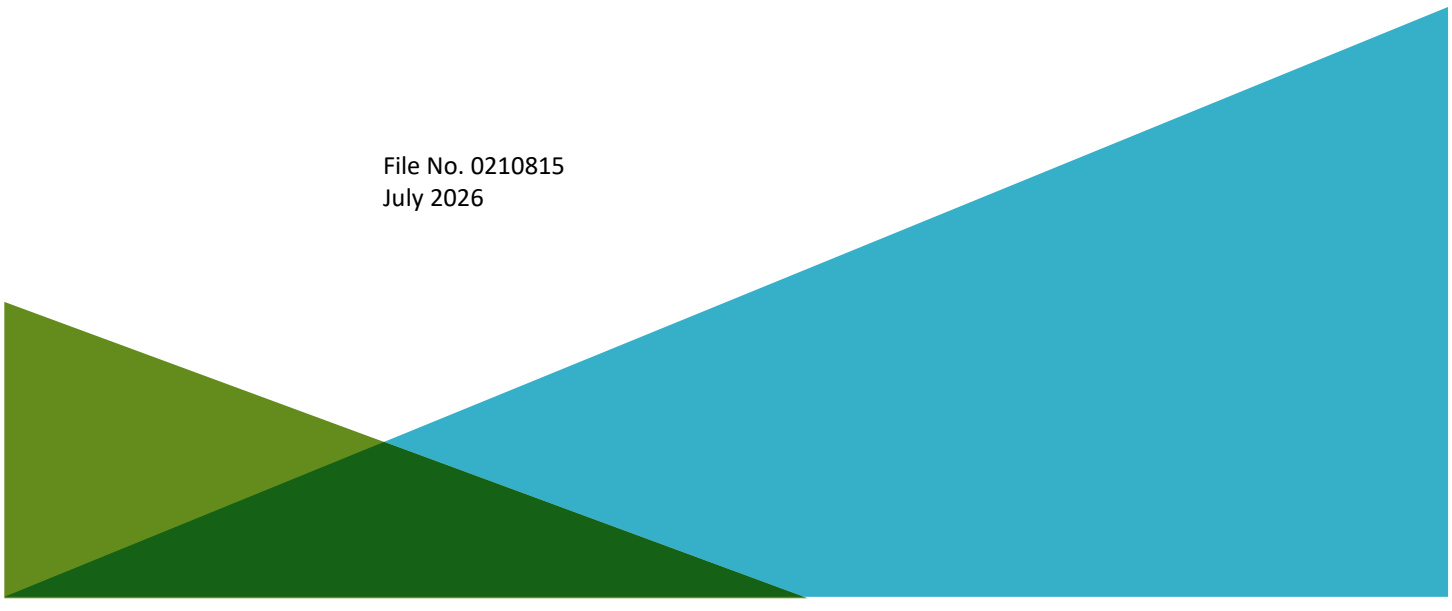
www.haleyaldrich.com

REMEDIAL ACTION WORK PLAN
4001 4TH AVENUE REDEVELOPMENT SITE
NYSDEC SITE No. C224412
4001-4011 4TH AVENUE
BROOKLYN, NEW YORK

Prepared by
H & A of New York Engineering and Geology, LLP
New York, New York

Prepared for
4 Ave Property LLC
New York, New York 10038

File No. 0210815
July 2026



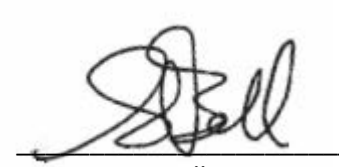
H & A OF NEW YORK ENGINEERING
AND GEOLOGY, LLP
213 W 35TH STREET
7TH FLOOR
NEW YORK, NY 10001
646.277.5685

SIGNATURE PAGE FOR

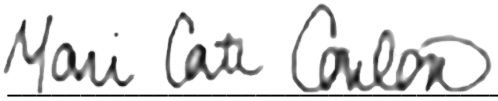
REMEDIAL ACTION WORK PLAN
4001-4011 4TH AVENUE
BROOKLYN, NEW YORK
NYSDEC SITE NO. C224412

PREPARED FOR
4TH AVENUE PROPERTY LLC
NEW YORK, NEW YORK

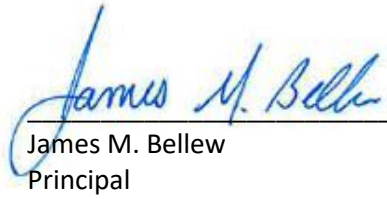
REVIEWED AND APPROVED BY:



Suzanne M. Bell, P.E.
Senior Associate
H & A of New York Engineering and Geology, LLP



Mari C. Conlon, P.G.
Senior Associate
H & A of New York Engineering and Geology, LLP



James M. Bellew
Principal
H & A of New York Engineering and Geology, LLP

Table of Contents

		Page
List of Tables		**v**
List of Figures		**v**
List of Appendices		**vi**
List of Acronyms and Abbreviations		**vii**
Certification		**xii**
Executive Summary		**xiii**
1.	**Introduction**	**1**
1.1	SITE LOCATION AND DESCRIPTION	1
1.2	REDEVELOPMENT PLAN	1
1.3	DESCRIPTION OF SURROUNDING PROPERTY	2
1.4	SITE HISTORY	2
1.5	PREVIOUS ENVIRONMENTAL REPORTS	2
2.	**Description of Remedial Investigation Findings**	**4**
2.1	SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED	4
2.1.1	Soil Investigation	5
2.1.2	Groundwater Investigation	5
2.1.3	Soil Vapor Investigation	6
2.2	SAMPLES COLLECTED	6
2.3	CHEMICAL ANALYSIS	7
2.4	REMEDIAL INVESTIGATION FINDINGS SUMMARY	7
2.4.1	Soil Sampling Results	7
2.4.2	Groundwater Sampling Results	9
2.4.3	Soil Vapor Sampling Results	11
2.5	SIGNIFICANT THREAT	12
2.6	GEOLOGY AND HYDROLOGY	12
2.6.1	Contaminated Fill Material	12
2.6.2	Native Soil	12
2.6.3	Bedrock	12
2.6.4	Hydrogeology	12
2.7	CONTAMINANT CONDITIONS	13
2.7.1	Conceptual Site Model	13
2.7.2	Qualitative Human Health Exposure Assessment	14
2.8	FISH & WILDLIFE REMEDIAL IMPACT ANALYSIS	17
2.9	REMEDIAL ACTION OBJECTIVES	17
2.9.1	Groundwater	17
2.9.2	Soil	18
2.9.3	Soil Vapor	18
3.	**Summary of Remedial Action**	**19**

3.1 ALTERNATIVE I – TECHNICAL DESCRIPTION 19
3.2 ALTERNATIVE II – TECHNICAL DESCRIPTION 25
3.3 EVALUATION OF THE PREFERRED REMEDY 28
3.3.1 Protection of Human Health and the Environment 29
3.3.2 Compliance with Standards, Criteria, and Guidance 29
3.3.3 Short-Term Effectiveness and Impacts 29
3.3.4 Long-Term Effectiveness and Performance 30
3.3.5 Reduction of Toxicity, Mobility, or Volume of Contaminated Material 30
3.3.6 Implementability 30
3.3.7 Cost-Effectiveness 31
3.3.8 Community Acceptance 31
3.3.9 Green and Sustainable Remediation 31
3.3.10 Land Use 32
3.4 SELECTION OF THE PREFERRED REMEDY 32
3.4.1 Zoning 32
3.4.2 Surrounding Property Uses 32
3.4.3 Environmental Justice Concerns 32
3.4.4 Land Use Designations 33
3.4.5 Population Growth Patterns 33
3.4.6 Accessibility to Existing Infrastructure 33
3.4.7 Proximity to Cultural Resources 33
3.4.8 Proximity to Natural Resources 33
3.4.9 Off-Site Groundwater Impacts 33
3.4.10 Proximity to Floodplains 33
3.4.11 Geography and Geology of the Site 33
3.4.12 Current Institutional Controls 33
3.5 SUMMARY OF SELECTED REMEDIAL ACTIONS 33

4. Remedial Action Program 36

4.1 GOVERNING DOCUMENTS 36
4.1.1 Standards, Criteria, and Guidance 36
4.1.2 Site-Specific Construction Health & Safety Plan 37
4.1.3 Quality Assurance Project Plan 37
4.1.4 Construction Quality Assurance Plan 38
4.1.5 Soil/Materials Management Plan 38
4.1.6 Stormwater Pollution Prevention Plan 38
4.1.7 Community Air Monitoring Plan 38
4.1.8 Contractors Site Operations Plan 38
4.1.9 Citizen Participation Plan 39
4.2 GREEN AND SUSTAINABLE REMEDIATION AND CLIMATE RESILIENCY 40
4.2.1 Best Practices and Techniques 40
4.2.2 Reporting 41
4.3 GENERAL REMEDIAL CONSTRUCTION INFORMATION 41
4.3.1 Project Organization 41
4.3.2 Remedial Engineer 42
4.3.3 Remedial Action Construction Schedule 43

4.3.4 Work Hours 43
4.3.5 Site Security 43
4.3.6 Traffic Control 43
4.3.7 Contingency Plan 43
4.3.8 Discovery of Additional Contaminated Soil 43
4.3.9 UST Discovery 44
4.3.10 Worker Training and Monitoring 44
4.3.11 Agency Approvals 44
4.3.12 Pre-Construction Meeting with NYSDEC 44
4.3.13 Emergency Contact Information 44
4.3.14 Remedial Action Costs 45
4.4 SITE PREPARATION 45
4.4.1 Mobilization 45
4.4.2 Monitoring Well Decommissioning 45
4.4.3 Erosion and Sedimentation Controls 45
4.4.4 Temporary Stabilized Construction Entrance(s) 45
4.4.5 Utility Marker and Easements Layout 46
4.4.6 Excavation Support and Groundwater Cutoff Wall 46
4.4.7 Equipment and Material Staging 46
4.4.8 Truck-Inspection Station 46
4.4.9 Site Fencing 46
4.4.10 Demobilization 47
4.5 REPORTING 47
4.5.1 Daily Reports 47
4.5.2 Weekly Reports 48
4.5.3 Monthly Reports 48
4.5.4 Photographs 48
4.5.5 Complaint Management Plan 49
4.5.6 Deviations from the RAWP 49

5. Remedial Action: Material Removal from Site 50

5.1 SOIL CLEANUP OBJECTIVES 50
5.2 REMEDIAL PERFORMANCE EVALUATION (DOCUMENTATION SAMPLING) 50
5.2.1 Soil Sampling Frequency 50
5.2.2 Methodology 50
5.2.3 QA/QC 50
5.2.4 Data Validation 51
5.2.5 Reporting 51
5.3 ESTIMATED MATERIAL REMOVAL QUANTITIES 51
5.4 SOIL/MATERIALS MANAGEMENT PLAN 51
5.4.1 Soil Screening Methods 51
5.4.2 Stockpile Methods 51
5.4.3 Materials Excavation and Load Out 52
5.4.4 Materials Transport Off Site 53
5.4.5 Materials Disposal Off Site 53
5.4.6 Materials Reuse On Site 54

5.4.7 Fluids Management 54
5.4.8 Backfill from Off-Site Sources 55
5.4.9 Stormwater Pollution Prevention 55
5.4.10 Contingency Plan 56
5.4.11 Community Air Monitoring Plan 56
5.4.12 Odor, Dust, and Nuisance Control Plan 57

6. Residual Contamination to Remain on the Site 59

7. Engineering Controls 60

7.1 ACTIVE SSDS 60
7.2 SVE SYSTEM 60
7.3 GROUNDWATER MONITORING 60
7.4 COMPOSITE COVER SYSTEM 61

8. Institutional Controls 62

8.1 ENVIRONMENTAL EASEMENT 62
8.2 SITE MANAGEMENT PLAN 63

9. Final Engineering Report 65

9.1 CERTIFICATIONS 65

10. Schedule 67

References 68

List of Tables

Table No.	Title
1	Alternative I Remedial Cost Estimate
2	Alternative II Remedial Cost Estimate
3	Track 4 Soil Cleanup Objectives

List of Figures

Figure No.	Title
1	Project Locus
2	Site Map
3	Sample Location Map
4	Groundwater Contour Map
5	Soil Results Exceedance Map
6	Groundwater Results Exceedances Map
7	Soil Vapor Results Summary Map
8	Alternative I Excavation Plan
9	Alternative II Excavation Plan
10	Documentation Sample Plan
11	Conceptual In-Situ Injection Plan
12	Post-Remediation Boring and Groundwater Well Plan
13A	Conceptual SSDS Plan
13B	Typical SSDS Design Details
14	Alternative I SVE Layout Plan
15	Proposed Truck Route

List of Appendices

Appendix	Title
A	Survey Map
B	Zoning Map
C	Construction Health and Safety Plan
D	NYSDEC Request to Import/Reuse Forms
E	AP-pH Product Specification Sheets
F	Citizen Participation Plan
G	Environmental Footprint Analysis and Climate Screening Checklist
H	Project Personnel Resumes
I	Quality Assurance Project Plan
J	Proposed Remedial Action Project Schedule
K	Odor Control Suppressant Safety Data Sheet
L	Proposed Development Plans

List of Acronyms and Abbreviations

Acronym	Definition
#	
6 NYCRR	Title 6 of the New York Codes, Rules and Regulations
Symbol	
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
A	
AOC	Area of Concern
ASP	Analytical Services Protocol
AWQS	Ambient Water Quality Standards
B	
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	below ground surface
BMP	best management practice
BTEX	benzene, toluene, ethylbenzene, xylenes
C	
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
CHASP	Construction Health & Safety Plan
COC	Contaminant of Concern
CP	Commissioner Policy
CPP	Citizen Participation Plan
CQAP	Construction Quality Assurance Plan
CSM	Conceptual Site Model
cu yd	cubic yard
CVOC	chlorinated volatile organic compound
D	
DER	Division of Environmental Remediation
DER-10	Division of Environmental Remediation-10 *(specifically "May 2010 NYSDEC Technical Guidance for Site Investigation and Remediation")*
DUSR	Data Usability Summary Report

List of Acronyms and Abbreviations (Continued)

Acronym	Definition
E	
EC	Engineering Controls
ECL	Environmental Conservation Law
EDD	Electronic Data Deliverable
EE	Environmental Easement
ELAP	Environmental Laboratory Approval Program
ESA	Environmental Site Assessment
Eurofins	Eurofins Scientific
F	
FDNY	Fire Department of the City of New York
FER	Final Engineering Report
ft	feet/foot
G	
GAC	granular activated carbon
GCM	grossly contaminated material
GSR	Green and Sustainable Remediation
GV	Guidance Value
H	
Haley & Aldrich of New York	H & A of New York Engineering and Geology, LLP
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HVAC	heating, ventilation, and air conditioning
I	
I.S.	Intermediate School
IC	Institutional Control
in.	inches
ISCO	in-situ chemical oxidation
L	
L/min	liters per minute
LEG	Lesova Environmental Group
LNAPL	light non-aqueous phase liquid
LSDF	low-sulfur diesel fuel

List of Acronyms and Abbreviations (continued)

Acronym	Definition
M	
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
MP	monitoring point
MTA	Metropolitan Transportation Authority
MTBE	methyl tert-butyl ether
MW	Monitoring Well
N	
ND	non-detect
ng/L	nanograms per liter
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOT	New York City Department of Transportation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O	
OSHA	Occupational Health and Safety Administration
P	
Pace	Pace Analytical Services, LLC
PAH	polycyclic aromatic hydrocarbon
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyl
PCE	perchloroethylene/tetrachloroethene
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PGWSCOs	Protection of Groundwater Soil Cleanup Objectives
PID	photoionization detector
PM-10	particles with diameters generally less than 10 micrometers and smaller
PPE	personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
Q	
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment

List of Acronyms and Abbreviations (continued)

Acronym	Definition
R	
RA	Remedial Action
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCA	recycled concrete aggregate
RCRA	Resource Conservation and Recovery Act
RE	Remedial Engineer
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
ROI	radius of influence
RRSCO	Restricted Residential Soil Cleanup Objective
S	
SCG	Standards, Criteria, and Guidelines
SCO	Soil Cleanup Objective
SDS	safety data sheet
Site	4001 4th Avenue, Brooklyn, New York
S/MMP	Soil/Materials Management Plan
SMP	Site Management Plan
SOE	support-of-excavation
SPDES	State Pollutant Discharge Elimination System
sq ft	square feet
SSDS	sub-slab depressurization system
SVE	soil vapor extraction
SVI	soil vapor intrusion
SVOC	semi-volatile organic compound
SWPPP	Stormwater Pollution Prevention Plan
T	
TAL	Total Analyte List
TCE	trichloroethylene
TCL	Target Compound List
TOGS 1.1.1	Technical and Operational Guidance Series 1.1.1 *(Specifically "June 1998 NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values, Class GA for the protection of a source of drinking water modified per the April 2000 addendum")*

List of Acronyms and Abbreviations (continued)

Acronym	Definition
U	
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UUSCO	Unrestricted Use Soil Cleanup Objective
V	
VEP	vapor extraction point
VOC	Volatile Organic Compound
Volunteer	4 Ave Property LLC

Certification

I, Suzanne M. Bell, certify that I am currently a New York State-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) and Green Remediation (DER-31).

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



NYS Professional Engineer No. 106301	7/27/2026	
	Date	Signature

It is a violation of Article 145 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 145, New York State Education Law.

Executive Summary

This Remedial Action (RA) Work Plan (RAWP) was developed by H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) on behalf of 4 Ave Property LLC for the proposed 4001 4th Ave Redevelopment Site, located at 4001-4011 4th Avenue, Brooklyn, New York (the Site). 4 Ave Property LLC applied to and was accepted into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) as a Volunteer. A Brownfield Cleanup Agreement (BCA) was executed by the NYSDEC on October 30, 2024, with 4 Ave Property LLC (the "Volunteer") (BCP Site No. C224412).

This RAWP summarizes the nature and extent of contamination on the Site as determined from data gathered during the Remedial Investigation (RI) performed by Haley & Aldrich of New York and completed in January 2026. It provides an evaluation of a Track 4 cleanup and other applicable RA alternatives, their associated costs, and the recommended and preferred remedy. The remedies described in this document are consistent with the procedures defined in the NYSDEC Division of Environmental Remediation (DER) Program Policy: Technical Guidance for Site Investigation and Remediation (DER-10) and comply with applicable federal, state, and local laws, regulations, and requirements.

SITE DESCRIPTION AND SITE HISTORY

The Site is located in the Sunset Park neighborhood of Brooklyn, New York, and is identified as Block 714 Lot 6 on the New York City tax map. The approximately 10,017-square-foot (sq-ft) (0.230-acre) Site is bound to the north by 4th Avenue, followed by Intermediate School (I.S.) 136; to the east by 40th Street, followed by a mixed-use residential and commercial building; to the south by a multi-story residential building; and to the west by a commercial building. Metropolitan Transportation Authority (MTA) Subway lines N and R run parallel to the Site beneath 4th Avenue. The Project Locus is shown on **Figure 1,** and existing Site features are displayed on the Site Plan provided as **Figure 2.** A Site survey map is provided in **Appendix A.**

According to the New York City Planning Commission Zoning Map 6c, the Site is currently zoned as a Residential R7-A and C2-4 zoning area with the intended post-development use as a school. The Site is located in an urban area characterized by multi-story commercial and residential buildings. A copy of the zoning map is included in **Appendix B.**

Based on the findings of the March 2024 Phase I Environmental Site Assessment (ESA) prepared by Lesova Environmental Group (LEG), the Site was comprised of one tax lot developed with a one-story concrete structure and a gasoline filling/auto service station with one underground storage tank (UST) circa 1926 and a second lot that was vacant. The 1942 Sanborn Fire Insurance Map depicted the Site merged as one lot with previous use similar to the 1926 map, with a garage to the south of the lot. The Site was operated as an automotive service station, including lubrication and minor repair services, with office use and a parking area until at least August 1965. The configuration of the Site changed and was identified with a cement brick one-story structure with a gasoline filling station circa 1970. A historical City Directory search indicated that the Site was operated as a gasoline filling station circa 1928, as an auto service station circa 1940 to 2000, and as a gasoline filling station again circa 2010 to 2024. Since that time, all structures have been demolished, and the Site is currently vacant.

There are three sensitive receptors that are within a 500-foot (ft) radius of the Site:

1) I.S. 136 – Charles O. Dewey, 4004 4th Avenue, Brooklyn, New York 11232, listed as a prep school and middle school.
2) Family Day Care Graciela's Little Angels – 432 41st Street, Brooklyn, New York 11232, listed as a daycare.
3) Sunset Park Group Family – 338 42nd Street, Brooklyn, New York 11232, listed as a daycare.

Properties immediately surrounding the Site are zoned for commercial and residential use.

SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

The RI was completed in accordance with Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Part 375, DER-10, the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006 and subsequent updates), and the February 2025 Remedial Investigation Work Plan (RIWP), prepared by Haley & Aldrich of New York. The RI was performed from April 14, 2025, through April 24, 2025, resuming July 1, 2025, through July 31, 2025, and completed from December 9, 2025, through January 15, 2026. The pauses in the RI schedule were due to ongoing discussions with the New York City Transit Authority for approval of the sidewalk borings, which will be handled under a separate cover.

The RI consisted of the following:

- Advancement of 12 soil borings to various depths ranging from 40 to 60 feet (ft) below ground surface (bgs) with samples collected from the top 0 to 2 ft bgs immediately beneath the impervious Site cover (i.e., surface soils); at the bottom of the observed fill layer (ranging from approximately 3 to 10 ft bgs); from the 15 to 17 ft bgs interval to aid with vertical delineation; and, from the 2-ft interval above the groundwater interface. An additional soil sample was collected from 32 to 34 ft bgs at soil boring HA-SB9, from within the anticipated clayey soils previously encountered at a 2-ft interval between 30 and 35 ft bgs; a well-defined confining layer was not encountered at the anticipated depth of 30 to 35 ft bgs. A total of 49 soil samples were collected (plus quality assurance/quality control [QA/QC] samples) for laboratory analysis.
- Advancement of five light non-aqueous phase liquid (LNAPL) delineation soil borings to a depth of 45 ft bgs, with shaker tests completed at 5-ft intervals from 15 ft bgs to 35 ft bgs.
- Installation of five 2-inch (in.) diameter groundwater monitoring wells to varied depths of approximately 52 to 60 ft bgs and collection of six groundwater samples (plus QA/QC samples) from the newly installed monitoring wells and the existing monitoring well.
- Installation of seven soil vapor probes to depths ranging from approximately 15 to 17 ft bgs, and collection of seven soil vapor samples.

A summary of environmental findings of the RI includes the following:

- The Site is underlain by a layer of urban fill material generally consisting of brown to dark brown to reddish brown silty sand and fine to medium sand, with varying amounts of gravel, brick, asphalt, concrete, glass, wood, and ceramic. Fill extends from the surface to variable depths between 5 and 20 ft bgs. The fill was observed to be underlain by a potential native layer consisting of brown to dark brown to reddish brown fine to medium sand and silty sand, with

varying amounts of silt, clay, and gravel extending down to the terminus depth in each boring of approximately 40 to 60 ft bgs. The potential confining unit observed from 30 to 35 ft bgs during previous investigations completed by others was not observed during this RI.

- Groundwater was encountered at depths ranging from approximately 40.75 to 45.12 ft bgs in monitoring wells MW-2 through MW-6, and at 35.98 ft bgs in the existing monitoring well MW-1, where a perched groundwater condition was observed during this RI. Groundwater flow beneath the Site is generally from east to west and northwest, as shown on **Figure 4.**
- Soil analytical results were compared to NYSDEC 6 NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs), Restricted Residential Soil Cleanup Objective (RRSCOs), and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs). Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) soil sample results were compared to the Unrestricted Use, Restricted Residential Use, and Protection of Groundwater Guidance Values (GVs) outlined in the "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances Under NYSDEC's Part 375 Remedial Programs," dated April 2023 (the "April 2023 PFAS Guidance"). Soil analytical results are summarized below and shown on **Figure 5.**

  Volatile Organic Compounds (VOCs)

  Eleven VOCs were detected in multiple soil samples at concentrations exceeding UUSCOs, RRSCOs, and/or PGWSCOs. Compounds that exceeded UUSCOs, RRSCOs, and PGWSCOs included 1,2,4 trimethlybenzene (maximum concentration of 370 milligrams per kilogram [mg/kg] in HA-SB1_15-17), benzene (maximum concentration of 21 mg/kg in HA-SB11_40-42), toluene (maximum concentration of 260 mg/kg in HA SB11_40-42), and total xylenes (maximum concentration of 300 mg/kg in HA-SB4_30-32). Multiple VOCs were detected above UUSCOs and PGWSCOs, but below RRSCOs, including 1,3,5-trimethylbenzene (maximum concentration of 75 mg/kg in HA-SB1_15-17), acetone (maximum concentration of 0.035 mg/kg in HA-SB10_0-2), chloroform (maximum concentration of 10 mg/kg in HA-SB10_5-7), ethylbenzene (maximum low bias estimated concentration of 54 mg/kg in HA-SB4_30-32), methyl tert-butyl ether (MTBE; maximum concentration of 2.5 mg/kg in HA-SB8_48-50), naphthalene (maximum concentration of 58 mg/kg in HA-SB1_15-17), and n-propylbenzene (maximum concentration of 39 mg/kg in HA-SB1_15-17).

  No other VOCs were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

  Semi-Volatile Organic Compounds (SVOCs)

  Seven SVOCs (including polycyclic aromatic hydrocarbons [PAHs]) were detected in up to three soil samples at concentrations exceeding the UUSCOs, RRSCOs, and/or PGWSCOs. Phenanthrene was detected above the UUSCO and RRSCO in three soil samples, at a maximum concentration of 6.5 mg/kg in HA-SB11_40-42. Naphthalene was detected above the UUSCO and PGWSCO in two soil samples, at a maximum concentration of 18 mg/kg in HA-SB1_15-17. Benzo(a)anthracene and chrysene were detected above the UUSCOs and PGWSCOs in one soil sample, HA-SB2_0-2, both at a maximum concentration of 1.1 mg/kg. Benzo(b)fluoranthene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene were detected above the UUSCOs in one soil

sample, HA-SB2_0-2, at maximum concentrations of 1.3 mg/kg, 0.76 mg/kg, and 0.57 mg/kg, respectively.

No other SVOCs were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Metals

Four metals were detected in multiple soil samples at concentrations exceeding the UUSCOs, RRSCOs, and/or PGWSCOs. Lead was detected above the UUSCO, RRSCO, and/or PGWSCO in seven soil samples, at a maximum concentration of 465 mg/kg in HA-SB2_0-2. Mercury was detected above the UUSCO and RRSCO in one soil sample, HA-SB2_0-2, at a maximum concentration of 0.317 mg/kg. Copper was detected above the UUSCO in two soil samples, at a high bias estimated maximum concentration of 110 mg/kg in HA-SB7_40-42. Zinc was detected above the UUSCO in seven soil samples, at a maximum estimated concentration of 285 mg/kg in HA-SB2_0-2.

No other metals were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Polychlorinated Biphenyls (PCBs)

PCBs were detected above the UUSCO in one soil sample, HA-SB9_0-2, at a maximum concentration of 0.137 mg/kg.

No other PCBs were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Pesticides

Two pesticides were detected at concentrations above UUSCOs in one soil sample each, including 4,4'-DDE at a maximum concentration of 0.00382 mg/kg in HA-SB1_0-2, and 4,4'-DDT at a maximum estimated concentration of 0.0043 mg/kg in HA-SB4_5-7.

No other pesticides were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Emerging Contaminants

1,4-dioxane was not detected above laboratory detection limits in any soil samples collected.

PFOS and PFOA were not detected above the GVs in any soil samples collected.

- Groundwater analytical results were compared to 6 NYCRR Part 703.5 NYSDEC Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards (AWQS). PFOA and PFOS were compared to the GVs for PFOA and PFOS outlined in the NYSDEC April 2023 PFAS

Guidance. 1,4-dioxane was compared to the GV as set by NYSDEC in March 2023. Groundwater analytical results are summarized below and shown on **Figure 6:**

Volatile Organic Compounds

Fourteen VOCs were detected in multiple groundwater samples at concentrations above the AWQS:

- 1,2,4,5-tetramethylbenzne was detected in one groundwater sample at a concentration of 88 micrograms per liter (µg/L) in MW-1.
- 1,2,4-trimethylbenzene was detected in each of the seven groundwater samples collected, including the duplicate sample, at a maximum concentration of 1,700 µg/L in MW-1.
- 1,3,5-trimethylbenzene was detected in five groundwater samples, at a maximum concentration of 470 µg/L in MW-1.
- 2-phenylbutane (sec-butylbenzene) was detected in one groundwater sample, at an estimated concentration of 22 µg/L in MW-1.
- Benzene was detected in each of the seven groundwater samples collected, including the duplicate sample, at a maximum concentration of 1,900 µg/L in MW-6.
- Ethylbenzene was detected in six groundwater samples, including the duplicate sample, at a maximum concentration of 1,100 µg/L in MW-4 and MW-6.
- Isopropylbenzene (cumene) was detected in three groundwater samples, at a maximum concentration of 84 µg/L in MW-1.
- M,p-xylenes were detected in each of the seven groundwater samples, including the duplicate sample, at a maximum concentration of 5,600 µg/L in MW-6.
- MTBE was detected in five groundwater samples, including the duplicate sample, at a maximum concentration of 16,000 µg/L in MW-3.
- Naphthalene was detected in three groundwater samples, at a maximum concentration of 280 µg/L in MW-1.
- N-butylbenzene was detected in one groundwater sample, at an estimated concentration of 34 µg/L in MW-1.
- N-propylbenzene was detected in three groundwater samples, at a maximum concentration of 240 µg/L in MW-1.
- O-xylene was detected in each of the seven groundwater samples, including the duplicate sample, at a maximum concentration of 2,800 µg/L in MW-6.
- Toluene was detected in each of the seven groundwater samples, including the duplicate sample, at a maximum concentration of 36,000 µg/L in MW-6.

No other VOCs were detected above the AWQS in any groundwater samples collected.

Semi-Volatile Organic Compounds

Three SVOCs (including PAHs) were detected above the AWQS in multiple groundwater samples, including benzo(a)anthracene (maximum estimated concentration of 0.05 µg/L in MW-4), naphthalene (maximum high-bias estimated concentration of 160 µg/L in the duplicate sample collected at MW-6), and phenol (maximum concentration of 10 µg/L in the duplicate sample collected at MW-6). Additionally, benzo(b)fluoranthene was detected in two groundwater samples, at a maximum estimated concentration of 0.05 µg/L in MW-4. Indeno(1,2,3-cd)pyrene was detected above the AWQS in one groundwater sample, at an estimated concentration of 0.04 µg/L in MW-4.

No other SVOCs were detected above the AWQS in the groundwater samples analyzed.

Polychlorinated Biphenyls

No PCBs were detected above laboratory detection limits in any groundwater samples collected.

Dissolved Metals

Three dissolved metals were detected in multiple groundwater samples above the AWQS, including magnesium (maximum high-bias estimated concentration of 57,800 µg/L in MW-4), manganese (maximum high-bias estimated concentration of 5,536 µg/L in MW-4), and sodium (maximum concentration of 707,000 µg/L in MW-2).

No other dissolved metals were detected above the AWQS in any groundwater samples collected.

Total Metals

Five total metals were detected in multiple groundwater samples above the AWQS, including antimony (maximum concentration of 5.2 µg/L in the duplicate sample collected at MW-6), iron (maximum concentration of 22,900 µg/L in MW-5), magnesium (maximum concentration of 61,600 µg/L in MW-4), manganese (maximum concentration of 6,329 µg/L in MW-4), and sodium (maximum concentration of 671,000 µg/L in MW-2). Additionally, barium, chromium, and nickel were detected above the AWQS in one sample each, at maximum concentrations of 1,287 µg/L in MW-4, 1,337 µg/L in MW-5, and 750.7 µg/L in MW-5, respectively. Lead was detected above the AWQS in two groundwater samples, at a maximum concentration of 63.93 µg/L in MW-5.

No other total metals were detected above the AWQS in any groundwater samples collected.

Pesticides

No pesticides were detected above laboratory detection limits in any groundwater samples collected.

Emerging Contaminants

1,4-dioxane was detected above the GV of 0.35 µg/L in three groundwater samples, at a maximum concentration of 1.6 µg/L in MW-3.

PFOS was detected above the GV of 2.7 nanograms per liter (ng/L) in each of the seven groundwater samples, including one duplicate, at a maximum estimated concentration of 9.59 ng/L in MW-1. PFOA was detected above the GV of 6.7 ng/L in each of the seven groundwater samples, including one duplicate, at a maximum estimated concentration of 102 ng/L in MW-3.

- No standard currently exists for soil vapor samples in New York State. Soil vapor analytical results are summarized below and shown on **Figure 7.**

  Total VOC concentrations ranged from 4,368.2 micrograms per cubic meter (µg/m^3) in SV-3 to a maximum of 19,259,150 µg/m^3 in SV-5. Total chlorinated VOC (CVOC) concentrations ranged from non-detect to 591.7 µg/m^3 in SV-3. Total benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations ranged from 602.3 µg/m^3 in SV-3 to 939,000 µg/m^3 in SV-6.

  Several petroleum-related VOCs were detected at elevated concentrations in soil vapor samples, including benzene (maximum concentration of 696,000 µg/m^3 in SV-6), toluene (maximum concentration of 243,000 µg/m^3 in SV-6), ethylbenzene (maximum concentration of 9,990 µg/m^3 in SV-1), m,p-xylenes (maximum concentration of 27,100 µg/m^3 in SV-1), o-xylene (maximum concentration of 4,950 µg/m^3 in SV-1), 1,2,4-trimethylbenzene (maximum concentration of 4,100 µg/m^3 in SV-1), 1,3,5-trimethylbenzene (maximum concentration of 25.2 µg/m^3 in SV-4), 2,2,4-trimethylpentane (isooctane; maximum concentration of 16,200,000 µg/m^3 in SV-5), cyclohexane (maximum concentration of 1,030,000 µg/m^3 in SV-6), hexane (maximum concentration of 2,220,000 µg/m^3 in SV-6), and n-heptane (maximum concentration of 729,000 µg/m^3 in SV-6).

  The CVOCs tetrachloroethene (PCE) and trichloroethene (TCE) were detected at elevated concentrations in one soil vapor sample, SV-3, at concentrations of 572 µg/m^3 and 19.7 µg/m^3, respectively.

  Several other VOCs were detected at elevated concentrations in soil vapor samples collected, including 1,3-butadiene (maximum concentration of 156 µg/m^3 in SV-3), 4-methyl-2-pentanone (methyl isobutyl ketone; maximum concentration of 21,500 µg/m^3 in SV-5), acetone (maximum concentration of 582 µg/m^3 in SV-3), carbon disulfide (maximum concentration of 205 µg/m^3 in SV-4), and ethanol (maximum concentration of 407 µg/m^3 in SV-4.

QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

Receptor Population

The Site is currently vacant and paved with an impervious surface (concrete and/or asphalt); therefore, receptors would currently only include construction/maintenance workers who may be employed to perform work on the property.

At this time, Site development plans are conceptual; however, it is anticipated that the Site will be redeveloped as a school with a partial cellar requiring excavation to approximately 25 ft bgs, which is consistent/compatible with surrounding property use and zoning. Exposed receptors under the future use scenario may comprise community members of the future building, indoor employees, outdoor employees (e.g., groundskeepers or maintenance staff), and construction workers who may be employed at or perform work on the property. Site visitors may also be considered receptors; however, their exposure would be similar to that of the indoor employees but at a lesser frequency and duration. In addition, residents or employees in off-Site adjoining buildings have the potential to be exposed to vapors.

Contaminant Sources

The Contaminants of Concern (COCs) present in the Site media at elevated concentrations above background levels are discussed in detail in the Remedial Investigation Report (RIR). In general, these are VOCs, metals, and SVOCs in soil; VOCs, SVOCs, and metals in groundwater; and VOCs in soil vapor.

Contaminant Release and Transport

Contaminant release and transport mechanisms carry contaminants from the source to points where people may be exposed and are specific to the type of contaminant and site use. For VOCs present in soil vapor, the potential exists for exposure through pathways associated with soil vapor intrusion (SVI). This would include the indoor vapor intrusion pathway (also referred to as SVI).

Concerning the indoor air pathway, under the current and future use scenarios, SVI is a relevant transport mechanism. SVI would entail soil vapor migrating from under the building slab and potentially impacting the indoor air above the slab. Concerning skin contact, inhalation, and incidental ingestion of volatile organics present in soil and groundwater, the potential exists for exposure to VOCs for construction workers involved in subsurface activities where volatiles are present at elevated concentrations.

Current Use Scenario

Site COCs include VOCs (specifically petroleum-related VOCs), metals, and SVOCs (specifically PAHs and naphthalene) in soil; VOCs (specifically petroleum-related VOCs), SVOCs (specifically PAHs, naphthalene, and phenol), and metals in groundwater; and VOCs in soil vapor. Under current conditions, the likelihood of exposure to soil or groundwater is limited. The Site is currently vacant, paved with an impervious surface (concrete and/or asphalt), and secured with locked doors on the construction fence. The Site entrances are each locked and secured, with Site access only granted to personnel associated with the planned development. Potable water for Brooklyn will continue to be sourced from reservoirs in the Catskill and Delaware watersheds. Intrusive work on the Site will be done in accordance with a Site-specific Health and Safety Plan (HASP) and the donning of personal protective equipment (PPE).

Construction/Remediation Scenario

The exposure element exists for each element during the construction/remediation phase. The overall risk will be minimized by the implementation of a Site-Specific Construction Health and Safety Plan (CHASP), localized monitoring of organic vapors, community air monitoring on the Site perimeter for

particulates and VOCs, vapor and dust suppression techniques, installation of a stabilized entrance, cleaning truck tires and undercarriages, and use of appropriate PPE. Additionally, the Site will be remediated under a RAWP, which will include a Soil Materials Management Plan (S/MMP) that will highlight measures for PPE, covering of stockpiles, housekeeping, suppression techniques (particulates and vapor), and measures to prevent off-Site migration of contaminants. In addition, the Site will be secured and inaccessible to the public during remedial construction.

Future Use Scenario

Under the proposed future condition (after construction/remediation), residual contaminants may remain on Site depending on the remedy achieved. The remaining contaminants would include those listed in the current conditions. If contaminants remain on Site after construction/remediation, the route of exposure will be mitigated by proper installation of engineering controls (ECs), such as a Site capping system foundation and vapor mitigation, and implementation of institutional controls (ICs), such as land use and groundwater use restrictions, and implementation of a Site Management Plan (SMP) to manage referenced controls.

SUMMARY OF THE REMEDY

Alternative I, a Track 4 remedy, will include the following tasks:

- Development and implementation of a CHASP and Community Air Monitoring Plan (CAMP) for the protection of on-Site workers, the community, residents, and the environment during remediation and construction activities.
- Design and construction of a support-of-excavation (SOE) system Sitewide and groundwater cutoff wall within the source area to facilitate the Track 4 remediation.
- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations.
- Removal of the existing asphalt and concrete cover and miscellaneous debris on the Site.
- Decommissioning of existing on-Site monitoring wells, as necessary, in accordance with NYSDEC Commissioner Policy (CP)-43.
- Excavation, stockpiling, off-Site transport, and disposal of approximately 6,000 cubic yards (cu yd) of contaminated soil Site-wide that exceeds RRSCOs as defined by 6 NYCRR Part 375-6.8; this includes Site-wide excavation to a depth of 2 ft bgs to facilitate installation of the sub-slab depressurization system (SSDS), soil vapor extraction (SVE) system, and Site cover system, and further advancement of the excavation within the source area (former UST area) to a total depth of 25 ft bgs.
- If encountered, removal, decommissioning, and off-Site disposal of any USTs and/or associated appurtenances (e.g., fill lines, vent lines, and electrical conduits), not removed under the previous Interim RA, in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements.
- Implementation of a preliminary waste characterization to facilitate off-Site disposal of excavated soil/fill.

- Screening for indications of contamination (by visual means, odor, and monitoring with photoionization detectors [PIDs]) of excavated material during intrusive Site work.
- Appropriate off-Site disposal of material removed from the Site in accordance with federal, state, and local rules and regulations for handling, transport, and disposal.
- Backfilling of excavated areas, as necessary for development, with certified-clean material (i.e., meeting RRSCOs), recycled concrete aggregate (RCA), or virgin, native crushed stone.
- Collection and analysis of documentation soil samples from the excavation base in accordance with DER-10, to document post-excavation conditions.
- Completion of an SVI Evaluation in accordance with DER-10 and NYSDOH Final Guidance on Soil Vapor Intrusion following remedial excavation activities and prior to occupancy.
- Construction of a composite cover system consisting of a minimum of 8 in. of subbase (virgin stone) overlain by a 6-in. concrete slab and installation of a waterproofing/vapor barrier (20-mil thick) to mitigate the potential for a soil vapor exposure pathway under the building.
- Installation, operation, and monitoring of an SVE system in the source area associated with the historical USTs at the Site to remediate source petroleum-related VOCs in the vadose zone.
- Installation, operation, and monitoring of an active SSDS to mitigate potential exposures related to SVI.
- Implementation of in-situ chemical oxidation (ISCO) by permanent injection points utilizing alkaline-activated persulfate (AP-pH) to reduce elevated concentrations of VOCs, including petroleum-related VOCs, in groundwater.
- Installation of six permanent monitoring wells and commencement of quarterly groundwater monitoring in accordance with DER-10 for a minimum of one year following remedial activities to document groundwater quality beneath the Site.
- Installation of two permanent monitoring wells and one additional soil boring in the sidewalk along 4th Avenue and commencement of groundwater sampling following approval from MTA.
- Establishment of use restrictions, if necessary, including prohibitions on the use of groundwater from the Site and prohibitions on sensitive Site uses, such as farming or vegetable gardening in residual Site soil, to significantly reduce the potential for future exposure pathways.
- Establish an SMP for ICs and ECs that includes an Institutional and Engineering Control Plan, a Monitoring Plan, and an Operations and Maintenance Plan.
- Recording of an Environmental Easement (EE) to ensure future owners of the Site continue to maintain ECs/ICs as required.

All responsibilities associated with this RA, including permitting requirements and pretreatment requirements, will be addressed in accordance with applicable federal, state and local rules and regulations.

1. Introduction

This Remedial Action (RA) Work Plan (RAWP) was developed by H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) on behalf of 4 Ave Property LLC for the proposed 4001 4th Avenue Redevelopment Site, located at 4001-4011 4th Avenue, Brooklyn, New York (the Site).

In October 2024, the project (Site No. C224412) was accepted into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), and a countersigned Brownfield Cleanup Agreement (BCA) was issued with 4 Ave Property LLC classified as a "Volunteer." The Volunteer proposes to remediate the Site for commercial use.

This RAWP summarizes the nature and extent of contamination on the Site as determined from data gathered during the Remedial Investigation (RI) performed by Haley & Aldrich of New York and completed in January 2026. It provides an evaluation of a Track 4 cleanup and other applicable RA alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined by the Division of Environmental Remediation (specifically, the "May 2010 NYSDEC Technical Guidance for Site Investigation and Remediation") (DER-10), DER Green Remediation (DER-31), and complies with all applicable federal, state, and local laws, regulations, and requirements.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located in the Sunset Park neighborhood of Brooklyn, New York, and is identified as Block 714 Lot 6 on the New York City tax map. The approximately 10,017-square-foot (sq-ft) (0.230-acre) Site is bound to the north by 4th Avenue, followed by Intermediate School (I.S.) 136; to the east by 40th Street, followed by a mixed-use residential and commercial building; to the south by a multi-story residential building; and to the west by a commercial building. Metropolitan Transportation Authority (MTA) Subway lines N and R run parallel to the Site beneath 4th Avenue. The Project Locus is shown on **Figure 1,** and existing Site features are displayed on the Site Plan provided as **Figure 2.** A Site survey map is provided in **Appendix A.**

According to the New York City Planning Commission Zoning Map 6c, the Site is currently zoned as a Residential R7-A and C2-4 zoning area with the intended post-development use as a school. The Site is located in an urban area characterized by multi-story commercial and residential buildings. A copy of the zoning map is included in **Appendix B.**

1.2 REDEVELOPMENT PLAN

The project will consist of a new four-story school with a one-level cellar encompassing a portion of the Site and extending approximately 25 feet (ft) below current grade. The proposed cellar is designed to house the remedial equipment for the Site. A copy of the proposed development plans is included in **Appendix L.**

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located on East 4th Avenue in an urban area identified as the Sunset Park neighborhood in the borough of Brooklyn. There are three sensitive receptors that are within a 500-ft radius of the Site:

1) I.S. 136 – Charles O. Dewey, 4004 4th Avenue, Brooklyn, New York 11232, listed as a prep school and middle school.
2) Family Day Care Graciela's Little Angels – 432 41st Street, Brooklyn, New York 11232, listed as a daycare.
3) Sunset Park Group Family – 338 42nd Street, Brooklyn, New York 11232, listed as a daycare.

Properties immediately surrounding the Site consist of residential and commercial uses.

Direction	Adjoining Properties	Surrounding Properties
North	40th Street, followed by mixed-use commercial and residential buildings.	Residential and commercial buildings
South	Sunset Car Wash, followed by mixed-use commercial, office, and residential buildings.	Residential and commercial buildings
East	Three-Story Residential Building, followed by residential buildings.	Residential buildings
West	4th Avenue, followed by mixed-use commercial and residential buildings	Residential and commercial buildings

1.4 SITE HISTORY

Based on the findings of the March 2024 Phase I Environmental Site Assessment (ESA) prepared by Lesova Environmental Group (LEG), the Site was comprised of one tax lot developed with a one-story concrete structure and a gasoline filling/auto service station with one underground storage tank (UST) circa 1926 and a second lot that was vacant. The 1942 Sanborn Fire Insurance Map depicted the Site merged as one lot with previous use similar to the 1926 map, with a garage to the south of the lot. The Site was operated as an automotive service station, including lubrication and minor repair services, with office use and a parking area until at least August 1965. The configuration of the Site changed and was identified with a cement brick one-story structure with a gasoline filling station circa 1970. A historical City Directory search indicated that the Site was operated as a gasoline filling station circa 1928, as an auto service station circa 1940 to 2000, and as a gasoline filling station again circa 2010 to 2024. Since that time, all structures have been demolished, and the Site is currently vacant.

1.5 PREVIOUS ENVIRONMENTAL REPORTS

The following reports were prepared for the Site prior to submission of the 2025 Remedial Investigation Report (RIR):

- *Phase I Environmental Site Assessment Report*, prepared by Castleton Environmental Geologic Services DPC, dated January 25, 2019
- *Supplemental Remedial Investigation Report*, prepared by Berninger Environmental, dated June 17, 2020

- *Supplemental Investigation Soil and Groundwater Report*, prepared by Berninger Environmental, October 8, 2021
- *Monitoring Report*, prepared by Berninger Environmental, dated February 27, 2024
- *Phase I Environmental Site Assessment*, prepared by LEG, dated March 12, 2022
- *Interim Remedial Measure Work Plan,* prepared by Haley & Aldrich of New York, dated February 2025
- *Interim Remedial Measure Work Plan,* prepared by Haley & Aldrich of New York, dated November 2025

Previous investigation findings are included in Section 3 of the RIR dated July 2026, prepared by Haley & Aldrich of New York.

2. Description of Remedial Investigation Findings

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation Work Plan (RIWP) dated February 2025. The RI was conducted from April 14, 2025, through April 24, 2025, resuming July 1, 2025, through July 31, 2025, and completed from December 9, 2025, through January 9, 2026. It is noted that there were pauses in the RI schedule for ongoing discussion with the New York City Transit Authority for sidewalk borings, which will be handled under a separate cover. The Final RIR was submitted to NYSDEC on July 2026.

2.1 SUMMARY OF REMEDIAL INVESTIGATIONS PERFORMED

The RI consisted of the following:

- Advancement of 12 soil borings to various depths ranging from 40 to 60 ft below ground surface (bgs) with samples collected from the top 0 to 2 ft immediately beneath the impervious Site cover (i.e., surface soils); at the bottom of the observed fill layer (ranging from approximately 3 to 10 ft bgs); from the 15 to 17 ft bgs interval to aid with vertical delineation; and, from the 2-ft interval above the groundwater interface. An additional soil sample was collected from 32 to 34 ft bgs at soil boring HA-SB9, from within the anticipated clayey soils previously encountered at a 2 ft interval between 30 and 35 ft bgs; a well-defined confining layer was not encountered at the anticipated depth of 30 to 35 ft bgs. A total of 49 soil samples were collected (plus quality assurance/quality control [QA/QC] samples) for laboratory analysis.
- Advancement of five light non-aqueous phase liquid (LNAPL) delineation soil borings to a depth of 45 ft bgs, with shaker tests completed at 5-ft intervals from 15 ft bgs to 35 ft bgs.
- Installation of five 2-inch (in.) diameter groundwater monitoring wells to varied depths of approximately 52 to 60 ft bgs and collection of six groundwater samples (plus QA/QC samples) from the newly installed monitoring wells and the existing monitoring well.
- Installation of seven soil vapor probes to depths ranging from approximately 15 to 17 ft bgs, and collection of seven soil vapor samples.

Soil and groundwater samples were collected into laboratory-prepared sample bottles (pre-preserved when appropriate), placed in ice-packed coolers maintained at approximately 4 degrees Celsius under standard chain of custody procedures, and transported to Pace Analytical Services, LLC (Pace) of Westborough, Massachusetts (Certification No. 11148) or Eurofins Environmental Testing Northeast, LLC (Eurofins) of Edison, New Jersey (Certification No. 11452). Soil vapor samples were collected in laboratory-supplied batch certified-clean 6-liter Summa® canisters with two-hour flow controllers and transported under a standard chain of custody to Pace of Mansfield, Massachusetts (Certification No. 12191). Pace and Eurofins are New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratories and were responsible for analyzing the samples as per the analyses and methods identified in the February 2025 RIWP and described in the RIR. A sample location map is provided on **Figure 3.**

2.1.1 Soil Investigation

Twelve soil borings were advanced throughout the Site to various depths ranging from 40 to 60 ft bgs, using a track-mounted sonic drill rig operated by a licensed operator provided by either Coastal Environmental Solutions, Inc. (Eijkelkamp CRS-XL-140 Duo), AARCO Environmental Services Corp. (Geoprobe® 8150LS), or Eastern Environmental Solutions, Inc. (Geoprobe® 8140LS), the drilling subcontractors. Soil samples were collected from dedicated acetate liners using a stainless-steel trowel or sampling spoon. Volatile organic compound (VOC) grab samples were collected using Terra Cores®.

Soils were logged continuously by field personnel using the Modified Burmister Soil Classification System. The presence of staining, odors, and photoionization detector (PID) response was noted in soil boring logs. Soil boring logs are provided in Appendix D of the RIR.

Four samples were collected at each boring, including from the top 0 to 2 ft immediately beneath the impervious Site cover (i.e., surface soils); at the bottom of the observed fill layer (ranging from approximately 3 to 10 ft bgs); from the 15 to 17 ft bgs interval to aid with vertical delineation; and, from the 2-ft interval above the groundwater interface. An additional soil sample was collected from 32 to 34 ft bgs at soil boring HA-SB9 from within the anticipated clayey soils previously encountered at a 2-ft interval between 30 and 35 ft bgs; a well-defined confining layer was not encountered at the anticipated depth of 30 to 35 ft bgs.

Previous investigations identified grossly contaminated material (GCM) and LNAPL in groundwater at monitoring well MW-1 installed in the southwestern portion of the Site. In addition to the soil boring investigation and sampling plan described above, five additional soil borings (DB-1 through DB-5) were installed in the southwestern portion of the Site to horizontally and vertically delineate the presence of LNAPL. Soil borings were observed for visual and olfactory evidence of gross contamination and were screened using a PID. Shaker tests were completed at 5-ft intervals from 15 ft bgs to 35 ft bgs to investigate the presence of LNAPL. No evidence of GCM/LNAPL was identified in the delineation borings, including intervals shallower than 15 ft or at the base of the borings at 35 ft. Soil boring logs are provided in Appendix D of the RIR.

A total of 25 shaker tests were conducted during the RI. Shaker tests were performed by collecting soil in a test jar, applying laboratory-provided distilled water to the test jar, agitating the soil/water within the covered test jar for 30 seconds, and allowing the test jar to sit immobile for at least 30 minutes. Upon completion of the process, the test jar was observed for LNAPL separating from the water. Based on the results of the shaker tests, no additional monitoring wells (beyond those originally proposed in the RIWP) were installed to monitor for plume migration.

2.1.2 Groundwater Investigation

Five 2-in. diameter permanent monitoring wells were installed to depths ranging from approximately 52 to 60 ft bgs. Each monitoring well was constructed using a 2-in. diameter polyvinyl chloride (PVC) riser pipe with a 10-ft-long, 10-slot (0.01-in.) slotted PVC screen. Each monitoring well was constructed within a 2-in. annular space backfilled with #0 certified clean sand fill, followed by a bentonite plug, and sealed at grade with steel flush-mount covers. During a monitoring well gauging event concurrent with the well survey on January 15, 2026, groundwater was encountered at depths ranging from approximately 40.75 to 45.12 ft bgs in monitoring wells MW-2 through MW-6 and at 35.98 ft bgs in

existing monitoring well MW-1, where a perched groundwater condition was observed. Groundwater flow beneath the Site is generally from the east to west and northwest. Well construction logs are provided in Appendix E of the RIR. A groundwater contour map and groundwater elevation data are provided on **Figure 4.**

2.1.3 Soil Vapor Investigation

Soil vapor samples were collected in accordance with the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, October 2006). Seven temporary soil vapor probes were installed by Lakewood Environmental Services, Corp. to approximately 15 to 17 ft bgs. The temporary vapor implants were installed with a Geoprobe® 6610DT drill rig to advance a stainless-steel probe to the desired sample depth.

To ensure the stainless-steel soil vapor probe was sealed completely to the surface using bentonite, a tracer gas was used in accordance with NYSDOH protocols to serve as a QA/QC measure to verify the integrity of the soil vapor probe seal. In addition, one to three implant volumes were purged prior to the collection of the soil vapor samples. Sampling occurred for the duration of two hours. At the conclusion of the sampling round, tracer monitoring was performed a second time to confirm the continued integrity of the probe seals. No leaks were observed during the soil vapor sampling.

Haley & Aldrich of New York collected seven soil vapor samples in accordance with the NYSDEC-approved RIWP. Samples were collected in appropriately sized Summa® canisters that were batch-certified clean by the laboratory. Samples were analyzed for VOCs using U.S. Environmental Protection Agency (USEPA) Method TO-15. The flow rate for both purging and sampling did not exceed 0.2 liters per minute (L/min). The soil vapor purge log is included in Appendix G of the RIR.

2.2 SAMPLES COLLECTED

During the RI, a total of 49 soil samples (plus QA/QC samples) were collected from the top 0 to 2 ft immediately beneath the impervious Site cover (i.e., surface soils); at the bottom of the observed fill layer (ranging from approximately 3 to 10 ft bgs); from the 15 to 17 ft bgs interval to aid with vertical delineation; and, from the 2-ft interval above the groundwater interface. An additional soil sample was collected from 32 to 34 ft bgs at soil boring HA-SB9 from within the anticipated clayey soils previously encountered at a 2-ft interval between 30 and 35 ft bgs; a well-defined confining layer was not encountered at the anticipated depth of 30 to 35 ft bgs. Samples were collected using laboratory-provided clean bottle ware, and VOC grab samples were collected using Terra Cores®.

A total of six groundwater samples, one from each newly installed monitoring well and the existing monitoring well, were collected for laboratory analysis, along with QA/QC samples. Groundwater monitoring wells were sampled using low-flow sampling methods. Monitoring wells were purged, and physical and chemical parameters stabilized before samples were taken.

A total of seven soil vapor samples were collected for laboratory analysis, one from each soil vapor probe. Samples were collected in appropriately sized Summa® canisters that were batch-certified clean by the laboratory. Sampling occurred for the duration of two hours.

2.3 CHEMICAL ANALYSIS

The laboratory analyses performed on the soil, groundwater, and soil vapor samples are summarized below.

Soil samples were analyzed for the following parameters:

- Target Compound List (TCL) VOCs by USEPA Method 8260B;
- TCL semi-volatile organic compounds (SVOCs) by USEPA Method 8270C;
- Total Analyte List (TAL) metals by USEPA Method 6010;
- TCL polychlorinated biphenyl (PCBs) by USEPA Method 8082;
- TCL pesticides by USEPA Method 8081B;
- Per- and polyfluoroalkyl substances (PFAS) by USEPA Method 1633A; and
- 1,4-dioxane by USEPA Method 8270 SIM.

Groundwater samples collected were analyzed for the following parameters:

- TCL VOCs by USEPA Method 8260B;
- TCL SVOCs by USEPA Method 8270C;
- Total and dissolved TAL metals by USEPA Methods 6010/7471;
- PCBs by USEPA Method 8082;
- TCL pesticides by USEPA Method 8081B;
- 1,4-dioxane by USEPA Method 8270 SIM; and
- PFAS by USEPA Method 1633A.

Soil vapor samples were analyzed for VOCs using USEPA Method TO-15.

2.4 REMEDIAL INVESTIGATION FINDINGS SUMMARY

Below is a summary of the RI findings.

2.4.1 Soil Sampling Results

Soil analytical results were compared to NYSDEC Title 6 of the New York Codes, Rules and Regulations (6 NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs), Restricted Residential Soil Cleanup Objective (RRSCOs), and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs). Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) soil sample results were compared to the Unrestricted Use, Restricted Residential Use, and Protection of Groundwater Guidance Values (GVs) outlined in the NYSDEC's "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances Under NYSDEC's Part 375 Remedial Programs," dated April 2023 (the "April 2023 PFAS Guidance"). Soil analytical results are summarized below and shown on **Figure 5.**

Volatile Organic Compounds

Eleven VOCs were detected in multiple soil samples at concentrations exceeding UUSCOs, RRSCOs, and/or PGWSCOs. Compounds that exceeded UUSCOs, RRSCOs, and PGWSCOs included 1,2,4-trimethlybenzene (maximum concentration of 370 milligrams per kilogram [mg/kg] in HA-SB1_15-17), benzene (maximum concentration of 21 mg/kg in HA-SB11_40-42), toluene (maximum concentration of 260 mg/kg in HA-SB11_40-42), and total xylenes (maximum concentration of 300 mg/kg in HA-SB4_30-32). Multiple VOCs were detected above UUSCOs and PGWSCOs, but below RRSCOs, including 1,3,5-trimethylbenzene (maximum concentration of 75 mg/kg in HA-SB1_15-17), acetone (maximum concentration of 0.035 mg/kg in HA-SB10_0-2), chloroform (maximum concentration of 10 mg/kg in HA-SB10_5-7), ethylbenzene (maximum low bias estimated concentration of 54 mg/kg in HA-SB4_30-32), methyl tert-butyl ether (MTBE; maximum concentration of 2.5 mg/kg in HA-SB8_48-50), naphthalene (maximum concentration of 58 mg/kg in HA-SB1_15-17), and n-propylbenzene (maximum concentration of 39 mg/kg in HA-SB1_15-17).

No other VOCs were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Semi-Volatile Organic Compounds

Seven SVOCs (including polycyclic aromatic hydrocarbons [PAHs]) were detected in up to three soil samples at concentrations exceeding the UUSCOs, RRSCOs, and/or PGWSCOs. Phenanthrene was detected above the UUSCO and RRSCO in three soil samples, at a maximum concentration of 6.5 mg/kg in HA-SB11_40-42. Naphthalene was detected above the UUSCO and PGWSCO in two soil samples, at a maximum concentration of 18 mg/kg in HA-SB1_15-17. Benzo(a)anthracene and chrysene were detected above the UUSCOs and PGWSCOs in one soil sample, HA-SB2_0-2, both at a maximum concentration of 1.1 mg/kg. Benzo(b)fluoranthene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene were detected above the UUSCOs in one soil sample, HA-SB2_0-2, at maximum concentrations of 1.3 mg/kg, 0.76 mg/kg, and 0.57 mg/kg, respectively.

No other SVOCs were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Metals

Four metals were detected in multiple soil samples at concentrations exceeding the UUSCOs, RRSCOs, and/or PGWSCOs. Lead was detected above the UUSCO, RRSCO, and/or PGWSCO in seven soil samples, at a maximum concentration of 465 mg/kg in HA-SB2_0-2. Mercury was detected above the UUSCO and RRSCO in one soil sample, HA-SB2_0-2, at a maximum concentration of 0.317 mg/kg. Copper was detected above the UUSCO in two soil samples, at a high bias estimated maximum concentration of 110 mg/kg in HA-SB7_40-42. Zinc was detected above the UUSCO in seven soil samples, at a maximum estimated concentration of 285 mg/kg in HA-SB2_0-2.

No other metals were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Polychlorinated Biphenyls

PCBs were detected above the UUSCO in one soil sample, HA-SB9_0-2, at a maximum concentration of 0.137 mg/kg.

No other PCBs were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Pesticides

Two pesticides were detected at concentrations above UUSCOs in one soil sample each, including 4,4'-DDE at a maximum concentration of 0.00382 mg/kg in HA-SB1_0-2, and 4,4'-DDT at a maximum estimated concentration of 0.0043 mg/kg in HA-SB4_5-7.

No other pesticides were detected above the UUSCOs, RRSCOs, and/or PGWSCOs in the soil samples analyzed.

Emerging Contaminants

1,4-dioxane was not detected above laboratory detection limits in any soil samples collected.

PFOS and PFOA were not detected above the GVs in any soil samples collected.

2.4.2 Groundwater Sampling Results

Groundwater analytical results were compared to 6 NYCRR Part 703.5 NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS). PFOA and PFOS were compared to the GVs for PFOA and PFOS outlined in the April 2023 PFAS Guidance. 1,4-dioxane was compared to the GV as set by NYSDEC in March 2023. Groundwater analytical results are summarized below and shown on **Figure 6.**

Volatile Organic Compounds

Fourteen VOCs were detected in multiple groundwater samples at concentrations above the AWQS.

- 1,2,4,5-tetramethylbenzene was detected in one groundwater sample at a concentration of 88 micrograms per liter (µg/L) in MW-1.
- 1,2,4-trimethylbenzene was detected in each of the seven groundwater samples collected, including the duplicate sample, at a maximum concentration of 1,700 µg/L in MW-1.
- 1,3,5-trimethylbenzene was detected in five groundwater samples, at a maximum concentration of 470 µg/L in MW-1.
- 2-phenylbutane (sec-butylbenzene) was detected in one groundwater sample, at an estimated concentration of 22 µg/L in MW-1.
- Benzene was detected in each of the seven groundwater samples collected, including the duplicate sample, at a maximum concentration of 1,900 µg/L in MW-6.

- Ethylbenzene was detected in six groundwater samples, including the duplicate sample, at a maximum concentration of 1,100 µg/L in MW-4 and MW-6.
- Isopropylbenzene (cumene) was detected in three groundwater samples, at a maximum concentration of 84 µg/L in MW-1.
- M,p-xylenes were detected in each of the seven groundwater samples, including the duplicate sample, at a maximum concentration of 5,600 µg/L in MW-6.
- MTBE was detected in five groundwater samples, including the duplicate sample, at a maximum concentration of 16,000 µg/L in MW-3.
- Naphthalene was detected in three groundwater samples, at a maximum concentration of 280 µg/L in MW-1.
- N-butylbenzene was detected in one groundwater sample, at an estimated concentration of 34 µg/L in MW-1.
- N-propylbenzene was detected in three groundwater samples, at a maximum concentration of 240 µg/L in MW-1.
- O-xylene was detected in each of the seven groundwater samples, including the duplicate sample, at a maximum concentration of 2,800 µg/L in MW-6.
- Toluene was detected in each of the seven groundwater samples, including the duplicate sample, at a maximum concentration of 36,000 µg/L in MW-6.

No other VOCs were detected above the AWQS in any groundwater samples collected.

Semi-Volatile Organic Compounds

Three SVOCs (including PAHs) were detected above the AWQS in multiple groundwater samples, including benzo(a)anthracene (maximum estimated concentration of 0.05 µg/L in MW-4), naphthalene (maximum high-bias estimated concentration of 160 µg/L in the duplicate sample collected at MW-6), and phenol (maximum concentration of 10 µg/L in the duplicate sample collected at MW-6). Additionally, benzo(b)fluoranthene was detected in two groundwater samples, at a maximum estimated concentration of 0.05 µg/L in MW-4. Indeno(1,2,3-cd)pyrene was detected above the AWQS in one groundwater sample, at an estimated concentration of 0.04 µg/L in MW-4.

No other SVOCs were detected above the AWQS in the groundwater samples analyzed.

Polychlorinated Biphenyls

No PCBs were detected above laboratory detection limits in any groundwater samples collected.

Dissolved Metals

Three dissolved metals were detected in multiple groundwater samples above the AWQS, including magnesium (maximum high-bias estimated concentration of 57,800 µg/L in MW-4), manganese (maximum high-bias estimated concentration of 5,536 µg/L in MW-4), and sodium (maximum concentration of 707,000 µg/L in MW-2).

No other dissolved metals were detected above the AWQS in any groundwater samples collected.

Total Metals

Five total metals were detected in multiple groundwater samples above the AWQS, including antimony (maximum concentration of 5.2 µg/L in the duplicate sample collected at MW-6), iron (maximum concentration of 22,900 µg/L in MW-5), magnesium (maximum concentration of 61,600 µg/L in MW-4), manganese (maximum concentration of 6,329 µg/L in MW-4), and sodium (maximum concentration of 671,000 µg/L in MW-2). Additionally, barium, chromium, and nickel were detected above the AWQS in one sample each, at maximum concentrations of 1,287 µg/L in MW-4, 1,337 µg/L in MW-5, and 750.7 µg/L in MW-5, respectively. Lead was detected above the AWQS in two groundwater samples, at a maximum concentration of 63.93 µg/L in MW-5.

No other total metals were detected above the AWQS in any groundwater samples collected.

Pesticides

No pesticides were detected above laboratory detection limits in any groundwater samples collected.

Emerging Contaminants

1,4-dioxane was detected above the GV of 0.35 µg/L in three groundwater samples, at a maximum concentration of 1.6 µg/L in MW-3.

PFOS was detected above the GV of 2.7 nanograms per liter (ng/L) in each of the seven groundwater samples, including one duplicate, at a maximum estimated concentration of 9.59 ng/L in MW-1. PFOA was detected above the GV of 6.7 ng/L in each of the seven groundwater samples, including one duplicate, at a maximum estimated concentration of 102 ng/L in MW-3.

2.4.3 Soil Vapor Sampling Results

Total VOC concentrations ranged from 4,368.2 micrograms per cubic meter (µg/m^3) in SV-3 to a maximum of 19,259,150 µg/m^3 in SV-5. Total chlorinated VOC (CVOC) concentrations ranged from non-detect (ND) to 591.7 µg/m^3 in SV-3. Total benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations ranged from 602.3 µg/m^3 in SV-3 to 939,000 µg/m^3 in SV-6.

Several petroleum-related VOCs were detected at elevated concentrations in soil vapor samples, including benzene (maximum concentration of 696,000 µg/m^3 in SV-6), toluene (maximum concentration of 243,000 µg/m^3 in SV-6), ethylbenzene (maximum concentration of 9,990 µg/m^3 in SV-1), m,p-xylenes (maximum concentration of 27,100 µg/m^3 in SV-1), o-xylene (maximum concentration of 4,950 µg/m^3 in SV-1), 1,2,4-trimethylbenzene (maximum concentration of 4,100 µg/m^3 in SV-1), 1,3,5-trimethylbenzene (maximum concentration of 25.2 µg/m^3 in SV-4), 2,2,4-trimethylpentane (isooctane; maximum concentration of 16,200,000 µg/m^3 in SV-5), cyclohexane (maximum concentration of 1,030,000 µg/m^3 in SV-6), hexane (maximum concentration of 2,220,000 µg/m^3 in SV-6), and n-heptane (maximum concentration of 729,000 µg/m^3 in SV-6).

The CVOCs tetrachloroethene (PCE) and trichloroethene (TCE) were detected at elevated concentrations in one soil vapor sample, SV-3, at concentrations of 572 µg/m^3 and 19.7 µg/m^3, respectively.

Several other VOCs were detected at elevated concentrations in soil vapor samples collected, including 1,3-butadiene (maximum concentration of 156 µg/m^3 in SV-3), 4-methyl-2-pentanone (methyl isobutyl ketone; maximum concentration of 21,500 µg/m^3 in SV-5), acetone (maximum concentration of 582 µg/m^3 in SV-3), carbon disulfide (maximum concentration of 205 µg/m^3 in SV-4), and ethanol (maximum concentration of 407 µg/m^3 in SV-4).

Figure 7 provides the soil vapor sampling locations as well as a summary of soil vapor data from the sampling event.

2.5 SIGNIFICANT THREAT

The NYSDEC and NYSDOH have determined that the Site poses a significant threat to human health and the environment.

2.6 GEOLOGY AND HYDROLOGY

2.6.1 Contaminated Fill Material

Based on field observations from the RI, the Site is underlain by a layer of fill material generally consisting of brown to dark brown to reddish brown silty sand and fine to medium sand, with varying amounts of gravel, brick, asphalt, concrete, glass, wood, and ceramic. Fill extends from the surface to variable depths between 5 and 20 ft bgs.

2.6.2 Native Soil

The native layer consists of brown to dark brown to reddish brown fine to medium sand and silty sand, with varying amounts of silt, clay, and gravel extending down to the terminus depth in each boring.

2.6.3 Bedrock

Based on previous reports, bedrock was encountered at depths greater than 100 ft bgs. According to the U.S. Geological Survey (USGS) Bedrock and Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York, the bedrock beneath the Site is within the Atlantic Coastal Plain physiographic province, which has a small section of the Manhattan Prong bedrock formation containing metamorphic rocks such as schist and gneiss.

2.6.4 Hydrogeology

Groundwater was encountered at depths ranging from approximately 40.75 to 45.12 ft bgs in monitoring wells MW-2 through MW-6, and at approximately 35.98 ft bgs in the existing monitoring well MW-1, where a perched groundwater condition was observed during this RI. Groundwater flow beneath the Site is generally from the east to west and northwest. A groundwater contour map is provided as **Figure 4.**

2.7 CONTAMINANT CONDITIONS

2.7.1 Conceptual Site Model

A conceptual site model (CSM) was developed based on the findings of the RI. The purpose of this model is to develop a simplified framework for understanding the sources of contamination, potential migration pathways, and potentially complete exposure pathways. The following is a description of each.

2.7.1.1 Potential Sources of Contamination

Subsurface soils are impacted with elevated concentrations of VOCs (specifically petroleum-related VOCs) and metals (including lead and mercury), and, in some areas, SVOCs (specifically PAHs and naphthalene), consistent with characteristics of contaminated fill found throughout the New York City area. Contaminated fill material varies throughout the Site, extending down to 15 ft bgs. Potential native soils are also impacted in some areas with VOCs and SVOCs. The SVOCs observed in soil and groundwater, CVOCs observed in soil vapor, and petroleum-related impacts observed in soil, groundwater, and soil vapor samples, can likely be attributed to the former use of the Site as a gasoline filling/auto service station between approximately 1926 and 2024, including lubrication and minor repair services, and the presence of USTs in the western portion of the Site. Additionally, CVOC impacts observed in soil vapor can potentially be attributed to the commercial car wash and auto repair shop located south-adjacent to the Site, identified as the Sunset Car Care Site and site code 224244 in the State Superfund Program.

2.7.1.2 Description of Areas of Concern

Based on Site observations, Site development history, and the findings of the previous environmental reports, three Areas of Concern (AOCs) were identified.

<u>AOC 1 – Site-Wide Contamination of Subsurface Soils</u>

Subsurface soils on the Site are impacted with elevated concentrations of VOCs (specifically petroleum-related VOCs) and metals (including lead and mercury), and, in some areas, SVOCs (specifically PAHs and naphthalene). These findings are consistent with characteristics of contaminated fill found throughout the New York City area. Contaminated fill material varies in depth throughout the Site, with the majority of Site-wide fill located from 5 to 20 ft bgs. Site Contaminants of Concern (COCs), including VOCs (specifically petroleum-related VOCs), associated with historic fill also exceeded UUSCOs in deeper soil samples collected across the Site during the RI. SVOCs (specifically naphthalene and phenanthrene) also exceeded UUSCOs in deeper soil samples collected in the northwest-central portion of the Site.

<u>AOC 2 – Groundwater Impacts</u>

VOCs (specifically petroleum-related VOCs), SVOCs (specifically PAHs, naphthalene, and phenol), and metals were detected above the NYSDEC AWQS in groundwater at the Site and are likely the result of historical Site use. Petroleum-related VOCs and metals were detected above the AWQS in groundwater

samples collected Site-wide, while SVOC AWQS exceedances were primarily detected on the southeastern and central portions of the Site.

AOC 3 – Soil Vapor Impacts

Based on a review of analytical data collected during this RI, VOCs were detected in soil vapor and have potentially partitioned from soil and/or groundwater into the vapor phase. VOCs, including petroleum-related VOCs (BTEX) and CVOCs, are present in the vapor phase at the Site and are likely the result of historical Site use. Petroleum-related VOCs were detected in soil vapor samples above laboratory detection limits across the Site, while CVOCs were detected in the eastern portion of the Site.

2.7.2 Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment (QHHEA) consists of characterizing the exposure setting (including the physical environment and potentially exposed human populations), identifying exposure pathways, and evaluating chemical fate and transport. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has the following five elements:

1. Receptor population;
2. Contaminant source;
3. Contaminant release and transport mechanism;
4. Point of exposure; and,
5. Route of exposure.

An exposure pathway is complete when all five elements of an exposure pathway are documented; a potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway is not documented but could reasonably occur. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway does not exist in the present and will not exist in the future.

2.7.2.1 Receptor Population

The receptor population includes the people who are or may be exposed to contaminants at a point of exposure. The identification of potential human receptors is based on the characteristics of the site, the surrounding land uses, and the probable future land uses. The Site is currently vacant and paved with an impervious surface (concrete and/or asphalt); therefore, receptors would currently only include construction/maintenance workers who may be employed to perform work on the property.

At this time, Site development plans are conceptual; however, it is anticipated that the Site will be redeveloped as a school with a partial cellar requiring excavation to approximately 25 ft bgs, which is consistent/compatible with surrounding property use and zoning. Exposed receptors under the future use scenario may comprise community members of the future building, indoor employees, outdoor employees (e.g., groundskeepers or maintenance staff), and construction workers who may be employed at or perform work on the property. Site visitors may also be considered receptors; however, their exposure would be similar to that of the indoor employees but at a lesser frequency and duration.

In addition, residents or employees in off-Site adjoining buildings have the potential to be exposed to vapors.

2.7.2.2 Contaminant Sources

The source of contamination is defined as either the source of contaminant release to the environment (such as a waste disposal area or point of discharge) or the impacted environmental medium (soil, air, and/or water) at the point of exposure. In general, Site COCs include VOCs, metals, and SVOCs in soil; VOCs, SVOCs, and metals in groundwater; and VOCs in soil vapor.

2.7.2.3 Contaminant Release and Transport

Contaminant release and transport mechanisms carry contaminants from the source to points where people may be exposed and are specific to the type of contaminant and site use. For VOCs present in soil vapor, the potential exists for exposure through pathways associated with soil vapor intrusion (SVI). This would include the indoor vapor intrusion pathway (also referred to as SVI).

Concerning the indoor air pathway, under the current and future use scenarios, SVI is a relevant transport mechanism. SVI would entail soil vapor migrating from under the building slab and potentially impacting the indoor air above the slab. Concerning skin contact, inhalation, and incidental ingestion of volatile organics present in soil and groundwater, the potential exists for exposure to VOCs for construction workers involved in subsurface activities where volatiles are present at elevated concentrations.

2.7.2.4 Exposure Points

The point of exposure is a location where actual or potential human contact with a contaminated medium may occur. Based on the exceedances of UUSCOs, RRSCOs, and PGWSCOs for VOCs, SVOCs, and metals in soil; exceedances of the AWQS for VOCs, SVOCs, and metals in groundwater; and VOCs detected in soil vapor, the point of exposure is defined as the entire Site.

2.7.2.5 Exposure Route and Mechanisms

The route of exposure is the manner in which a contaminant enters or contacts the human body (e.g., ingestion, inhalation, and dermal absorption). Based on the types of receptors and points of exposure identified above, potential routes of exposure are listed below:

Current Use Scenario: The Site is currently vacant, paved with an impervious surface (concrete and/or asphalt), and secured with locked doors on the construction fence. The risk of exposure to contaminated soil and contaminated groundwater is very low, other than during subsurface investigations or other activities that disturb the subsurface. Release and transport mechanisms include contaminated surface soil transported as dust, contaminated groundwater flow, and volatilization of contaminants from soil and/or groundwater into the vapor phase. Persons at risk of exposure, via the indicated exposure routes, are noted below:

- Site Visitors and Public Adjacent to the Site – inhalation.

- Construction/Utility/Site Investigation Worker – skin contact, inhalation, and incidental ingestion.

Construction/Remediation Scenario: In the continued absence of engineering controls (ECs) and institutional controls (ICs), there will be continued exposure pathways during construction/remediation, specifically related to surface soil. Planned construction/remedial activities include removal of the impervious Site cover, removal of USTs, excavation and off-Site disposal of soil, and dewatering of impacted groundwater (if required) to facilitate the construction of the foundation elements. Release and transport mechanisms include disturbed and exposed soil during excavation, contaminated soil transported as dust, contaminated groundwater flow (dewatering, if required), and volatilization of contaminants from soil and/or groundwater into the vapor phase. Persons at risk of exposure, via the indicated exposure routes, are noted below.

- Site Visitors and Public Adjacent to the Site – inhalation and incidental ingestion.
- Construction/Utility/Remediation Worker – skin contact, inhalation, and incidental ingestion.

Future Use Scenario: The anticipated future use as a school will include a cellar extending to approximately 25 ft bgs. In the absence of remedial removal of impacted material, remaining contaminant release and transport would include potential migration of contaminated groundwater and volatilization of contaminants from soil and/or groundwater into the vapor phase. Routes of future exposure include cracks in the foundation or slab, or emergency repairs to the foundation walls or slab. Persons at risk of exposure, via the indicated exposure routes, are noted below.

- Construction/Utility Worker – skin contact, inhalation, and incidental ingestion.
- Occupant/Employee/Visitor – inhalation.
- Public Adjacent to the Site – inhalation.

2.7.2.6 Exposure Assessment

Based on the above assessment, the potential exposure pathways for the current and future use conditions are listed below.

Current Use Scenario

Site COCs include VOCs (specifically petroleum-related VOCs), metals, and SVOCs (specifically PAHs and naphthalene) in soil; VOCs (specifically petroleum-related VOCs), SVOCs (specifically PAHs, naphthalene, and phenol), and metals in groundwater; and VOCs in soil vapor. Under current conditions, the likelihood of exposure to soil or groundwater is limited. The Site is currently in the process of an Interim Remedial Measure (IRM). The impervious surfaces have been removed, the groundwater cutoff wall has been installed, and excavation to approximately 24.5 ft bgs has been completed in the source area. During work hours, the Site entrance is monitored by a laborer and secured at night with a lock and video surveillance, with access only granted to personnel associated with the planned development. Potable water for Brooklyn will continue to be sourced from reservoirs in the Catskill and Delaware watersheds. Intrusive work on the Site will continue to be done in accordance with a Site-Specific Health and Safety Plan (HASP), the IRM Work Plan dated November 4, 2025, the Corrective Action Memorandum dated June 15, 2026, and the donning of personal protective equipment (PPE).

Construction/Remediation Scenario

The exposure element exists for each element during the construction/remediation phase. The overall risk will be minimized by the implementation of a Site-Specific Construction Health and Safety Plan (CHASP), localized monitoring of organic vapors, community air monitoring on the Site perimeter for particulates and VOCs, vapor and dust suppression techniques, installation of a stabilized entrance, cleaning truck tires and undercarriages, and use of appropriate PPE. Additionally, the Site will be remediated under this RAWP, which will include a Soil Materials Management Plan (S/MMP) that will highlight measures for PPE, covering of stockpiles, housekeeping, suppression techniques (particulates and vapor), and measures to prevent off-Site migration of contaminants. In addition, the Site will be secured and inaccessible to the public during remedial construction.

Future Use Scenario

Under the proposed future condition (after construction/remediation), residual contaminants may remain on the Site depending on the remedy achieved. The remaining contaminants would include those listed in the current conditions. If contaminants remain on the Site after construction/remediation, the route of exposure will be mitigated by proper installation of ECs, such as a composite Site cover system, and implementation of ICs, such as land use and groundwater use restrictions.

2.8 FISH & WILDLIFE REMEDIAL IMPACT ANALYSIS

NYSDEC DER-10 requires an on-Site and off-Site Fish and Wildlife Resource Impact Analysis if the stipulated criteria are met. The Site, which was developed by the 1920s and most recently operated as a gasoline filling station, is located in the Sunset Park neighborhood of Brooklyn, New York. The Site provides little or no wildlife habitat or food value and/or access to the detected subsurface contamination. No natural waterways are present on or directly adjacent to the Site. The proposed future use of the Site is as a school; as such, no unacceptable ecological risks are expected under the current and future use scenarios.

2.9 REMEDIAL ACTION OBJECTIVES

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for the Site.

2.9.1 Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of groundwater contamination.

2.9.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation exposure to contaminants volatizing from soil.

RAOs for Environmental Protection

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

2.9.3 Soil Vapor

RAOs for Public Health Protection:

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

3. Summary of Remedial Action

3.1 ALTERNATIVE I – TECHNICAL DESCRIPTION

Alternative I, a Track 4 remedy, will include the following tasks:

- Development and implementation of a CHASP and Community Air Monitoring Plan (CAMP) for the protection of on-Site workers, the community, residents, and the environment during remediation and construction activities.
- Design and construction of a support-of-excavation (SOE) system Sitewide and groundwater cutoff wall within the source area to facilitate the Track 4 remediation.
- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations.
- Removal of the existing asphalt and concrete cover and miscellaneous debris on the Site.
- Decommissioning of existing on-Site monitoring wells, as necessary, in accordance with NYSDEC Commissioner Policy (CP)-43.
- Excavation, stockpiling, off-Site transport, and disposal of approximately 6,000 cubic yards (cu yd) of contaminated fill material Site-wide that exceeds RRSCOs as defined by 6 NYCRR Part 375-6.8. This includes Site-wide excavation to a depth of 2 ft bgs to facilitate installation of the sub-slab depressurization system (SSDS), soil vapor extraction (SVE) system, and Site cover system, and further advancement of the excavation within the source area (former UST area) to a total depth of 25 ft bgs.
- If encountered, removal, decommissioning, and off-Site disposal of any USTs and/or associated appurtenances (e.g., fill lines, vent lines, and electrical conduits), not removed under the previous Interim RA, in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements.
- Implementation of a preliminary waste characterization to facilitate off-Site disposal of excavated soil/fill.
- Screening for indications of contamination (by visual means, odor, and monitoring with PIDs) of excavated material during intrusive Site work.
- Appropriate off-Site disposal of material removed from the Site in accordance with federal, state, and local rules and regulations for handling, transport, and disposal.
- Backfilling of excavated areas, as necessary for development, with certified-clean material (i.e., meeting RRSCOs), recycled concrete aggregate (RCA), or virgin, native crushed stone.
- Collection and analysis of documentation soil samples from the excavation base in accordance with DER-10, to document post-excavation conditions.
- Completion of an SVI Evaluation in accordance with DER-10 and NYSDOH Final Guidance on Soil Vapor Intrusion following remedial excavation activities and prior to occupancy.

- Construction of a composite cover system consisting of a minimum of 8 in. of subbase (virgin stone) overlain by a 6-in. concrete slab and installation of a waterproofing/vapor barrier (20-mil thick) to mitigate the potential for a soil vapor exposure pathway under the building.
- Installation, operation, and monitoring of an SVE system in the source area associated with the historical USTs at the Site to remediate source petroleum-related VOCs in the vadose zone.
- Installation, operation, and monitoring of an active SSDS to mitigate potential exposures related to soil vapor intrusion.
- Implementation of in-situ chemical oxidation (ISCO) by permanent injection points utilizing AP-pH to reduce elevated concentrations of VOCs, including petroleum-related VOCs, in groundwater.
- Installation of six permanent monitoring wells and commencement of quarterly groundwater monitoring in accordance with DER-10 for a minimum of one year following remedial activities to document groundwater quality beneath the Site.
- Installation of two permanent monitoring wells and one additional soil boring in the sidewalk along 4th Avenue and commencement of groundwater sampling once approval from MTA.
- Establishment of use restrictions, if necessary, including prohibitions on the use of groundwater from the Site and prohibitions on sensitive Site uses, such as farming or vegetable gardening in residual Site soil, to significantly reduce the potential for future exposure pathways.
- Establish a Site Management Plan (SMP) for ICs and ECs that includes an Institutional and Engineering Control Plan, a Monitoring Plan, and an Operations and Maintenance Plan.
- Recording of an Environmental Easement (EE) to ensure future owners of the Site continue to maintain ECs/ICs as required.

The Alternative I remediation extent is shown on **Figure 8 a**nd is based on data presented in the RIR and the proposed development plans. The requirements for each of the Alternative I tasks are described below.

On-Site Worker, Public Health, and Environmental Protection

A Site-Specific CHASP is appended to this RAWP (**Appendix C**) and will be implemented during excavation and foundation construction to protect on-Site workers from accidents and acute and chronic exposures to the identified contaminated media. Public health will be protected by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures included in the CAMP. The CAMP will include continuous perimeter monitoring of dust and organic vapor using Aeroqual® AQS1 Air Quality Monitors capable of recording data and calculating 15-minute averages. Field personnel will monitor Site perimeters for visible dust and odors.

Support of Excavation and Groundwater Cutoff Wall

To accommodate the removal of soil that exceeds Track 4 RRSCOs, an SOE system will be required. Excavations are anticipated to be completed above the water table throughout the Site to remove material that exceeds the protection to groundwater standard. Additional SOE to support the groundwater cutoff wall may be constructed, as necessary. The SOE installed within the source area will

be designed in a way to provide hydraulic isolation of groundwater directly impacted by the source material.

Waste Characterization

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, and analytical results will be reported. Data available for excavated material to be disposed of at a given facility will be submitted to the disposal facility with a suitable explanation prior to shipment and receipt.

Hazardous soil, if present, will be managed in accordance with applicable federal, state, and local regulations. As such, the handling, transport, and disposal of hazardous fill material is subject to USEPA and Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations. The excavated material would be segregated in the field and temporarily placed in stockpiles, or direct loaded, and transported by Part 364-permitted trucks to a facility permitted by the Resource Conservation and Recovery Act (RCRA) to accept hazardous waste.

Fill and Soil Removal

Petroleum-related VOCs, metals, and SVOCs were detected in contaminated fill material at concentrations that exceed the RRSCOs. To achieve Track 4, soil removal and disposal will extend from surface grade to 2 ft bgs to facilitate installation of the SSDS, SVE system, and Site cover system, and further advancement of the excavation within the source area (former UST area) to a total depth of 25 ft bgs. The estimated volume of material requiring removal and off-Site disposal for a Track 4 cleanup is approximately 6,000 cu yd. The soil will be screened for visual, olfactory, and instrumental evidence of environmental impacts.

UST Removal

If encountered, USTs and/or associated appurtenances (e.g., fill lines, vent lines, and electrical conduits) would be decommissioned in accordance with applicable NYSDEC tank closure requirements, including DER-10 Section 5.5, 6 NYCRR Part 613.9, and NYSDEC CP-51. USTs and/or associated appurtenances would be registered and administratively closed with the NYSDEC Petroleum Bulk Storage (PBS) unit. Petroleum-impacted soil would be excavated and disposed of off the Site at a permitted disposal facility in accordance with applicable regulations. Closure documentation, such as contractor affidavits, bills of lading for sludge disposal, and tank disposal receipts, would be provided as appendices in the Final Engineering Report (FER).

Excavation Backfill

As required for construction purposes in the hotspot excavation area, imported material will consist of clean fill that meets the RRSCOs or other acceptable fill material, such as virgin stone from a quarry or RCA. If RCA is imported to the Site, it will come from an NYSDEC-registered facility in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of RCA acquisition. RCA imported from compliant facilities will not require chemical testing unless required by NYSDEC under its terms for operation of the source facility. Imported RCA must be derived from recognizable and

uncontaminated concrete (less than 10 percent by weight passing through a No. 100 sieve). RCA is not acceptable for, and will not be used as, Site cover or drainage material. NYSDEC Request to Import/Reuse forms will be submitted, and a template is provided in **Appendix D.**

Documentation Soil Sampling

Per NYSDEC DER-10, documentation soil samples will be collected from the bottom of the proposed remedial excavation at a frequency of one sample per 900 sq ft to confirm Track 4 RRSCOs were achieved. An estimated 12 documentation soil samples, plus QA/QC samples, would be collected and analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, metals, PFAS, and 1,4-dioxane. The proposed documentation sample locations are included on **Figure 9.**

Composite Cover System

As part of the construction, a composite cover system would be installed, consisting of a minimum of 8 in. of subbase (virgin stone) overlain by a 6-in. concrete slab and installation of a waterproofing/vapor barrier (20-mil thick) to reduce the potential for a soil vapor exposure pathway. Under the Track 4 remedy, the composite cover system would function as an EC to be monitored under Site management.

Alkaline-Activated Persulfate Groundwater Treatment

AP-pH injections would be conducted throughout the Site up to 12 locations as shown in **Figure 11.** The injections would be conducted via permanent injection points/wells. Treatment would include the introduction of persulfate and sodium hydroxide solution.

A pilot test will be completed to determine the injection radius of influence (ROI); a pilot test work plan will be submitted to NYSDEC and NYSDOH under separate cover. The results of the pilot test will be provided to NYSDEC and NYSDOH prior to further implementation. Dosing calculations will factor in both groundwater and soil concentrations. Additionally, all injection and monitoring wells will be installed with robust covers and plugs for extra protection due to the intended future use and for future treatment.

After the pilot test, design of the groundwater treatment will be provided to NYSDEC and NYSDOH in a Remedial Design Technical Memorandum prior to implementation of the program in the field. Existing site data (e.g., groundwater and soil results, geologic conditions, and groundwater contours) will be used to characterize Site soil and groundwater conditions to determine the volume of amendment to be injected over the vertical and horizontal treatment zones, and a final, conservative ROI for each injection point to ensure adequate coverage of the proposed area.

The Remedial Design Technical Memorandum will include the proposed treatment interval, expected ROI, procedures for confirming the ROI during implementation of the injection program, and dosing calculations. At this time, the design anticipates an approximate 20 ft ROI and 12 injection points to be installed to treat groundwater and saturated soils where elevated concentrations of petroleum-related VOCs were detected in groundwater. The remedy would treat impacted groundwater and saturated soils and address the smear zone from 40 to 55 ft bgs through the activation of persulfate by the sodium hydroxide solution; the AP-pH works by breaking the bonds between the carbon and hydrogen in petroleum-based compounds.

Post-remediation groundwater sampling would be conducted to evaluate the effectiveness of the AP-Ph groundwater treatment. Specifications of the alkaline-activated persulfate are provided as **Appendix E.**

This will be further refined in the design, and the chemical demand for injections will take into consideration soil concentrations in addition to groundwater concentrations so the amendment continues subsurface treatment in the event of leaching from soil. A map of proposed post-remediation wells is provided on **Figure 12.**

Sub-Slab Depressurization System

An active SSDS would be installed, consisting of horizontal perforated piping installed in a permeable layer under the vapor barrier (20-mil Stego® or equivalent). The permeable layer will be 8-in. thick ¾-in. washed aggregate, or similar permeable material. The horizontal piping would consist of 3-in. diameter perforated Schedule 40 PVC pipes with leader pipes connecting to vertical risers. The vertical risers would be constructed of solid steel pipe risers and exit through the building slab with sealed penetrations. Each vertical riser would have a sample port assembly installed in the cellar. The exhaust point of the riser would be at least 12 in. above the highest roof surface and at least 10 ft away from any adjacent building or heating, ventilation, and air conditioning (HVAC) intakes. It will be complete with a check valve to prevent air flow into the SSDS, and a rain cap. At least six permanent sub-slab vapor monitoring points would be installed in the permeable layer to allow for the collection of sub-slab vapor samples. Pressure field extension testing will be performed no sooner than 30 days after system startup, prior to building occupancy and while HVAC systems are operating.

The preliminary location and layout of the active SSDS are shown in **Figure 13A**. Typical SSDS design details are shown in **Figure 13B**. The location and layout of the SSDS may be altered to accommodate structural, electrical, sewer, utility, and other aspects of building construction.

Soil Vapor Extraction System

An SVE system would be installed in the soil vapor source area located within the historical UST area of the Site. This would be designed to remediate source petroleum-related VOCs in the vadose zone. Vadose zone impacts identified above were observed primarily within the source area of the RI, extending to the groundwater table. Therefore, the vertical extent of potentially impacted soil vapor is from beneath the basement slab to the groundwater table (encountered between 35 and 45 ft bgs).

The top of cellar is anticipated to be installed to 20 ft bgs, with the interval between approximately 20 and 24 ft bgs to house the SSDS and foundation. Footers will also extend an additional 3 to 4 ft. The construction of the SVE wells will also require approximately 3 to 5 feet for sealing above the screen interval. Therefore, the anticipated feasible treatment zone will be approximately 27 to a maximum of 40 ft bgs. As the interval is less than 15 ft, nested SVE wells are not anticipated as required.

The design of the SVE will be provided to NYSDEC and NYSDOH in a Remedial Design Technical Memorandum prior to implementation in the field. At this time, the system assumes an ROI of 25 ft, which is based on the experience with highly similar geology. A conceptual layout of the SVE system is shown in **Figure 14.**

A pilot test will be performed to determine the ROI with sufficient vacuum to remove source material. Results of the pilot test will be provided to NYSDEC and NYSDOH prior to further implementation.

Vapor extraction point (VEP) locations will be installed from beneath the sealed interval installed below the cellar slab to a maximum of approximately 40 ft bgs. This approximately vertical treatment zone will not exceed 15 ft and will be treated with a single VEP screen. The VEPs would be 2-in. diameter, schedule 40 PVC, and have 0.010-in. slotted screens. Each VEP well pipe would enter the first-floor area through sealed penetrations in the concrete floor. The 2-in. diameter pipes would each have a dedicated sample port and valve to monitor individual VEPs separately. Additionally, monitoring points (MPs) will be installed at a depth of approximately 32 to 35 ft bgs, or the center of the screened interval in the treatment zone, and consist of 12-in. stainless steel screens, connected to the surface with Teflon tubing. Once installed, a field confirmation test would be conducted on several VEPs throughout the Site with a regenerative blower. Vacuum readings will be collected at the MPs at different applied vacuums and flow rates to determine the vacuum demand to achieve a 25 ft ROI.

After the field confirmation test, the above-grade components of the SVE system will be installed, which will connect each VEP to a 4-in. header pipe and will direct air flow to an air-water separator, blower, and vapor treatment system. The air-water separator would be used to separate condensate from the vapor stream. The extracted water would be pumped from the separator to a tank. Any collected water would be characterized and properly disposed of off Site. Off-gas from the SVE blower would be treated with two drums of granular activated carbon (GAC) in series.

GAC vessels will be operated in a lead/lag configuration. Carbon in the lead vessel will be changed out when sampling indicates breakthrough or saturation of the lead GAC vessel (outlet PID reading within 20 percent of inlet reading). When the primary vessel is spent, the GAC will be replaced, and the secondary vessel will be plumbed to the primary treatment location. GAC will either be regenerated or disposed of off-Site by the GAC vendor. Periodic samples may be collected from the GAC vessels to ensure proper classification and disposal. Additional details on the carbon changeout process and any sampling will be included in the SMP and the SVE system O&M manual, and after the design is finalized. The exhaust point of the SVE system shall be at least 12 in. above the highest roof surface and at least 10 ft away from any adjacent building or HVAC intakes. The operation of the SVE system will continue until influent concentrations show no remaining contamination or indicate asymptotic conditions and will not be discontinued without written approval from NYSDEC.

SVI Evaluation

An SVI Evaluation will be completed following remedial activities and prior to occupancy, which will include at least one confirmatory indoor air sample collected over a 24-hour time period.

Post-Remediation Groundwater Sampling

Following completion of the remediation, groundwater samples will be collected to document groundwater quality at the Site. An estimated eight groundwater samples representing upgradient (PRMW-05 and PRMW-06), source/treatment area (PRMW-01 and PRMW-02), downgradient (PRMW-04, MW-7, and MW-8), and cross gradient (PRMW-03) plus QA/QC samples will be collected and analyzed for VOCs quarterly for a minimum of one year post-remediation.

Site Management Plan and Environmental Easement

An EE would be recorded referencing ICs that are part of the selected remedy, which would be binding upon all subsequent owners and occupants of the property. The ICs would: 1) restrict the Site's use to restricted residential, commercial, and industrial uses, although land use is subject to local zoning laws; 2) restrict the use of groundwater as a source of potable or process water, unless it undergoes necessary water quality treatment as determined by the NYSDEC or NYSDOH; 3) require implementation of a NYSDEC-approved SMP; 4) require the completion and submission to the NYSDEC of a periodic certification of ICs and ECs in accordance with Part 375; and 5) include notice-of-use restrictions of the Site's soil. The ECs for the Site would include the SSDS, SVE system and composite cover system.

The SMP would identify all use restrictions, ECs, and long-term monitoring and maintenance requirements to ensure the ICs and/or ECs remain in place and are effective. The SMP will include, but may not be limited to:

1. An Excavation Work Plan which details the provisions for the management of future excavations in areas of remaining contamination;
2. Descriptions of the provisions of the EE, including any land use and/or groundwater use restrictions;
3. Provision for evaluation of the potential for SVI for any buildings developed on the Site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
4. Provision for the management and inspection of the identified ECs;
5. Maintaining Site access controls and NYSDEC notification;
6. The steps necessary for the periodic reviews and certification of the ICs and ECs;
7. A Monitoring Plan to assess the performance and effectiveness of the remedy. The Monitoring Plan will include, but may not be limited to:
    a. Visual monitoring of the building slab to rule out any vapor intrusion pathways in buildings developed on the Site, as may be required by the Institutional and Engineering Control Plan discussed above; and
8. A schedule of monitoring and frequency of submittals to NYSDEC.

3.2 ALTERNATIVE II – TECHNICAL DESCRIPTION

Alternative II, a Track 1 remedy, will include the following tasks:

- Development and implementation of a CHASP and CAMP for the protection of on-Site workers, the community, residents, and the environment during remediation and construction activities.
- Design and construction of an SOE system sitewide and groundwater cutoff wall within the source area to facilitate the Track 1 remediation.
- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations.
- Removal of the existing asphalt and concrete cover and miscellaneous debris on the Site.

- Decommissioning of existing on-Site monitoring wells, as necessary, in accordance with NYSDEC CP-43.
- Excavation, stockpiling, off-Site transport, and disposal of approximately 24,620 cu yd of contaminated material Site-wide that exceeds UUSCOs as defined by 6 NYCRR Part 375-6.8. This includes Sitewide excavation to a depth of 60 ft bgs.
- If encountered, removal, decommissioning, and off-Site disposal of any USTs and/or associated appurtenances (e.g., fill lines, vent lines, and electrical conduits), not removed under the previous Interim RA, in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements.
- Implementation of a preliminary waste characterization to facilitate off-Site disposal of excavated soil/fill.
- Screening for indications of contamination (by visual means, odor, and monitoring with PIDs) of excavated material during intrusive Site work.
- Dewatering, characterization, and treatment of petroleum-contaminated groundwater to facilitate deeper excavations prior to discharge to a NYSDEC-approved sewer/sanitary line (pending permits), or localized dewatering with containerization, classification, and disposal at an approved receiving facility.
- Appropriate off-Site disposal of material removed from the Site in accordance with federal, state, and local rules and regulations for handling, transport, and disposal.
- Backfilling of excavated areas with certified-clean material (i.e., meeting UUSCOs and PGWSCOs), RCA, or virgin, native crushed stone.
- Collection and analysis of confirmation soil samples from the excavation base in accordance with DER-10, to confirm that a Track 1 remedy was achieved.
- Completion of an SVI Evaluation in accordance with DER-10 and NYSDOH Final Guidance on Soil Vapor Intrusion following remedial excavation activities and prior to occupancy.
- Installation of three permanent monitoring wells and commencement of one round of groundwater sampling following remedial activities to document groundwater quality beneath the Site.
- Installation of two permanent monitoring wells and one additional soil boring in the sidewalk along 4th Avenue and commencement of groundwater sampling once approval from MTA is received.

The Alternative II remediation extent is shown on **Figure 9** and is based on data presented in the RIR, and the proposed development plans. The requirements for each of the Alternative II tasks are described below.

<u>On-Site Worker, Public Health, and Environmental Protection</u>

A Site-specific CHASP is appended to this RAWP (**Appendix C**) and will be implemented during excavation and foundation construction to protect on-Site workers from accidents and acute and chronic exposures to the identified contaminated media. Public health will be protected by

implementing and enforcing dust, odor, and organic vapor control and monitoring procedures included in the CAMP. The CAMP will include continuous perimeter monitoring of dust and organic vapor using Aeroqual® AQS1 Air Quality Monitors capable of recording data and calculating 15-minute averages. Field personnel will monitor Site perimeters for visible dust and odors.

Support of Excavation

To accommodate the removal of soil that exceeds Track 1 UUSCOs, an SOE system will be required. Excavations are anticipated to be completed into the water table throughout the Site. Additional SOE to support hotspot excavation areas throughout the Site may be constructed, as necessary.

Waste Characterization

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, and analytical results will be reported. Data available for excavated material to be disposed of at a given facility will be submitted to the disposal facility with a suitable explanation prior to shipment and receipt.

Hazardous soil, if present, will be managed in accordance with applicable federal, state, and local regulations. As such, the handling, transport, and disposal of hazardous fill material is subject to USEPA and OSHA HAZWOPER regulations. The excavated material would be segregated in the field and temporarily placed in stockpiles, or direct loaded, and transported by Part 364-permitted trucks to a facility permitted by the RCRA to accept hazardous waste.

Fill and Soil Removal

Petroleum-related VOCs and metals, and, in some areas, SVOCs, pesticides, and PCBs, were detected in contaminated fill material at concentrations that exceed the UUSCOs and PGWSCOs. To achieve Track 1, soil removal and disposal will extend from surface grade to 60 ft bgs. The estimated volume of material requiring removal and off-Site disposal for a Track 1 cleanup is approximately 24,620 cu yd. The soil will be screened for visual, olfactory, and instrumental evidence of environmental impacts.

UST Removal

If encountered, USTs and/or associated appurtenances (e.g., fill lines, vent lines, and electrical conduits) would be decommissioned in accordance with applicable NYSDEC tank closure requirements, including DER-10 Section 5.5, 6 NYCRR Part 613.9, and NYSDEC CP-51. USTs and/or associated appurtenances would be registered and administratively closed with the NYSDEC PBS unit. Petroleum-impacted soil would be excavated and disposed of off the Site at a permitted disposal facility in accordance with applicable regulations. Closure documentation, such as contractor affidavits, bills of lading for sludge disposal, and tank disposal receipts, would be provided as appendices in the FER.

Excavation Backfill

As required for construction purposes in the hotspot excavation area, imported material will consist of clean fill that meets the UUSCOs or other acceptable fill material, such as virgin stone from a quarry or

RCA. If RCA is imported to the Site, it will come from an NYSDEC-registered facility in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of RCA acquisition. RCA imported from compliant facilities will not require chemical testing unless required by NYSDEC under its terms for operation of the source facility. Imported RCA must be derived from recognizable and uncontaminated concrete (less than 10 percent by weight passing through a No. 100 sieve). RCA is not acceptable for, and will not be used as, Site cover or drainage material. NYSDEC Request to Import/Reuse forms will be submitted, and a template is provided in **Appendix D.**

Fluids Management

Liquids removed from the Site, including dewatering fluids, would be handled, transported, and disposed of in accordance with applicable local, state, and federal regulations. Fluids will not be recharged back to the land surface or subsurface. Discharge of water generated during remedial construction to surface waters (i.e., a local pond, stream, and/or river) is prohibited without a State Pollutant Discharge Elimination System (SPDES) permit.

Based on the depth to water, dewatering is anticipated to facilitate the excavation of material that exceeds the UUSCOs and the construction of foundation components. Dewatering fluids discharged into the New York City sewer system will be addressed through approval by the New York City Department of Environmental Protection (NYCDEP). No dewatering discharge will commence prior to NYCDEP approval.

Confirmation Soil Sampling

Per NYSDEC DER-10, confirmation soil samples will be collected from the bottom of the proposed remedial excavation at a frequency of one sample per 900 sq ft to confirm Track 1 UUSCOs were achieved. An estimated 12 confirmation soil samples, plus QA/QC samples, would be collected and analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides, metals, PFAS, and 1,4-dioxane. The proposed confirmation sample locations are included on **Figure 10.**

Post-Remediation Groundwater Sampling

Following completion of the remediation, one round of groundwater samples will be collected to document groundwater quality at the Site post remediation. An estimated five groundwater samples representing the source/treatment area (PRMW-01 and PRMW-02) and downgradient area (PRMW-04, MW-7, and MW-8), plus QA/QC samples, will be collected and analyzed for VOCs.

3.3 EVALUATION OF THE PREFERRED REMEDY

The following is an evaluation of the proposed remedy based on the BCP remedy evaluation criteria listed below. The first two criteria are considered “threshold criteria,” and the remaining criteria are “balancing criteria.” A remedial alternative must meet the threshold criteria to be considered and evaluated further under the balancing criteria.

- 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
- Green and Sustainable Remediation (GSR; including climate resiliency)
- Land use

3.3.1 Protection of Human Health and the Environment

Alternative I – The remedy would significantly reduce the potential for each of the identified pathways of exposure to on-Site contaminated media. Remediating the Site to Track 4 standards would result in the removal of a significant mass of Site soil that exceeds PGWSCOs. The SVE system would treat, over time, the remaining source material above the PGWSCOs. Construction of an SSDS and composite cover system, consisting of a proposed 8 in. of subbase (virgin stone) overlain by a 6-in. concrete slab and installation of a waterproofing/vapor barrier, to mitigate the SVI exposure pathway. With the cover system, this remedy is protective of human health and the environment.

Alternative II – The Track 1 remedy would significantly reduce the potential for each of the identified pathways of exposure to on-Site contaminated media. Remediating the Site to Track 1 standards would result in the elimination of Site soil that exceeds UUSCOs. USTs, if encountered, would be decommissioned, removed, and disposed off Site. Dewatering would be required for the remedial excavation as well as for the proposed development. The RAOs for public health and environmental protection would be met through the removal of contaminated media at the Site to meet UUSCOs and AWQS, which would significantly reduce the potential for exposure pathways via possible ingestion, inhalation, or dermal contact.

Since no ECs or ICs will be required for this remedy to maintain the Site in the future, this remedy is protective of human health and the environment.

Public health will be protected during remediation under both alternatives by implementing and enforcing dust, odor, and organic vapor control and monitoring procedures when needed.

3.3.2 Compliance with Standards, Criteria, and Guidance

Both alternatives will be in compliance with applicable SCGs listed in Section 4.1 by removing Site sources of contamination to achieve the RAOs. While implementing either remedy, the protection of public health and the environment will be maintained by enforcing a Site-Specific CHASP and CAMP. OSHA requirements for on-Site construction safety will be followed by Site contractors performing work.

3.3.3 Short-Term Effectiveness and Impacts

Alternative I – The most significant short-term adverse impacts and risks to the community will be the potential complications and risks involved with designing and constructing the SOE/groundwater cutoff

wall. Potential impositions on roadway and pedestrian traffic associated with construction may result from the remedial excavation to achieve Track 4 cleanup. Under Alternative I, the excavated soil and fill would require up to approximately 300 20-cu-yd truck trips for disposal. Implementing Alternative I would require approximately two months of effort (assuming normal work hours). Truck traffic will be routed on the most direct course using major thoroughfares where possible and appropriate (see Section 5.4.4 for a full discussion of truck routing), and flaggers will be used to protect pedestrians at Site entrances and exits. The effects of potential adverse impacts on the community, workers, and the environment will be minimized by implementing the respective control plans.

Alternative II will have similar impact types; however, it will result in significantly more short-term adverse impacts and risks to the community. The excavated soil and fill would require approximately 1,200 20-cu-yd truck trips. Waiting times associated with the analysis of confirmation sampling and resampling may delay construction, leaving soil exposed for a longer time, resulting in a potential increase in dust, odors, and/or organic vapor from the excavation and construction-related noise. The effects of these potential adverse impacts on the community, workers, and the environment will be minimized by implementing the respective control plans. Implementing the Alternative II concept would require approximately 10 to 12 months of effort (assuming normal work hours). Increased truck traffic in Alternative II, relative to Alternative I, would be necessary to haul out the additional soil that exceeds UUSCOs to achieve Track 1 standards.

Under both remedial alternatives, dust will be controlled by the on-Site application of water spray as needed. ECs, such as slowing the pace of work, applying foam and/or dust suppressant, and/or covering portions of the excavation, will be used to suppress odors/dust when required. Work will be modified or stopped according to the action levels defined in the CAMP. Therefore, short-term impacts are similar for both alternatives.

3.3.4 Long-Term Effectiveness and Performance

Alternative I will remove contaminated soil with a significant mass of source LNAPL from the Site and treat long-term vadose zone soil exceeding PGWSCOs through SVE, while Alternative II will remove contaminated soil from the Site exceeding UUSCOs and PGWSCOs, which will be documented in post-excavation documentation soil sampling.

3.3.5 Reduction of Toxicity, Mobility, or Volume of Contaminated Material

Both remedial alternatives would permanently and significantly reduce the toxicity, mobility, and volume of contamination through the removal of contaminated fill and buried solid waste through excavation and off-Site disposal.

3.3.6 Implementability

Alternative I – The technical feasibility of implementing the Alternative I remedy is feasible as excavation depths are able to be achieved without underpinning the neighbors and receiving access letters. This alternative will consist primarily of excavation with standard bucket excavators, installation of vapor mitigation measures, and in situ chemical injection on the Site. The availability of local contractors, personnel, and equipment suitable for working in a structurally challenging environment is high due to

the frequency of this type of remediation in the region. Additional coordination between trades may be required. This alternative is considered feasible.

Alternative II – Implementing a Track 1 remedy will be technically challenging because of SOE requirements associated with the protection of the neighboring buildings and streets. This remedy will consist primarily of excavation with standard bucket excavators to deeper depths that will eventually need to be lifted out of the excavation with a crane. The availability of local contractors, personnel, and equipment suitable for working in a structurally challenging environment is low due to the specialized construction for this type of remediation in the region. The excavation and SOE will likely require schedule extensions and/or additional costs based on discussions with the MTA. If deeper contamination above UUSCOs is encountered requiring unanticipated over-excavation, the cost will be significant as the earthwork may be required to stop until the support can be evaluated for potential failures due to the increase in depth. The overall costs of implementing Alternative II and the potential for additional costs compared to the benefit of achieving an unrestricted use remediation and avoiding long-term ECs and ICs make this alternative infeasible.

3.3.7 Cost-Effectiveness

Alternative I – Based on the assumptions detailed for Alternative I, the estimated remediation cost of a Track 4 cleanup is approximately $11,467,000. A detailed cost estimate for a Track 4 cleanup is provided in **Table 1.**

Alternative II – Based on the assumptions detailed for Alternative II, the estimated remediation cost of a Track 1 cleanup is approximately $23,500,000. Alternative II is not more cost-effective, even though Alternative I will require long-term operation, maintenance, and monitoring for Site management. A detailed cost estimate for a Track 4 cleanup is provided in **Table 2.**

3.3.8 Community Acceptance

Both remedial alternatives should be acceptable to the community because the potential exposure pathways to on-Site contamination will be addressed upon completion of the respective remedies, and the Site will be remediated to allow for a higher-level use. The selected remedy will be subject to a 45-day public comment period in accordance with the Citizen Participation Plan (CPP), included as **Appendix F.** Substantive public comments will be addressed before the remedy is approved.

3.3.9 Green and Sustainable Remediation

An environmental footprint analysis was conducted for both remedial alternatives and is provided in **Appendix G.** Alternative II, a Track 1 remedy, would export a greater volume (up to approximately 24,620 cu yd) of non-hazardous waste off the Site to a recycling facility than Alternative I, a Track 4 remedy, due to the expected requirement of greater excavation depths. Additionally, Alternative II will result in significantly more air emissions than Alternative I due to the expected additional excavation and off-Site disposal required. Only Alternative II will require dewatering as part of construction.

3.3.10 Land Use

The current, intended, and reasonably anticipated future residential land use of the Site and its surroundings are compatible with both remedial alternatives. The proposed development will include the construction of a community facility (school) with a cellar (to house the remedial equipment) extending approximately 25 ft bgs. Mid-rise residential and commercial-use buildings are present in the surrounding neighborhood.

3.4 SELECTION OF THE PREFERRED REMEDY

Both alternatives would be protective of human health and the environment and meet the remedy selection criteria. Alternative I is implementable, achieves the RA goals established for the redevelopment project, and is effective in the short-term. Alternative II effectively reduces contaminant mobility and toxicity and reduces the contaminant toxicity and volume; however, since it requires excavation to 60 ft bgs (well below the groundwater table), an extensive SOE system would have to be installed, and the remedy would require large-scale dewatering. The excavation depths for Alternative II are deeper and therefore have a significantly higher remedial cost compared to Alternative I.

Alternative I is preferred over Alternative II due to implementability and cost-effectiveness, as it also provides overall protection to human health and the environment at a lesser cost and with different remedial elements (i.e., composite cover system). Therefore, Alternative I is the recommended remedial alternative for this Site.

Figure 8 depicts the Alternative I (Track 4) soil cleanup plan. **Figure 9** depicts the Alternative II (Track 1) soil cleanup plan. The Alternative I and II remediation extents are based on data presented in the RIR (Haley & Aldrich of New York, 2026).

3.4.1 Zoning

The Site is currently zoned R7-A and C2-4 for Residential and commercial use. The Site is located in an urban area characterized by multi-story commercial and residential buildings.

3.4.2 Surrounding Property Uses

The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy. The construction of a new mixed-use commercial and residential building conforms to recent development patterns in the area and current zoning.

3.4.3 Environmental Justice Concerns

Per the “Potential Environmental Justice Areas in Kings County, New York,” the Site is in a potential Environmental Justice area, identified as Census Block Group 360470082001, with 18.05 percent of the population below the poverty level and a minority population of 80.86 percent. The NYSDEC’s Office of Environmental Justice acts as an advocate on behalf of these areas, which are disproportionately affected by environmental burdens. The proposed remedy will best reduce the environmental burden on the surrounding area.

3.4.4 Land Use Designations

There are no federal or state land use designations.

3.4.5 Population Growth Patterns

The population growth patterns and projections support the current and anticipated future land use.

3.4.6 Accessibility to Existing Infrastructure

The Site is accessible via existing infrastructure.

3.4.7 Proximity to Cultural Resources

The Site is not in close proximity to a registered landmark.

3.4.8 Proximity to Natural Resources

The Site is not located in close proximity to important federal, state, or local natural resources, including waterways, wildlife refuges, wetlands, and critical habitats of endangered or threatened species.

3.4.9 Off-Site Groundwater Impacts

Municipal water supply wells are not present in this area of New York City; therefore, groundwater from the Site does not affect municipal water supply wells or recharge areas.

3.4.10 Proximity to Floodplains

The Site is not located in a floodplain.

3.4.11 Geography and Geology of the Site

The Site geology is described in Section 2.6.

3.4.12 Current Institutional Controls

There are currently no ICs being implemented at the Site.

3.5 SUMMARY OF SELECTED REMEDIAL ACTIONS

The selected Track 4 (Alternative I) remedy will include the following:

- Development and implementation of a CHASP and CAMP for the protection of on-Site workers, the community, residents, and the environment during remediation and construction activities.
- Design and construction of an SOE system Sitewide and groundwater cutoff wall within the source area to facilitate the Track 4 remediation.

- Implementation of soil erosion, pollution, and sediment control measures in compliance with applicable laws and regulations.
- Removal of the existing asphalt and concrete cover and miscellaneous debris on the Site.
- Decommissioning of existing on-Site monitoring wells, as necessary, in accordance with NYSDEC CP-43.
- Excavation, stockpiling, off-Site transport, and disposal of approximately 6,000 cu yd of contaminated fill material Sitewide that exceeds RRSCOs as defined by 6 NYCRR Part 375-6.8. This includes Site-wide excavation to a depth of 2 ft bgs to facilitate installation of the SSDS, SVE system, and Site cover system, and further advancement of the excavation within the source area (former UST area) to a total depth of 25 ft bgs.
- If encountered, removal, decommissioning, and off-Site disposal of any USTs and/or associated appurtenances (e.g., fill lines, vent lines, and electrical conduits), not removed under the previous Interim RA, in accordance with DER-10, 6 NYCRR Part 613.9, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements.
- Implementation of a preliminary waste characterization to facilitate off-Site disposal of excavated soil/fill.
- Screening for indications of contamination (by visual means, odor, and monitoring with PIDs) of excavated material during intrusive Site work.
- Appropriate off-Site disposal of material removed from the Site in accordance with federal, state, and local rules and regulations for handling, transport, and disposal.
- Backfilling of excavated areas, as necessary for development, with certified-clean material (i.e., meeting RRSCOs), RCA, or virgin, native crushed stone.
- Collection and analysis of documentation soil samples from the excavation base in accordance with DER-10, to document post-excavation conditions to confirm a Track 4 remedy was achieved.
- Completion of an SVI Evaluation in accordance with DER-10 and NYSDOH Final Guidance on Soil Vapor Intrusion following remedial excavation activities and prior to occupancy.
- Installation, operation, and monitoring of an SVE system soil vapor source area located within the historical UST area of the Site to remediate source petroleum-related VOCs in the vadose zone.
- Installation, operation, and monitoring of an active SSDS to mitigate potential exposures related to soil vapor intrusion.
- Implementation of ISCO by permanent injection points utilizing AP-pH to reduce elevated concentration of VOCs, including petroleum-related VOCs and chlorinated VOCs in groundwater.
- Installation of six permanent monitoring wells and commencement of quarterly groundwater monitoring in accordance with DER-10 for a minimum of one year following remedial activities to document groundwater quality beneath the Site.

- Installation of two permanent monitoring wells and one additional soil boring in the sidewalk along 4th Avenue and commencement of groundwater sampling once approval from MTA is received.
- Establishment of use restrictions, if necessary, including prohibitions on the use of groundwater from the Site and prohibitions on sensitive Site uses, such as farming or vegetable gardening in residual Site soil, to significantly reduce the potential for future exposure pathways.
- Establish an SMP for ICs and ECs that includes an Institutional and Engineering Control Plan, a Monitoring Plan, and an Operations and Maintenance Plan.
- Recording of an EE to ensure future owners of the Site continue to maintain ECs/ICs as required.

4. Remedial Action Program

4.1 GOVERNING DOCUMENTS

The primary documents governing the remedial action are summarized in this section.

4.1.1 Standards, Criteria, and Guidance

- 29 Code of Federal Regulations (CFR) Part 1910.120 – Hazardous Waste Operations and Emergency Response
- 6 NYCRR Part 364 – Waste Transporter Permits
- 6 NYCRR Part 371 – Identification and Listing of Hazardous Wastes
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities
- 6 NYCRR Subpart 373-4 – Facility Standards for the Collection of Household Hazardous Waste and Hazardous Waste from Conditionally Exempt Small Quantity Generators
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste
- 6 NYCRR Part 375 – Environmental Remediation Programs
- 6 NYCRR Part 376 – Land Disposal Restrictions
- 6 NYCRR Part 750 –SPDES Permits
- CFR Title 29 Part 1926 - Safety and Health Regulations for Construction
- CP-43 – Commissioner Policy on Groundwater Monitoring Well Decommissioning (December 2009)
- NYSDEC Spill Response Guidance Manual
- NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances Under NYSDEC's Part 375 Remedial Programs (April 2023)
- CP-51 – Soil Cleanup Guidance (2010)
- DER-10 – Technical Guidance for Site Investigation and Remediation (May 3, 2010)
- DER-23 – Citizen Participation Handbook for Remedial Programs (March 2010)
- DER-31 – Green Remediation (2011)
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006)
- TOGS 1.1.1 – AWQS and GVs and Groundwater Effluent Limitations

- Screening and Assessment of Contaminated Sediment (Division of Fish, Wildlife and Marine Resources, June 2014)

4.1.2 Site-Specific Construction Health & Safety Plan

A site-specific CHASP has been prepared (**Appendix C).** The CHASP will apply to remedial and construction-related work on the Site. The CHASP provides a mechanism for establishing on-Site safe working conditions, safety organization, procedures, and PPE requirements during the implementation of the remedy. The CHASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65, respectively). The CHASP includes, but is not limited to, the following components:

- Organization and identification of key personnel;
- Training requirements;
- Medical surveillance requirements;
- List of Site hazards;
- Excavation safety;
- Drill rig safety;
- Work zone descriptions and monitoring procedures;
- Personal safety equipment and PPE requirements;
- Decontamination requirements;
- Standard operating procedures;
- Contingency plan;
- CAMP; and
- Safety data sheets (SDS).

The Volunteer and associated parties preparing the remedial documents submitted to New York State and those performing the construction work are responsible for the preparation of a CHASP and the performance of the work according to the CHASP and applicable laws. The CHASP and requirements defined in this RAWP pertain to remedial and ground-intrusive work performed at the Site until the issuance of a Certificate of Completion. The Haley & Aldrich of New York Safety Coordinator will be Brian Ferguson, a resume for whom is included in **Appendix H**. If required, confined space entry will comply with OSHA requirements to address the potential risk posed by combustible and toxic gases.

4.1.3 Quality Assurance Project Plan

A Quality Assurance Project Plan (QAPP) has been prepared that describes the QC components that will ensure that the proposed remedy accomplishes the remedial goals and RAOs and is completed in accordance with the design specifications. The QAPP is provided as **Appendix I** and includes:

- Responsibilities of key personnel and their organizations for the proposed remedy.

- Qualifications of the QA Officer.
- Sampling requirements, including methodologies, quantity, volume, locations, frequency, and acceptance and rejection criteria.
- Description of the reporting requirements for QA activities, including weekly QA review reports.

4.1.4 Construction Quality Assurance Plan

A Construction Quality Assurance Plan (CQAP) has been prepared that describes the QC components that will ensure that the proposed remedy accomplishes the remedial goals and RAOs and is completed in accordance with the design specifications. Because the remedy will be accomplished concurrently with building construction, the contractor and Construction Manager will have the primary responsibility to provide construction quality. A list of engineering personnel involved in the implementation of the CQAP and procedures that will be carried out by the remedial engineering team are listed in Section 4.3.1. Project personnel resumes are provided in **Appendix H.**

4.1.5 Soil/Materials Management Plan

An S/MMP has been prepared that includes detailed plans for managing soils/materials that are disturbed at the Site, including excavation, handling, storage, transport, and disposal. The S/MMP also includes controls that will be applied to these efforts to facilitate effective, nuisance-free performance in compliance with applicable federal, state, and local laws and regulations (see Section 5.4).

4.1.6 Stormwater Pollution Prevention Plan

Erosion and sediment controls will be implemented as necessary in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. Best management practices (BMPs) for soil erosion and sediment control will be selected to minimize erosion and sedimentation off the Site from the outset of remediation to the completion of development. Stormwater pollution prevention will be implemented as described below in Section 5.4.9. A Stormwater Pollution Prevention Plan (SWPPP) is not necessary because the project will disturb less than 20,000 sq ft, and stormwater discharge will be to a combined sewer in accordance with the New York City generic SPDES permit.

4.1.7 Community Air Monitoring Plan

Details of the CAMP are discussed in section 5.4.11.

4.1.8 Contractors Site Operations Plan

The Remedial Engineer (RE) will review plans and submittals for this remedial project, contractor and subcontractor document submittals, and will confirm that plans and submittals are in compliance with this RAWP. The RE is responsible for ensuring that all later document submittals for this remedial project, including contractor and subcontractor document submittals, are in compliance with this RAWP. Remedial documents, including contractor and subcontractor document submittals, will be submitted to

the NYSDEC and NYSDOH in a timely manner and prior to the start of work associated with the remedial document.

4.1.9 Citizen Participation Plan

Document repositories were established at the following locations and contain the applicable project documents:

1. Brooklyn Community Board 7
   Attn: Jeremy Laufer
   4201 4th Avenue
   Brooklyn, New York 10035
   Phone: 718.854.0003
   Email: Bk07@cb.nyc.gov

2. Sunset Park Public Library
   Attn: Roxana Benevides
   5108 4th Avenue
   Brooklyn, New York 11220
   Phone: 718.230.2255
   Email: rbenavides@bklynlibrary.org
   Hours: Monday to Thursday – 10 a.m. to 7 p.m.
   Friday to Saturday – 10 a.m. to 5 p.m.
   Sunday – Closed

3. NYSDEC Region 2
   1 Hunter's Point Plaza
   47-20 21st Street
   Long Island City, New York 11101-5401
   Hours: Monday to Friday - 8:30 a.m. to 4:45 p.m.
   Call for appointment

In addition, an electronic repository can be accessed via DECInfo Locator at the following link: https://extapps.dec.ny.gov/data/DecDocs/C224412/.

A certification of mailing will be sent by the Volunteer to the NYSDEC Case 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 (date to be determined) and that it contained all of applicable project documents.

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

4.2 GREEN AND SUSTAINABLE REMEDIATION AND CLIMATE RESILIENCY

The work completed as part of this work plan will comply with all NYSDEC guidance documents, including DER-31: Green Remediation (NYSDEC, 2011). To ensure compliance with DER-31, the work will be completed using the best practices and techniques described below. Specific reporting methods relative to DER-31 are further described below.

4.2.1 Best Practices and Techniques

DER-31 provides examples of best practices and techniques that could be applied during all phases of remediation (Attachment 1 of the DER-31 policy). In addition, the NYSDEC expects that the techniques identified below will be implemented at sites unless a site-specific evaluation demonstrates impracticability or favors an alternative green approach:

Practice/Technique	Potential Benefits[1]	Applicable to this Work Plan
Use renewable energy where possible or purchase Renewable Energy Credits	Reduce/supplement purchased energy use	
Use of remediation technologies with an intermittent energy supply (i.e., energy use during peak energy generation only)	Reduce energy use	
Incorporate green building design	Reduce future use impacts	X
Reuse existing buildings and infrastructure to reduce waste	Reduce waste and material use	
Reuse and recycle construction and demolition debris and other materials (i.e., grind waste wood and other organics for on-site use)	Reduce waste and material use	
Design cover systems to be usable (i.e., habitat or recreation)	Reduce construction impacts of future development	X
Reduce vehicle idling	Reduce air emissions and fuel use	X
Use of Low-Sulfur Diesel Fuel (LSDF) or alternate fuels (i.e., biodiesel or E85) when possible	Reduce air emissions	X
Sequence work to minimize double-handling of materials	Reduce construction impacts	X
Use energy-efficient systems and office equipment in the job trailer	Reduce energy use	X
Encourage development and evaluation of low-energy alternatives, such as source removal with monitored natural attenuation (MNA) and remedies that can be driven to MNA of monitoring only	Reduce energy use	X
Encourage the use of remediation technologies that permanently destroy contamination to reduce impacts	Reduce energy use	X

Practice/Technique	Potential Benefits[1]	Applicable to this Work Plan
associated with long-term Site management		
Address sources more aggressively to reduce long-term operation and maintenance of treatment or containment systems	Reduce energy use	X
Design for efficiency	Reduce energy use	X
Design adaptable systems	Reduce energy use	X
Integrate remedial design with contemplated reuse of the Site	Reduce future use impacts	X
[1]*Potential benefits listed are not comprehensive and will vary depending upon the site and implementation of the practice or technique.*		

In order to comply with the requirements of DER-31, the following actions will be taken:

1. All vehicles and fuel-consuming equipment on the Site will be shut off if not in use for more than three minutes;
2. If necessary, any soil cover placed on the Site will meet 6 NYCRR Part 375 residential use soil standards and will allow future use of the Site in a residential setting;
3. Work will be sequenced, to the extent practicable, to allow the direct loading of waste containers for off-Site disposal;
4. To the extent practicable, energy-efficient systems and office equipment will be utilized within the Site trailers;
5. All vehicles and equipment that consume diesel fuel will be required to use ultra-LSDF;
6. Remedial technologies will be designed and implemented to address source material and reduce long-term maintenance and monitoring;
7. Remedial systems will be designed to be energy efficient and adaptable to use less energy as the Site cleans up (i.e., portions of the SVE system can be turned off once source material is removed); and,
8. Remedial design will accommodate future land use.

4.2.2 Reporting

All green and sustainable practices and techniques employed will be discussed in the FER.

4.3 GENERAL REMEDIAL CONSTRUCTION INFORMATION

4.3.1 Project Organization

A project team for the Site was created based on qualifications and experience with personnel suited for the successful completion of the project.

The following project personnel are anticipated for oversight of the RAWP implementation. Project personnel resumes are provided in **Appendix H.**

NYSDEC Case Manager	Shawn Roberts
NYSDOH Case Manager	Christopher Budd
RE	Suzanne M. Bell, P.E.
Principal/Qualified Environmental Professional (QEP)	Mari C. Conlon, P.G.
Project Manager	Nicole Mooney
Haley & Aldrich of New York Health & Safety Director	Brian Fitzpatrick, CHMM
Health & Safety Officer	Brian Ferguson
Field Team Leader/QA Officer	Calvin Jackson

Haley & Aldrich of New York personnel, under the direct supervision of the QEP and the RE, will be on the Site during the implementation of the RAWP to monitor particulates and organic vapor in accordance with the CAMP. CAMP results that exceed specified action levels will be reported to the NYSDEC and NYSDOH.

Haley & Aldrich of New York personnel will meet with the Construction Superintendent daily to discuss the plans for that day and schedule upcoming activities. Field personnel will document remedial activities. Field activities will be forwarded to the Field Team Leader and Project Manager daily and to the QEP and the RE on a weekly basis. Daily reports will also be submitted to the NYSDEC and NYSDOH Case Managers by noon the following business day.

Field personnel will screen excavations with a PID during ground-intrusive work. PID readings, including specifically elevated readings, will be recorded in the project field book (or on separate logs) and reported to the NYSDEC and NYSDOH. Field personnel under the direct supervision of the RE and QEP will collect endpoint samples from the base of the excavation in accordance with this RAWP.

Field observations and 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, and/or photographs. A photo log will be kept to document construction activities during remediation.

The Field Team Leader will maintain original field paperwork during performance of the remedy. Remedial activities will be documented in the monthly BCP progress reports. The Project Manager will maintain the field paperwork after completion and will maintain submittal document files.

4.3.2 Remedial Engineer

The RE for this project will be Suzanne M. Bell. The RE is a registered Professional Engineer licensed by the state of New York. The RE will have primary direct responsibility for the implementation of the remedial program at the Site. The RE will certify in the FER that the remedial activities were observed by qualified environmental professionals under their supervision and that the remediation requirements set forth in this RAWP and other relevant provisions of Environmental Conservation Law (ECL) 27-1419 have been achieved in substantial conformance with the RAWP.

Under the direction of the RE, the work of other contractors and subcontractors involved in aspects of the remedial construction will be documented, including soil excavation, stockpiling, sample collection,

air monitoring, emergency spill response services, import of backfill, and management of waste transport and disposal. The RE will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The RE will review the pre-remedial plans submitted by contractors and subcontractors for substantial conformance with this RAWP and will provide a certification in the FER. The RE will provide the certifications listed below in Section 9.1.

4.3.3 Remedial Action Construction Schedule

The RA construction schedule is discussed below in Section 10 and included in **Appendix J.** The NYSDEC will be promptly notified of proposed changes, delays, and/or deviations to the schedule.

4.3.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings (NYCDOB) construction code requirements or according to specific variances issued by that agency. The NYSDEC will be notified by the Volunteer of any variances issued by the NYCDOB. The NYSDEC reserves the right to deny alternate remedial construction hours.

4.3.5 Site Security

Site access will be controlled by gate entrances to the property. The Site perimeter will be secured with gated and signed plywood fencing with restricted points of entry in accordance with the NYCDOB and New York City Department of Transportation (NYCDOT) permits and requirements. The purpose of the fencing is to limit Site access to authorized personnel, protect pedestrians from Site activities, and maintain Site security.

4.3.6 Traffic Control

Site traffic will be controlled through designated points of access along 4th Avenue and 40th Street. Access points will be continuously monitored, and if necessary, a flagging system will be used to protect workers, pedestrians, and authorized guests. Traffic will also be required to adhere to applicable local, state, and federal laws.

4.3.7 Contingency Plan

Contingency plans, as described below, have been developed to effectively deal with the potential unexpected discovery of additional contaminated media or USTs.

4.3.8 Discovery of Additional Contaminated Soil

During remediation and construction, the soil will be continuously monitored by the RE's field representatives via visual, olfactory, and instrumental field screening techniques to identify additional soil that may not be suitable for disposal at the NYSDEC-approved disposal facility. If such soil is identified, the suspected impacts will be confirmed by collecting and analyzing samples in accordance with the NYSDEC-approved facility's requirements. If the previously approved facility is not permitted to

receive the impacted soil, the soil will be excavated and disposed of off Site at a permitted facility that can receive the material.

Identification of unknown or unexpected contaminated media identified by screening during ground-intrusive Site work will be promptly communicated to the NYSDEC Case Manager. These findings will be detailed in the monthly report.

4.3.9 UST Discovery

Previous investigations did identify the presence of USTs on the Site. Should expected or potentially unexpected USTs be discovered during excavation, USTs will be decommissioned as per the 6 NYCRR Parts 612.2 and 613.9 and DER-10 Section 5.5. After removal of the tank and residual contents, confirmatory post-excavation soil samples will be collected as outlined in DER-10 if deemed necessary by the NYSDEC and/or the RE.

Post-excavation soil samples are not expected where the proposed excavation would extend below the UST unless visual, olfactory, or instrumental field screening techniques indicate the potential for contamination. If petroleum-impacted soils are encountered, they will be segregated, characterized, and disposed of at an appropriate off-Site facility. Closure documentation, including affidavits, bills of lading, and tank disposal receipts, will be included in the FER. If necessary, the NYSDEC PBS registration will be updated.

In the event USTs are encountered during ground-intrusive activities, the NYSDEC Case Manager will be promptly notified, and pertinent information will be included in the monthly report.

4.3.10 Worker Training and Monitoring

Worker training and monitoring will be conducted in accordance with the Site-specific CHASP.

4.3.11 Agency Approvals

Permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction.

4.3.12 Pre-Construction Meeting with NYSDEC

Prior to the start of remedial construction, a meeting will be held among the NYSDEC, RE, the Volunteer, the Construction Manager, and the Remediation Contractor to discuss project roles, responsibilities, and expectations associated with this RAWP.

4.3.13 Emergency Contact Information

An emergency contact sheet that states the specific project contacts (with names and phone numbers) for use by NYSDEC and NYSDOH in the case of an emergency is included in the CHASP.

4.3.14 Remedial Action Costs

Detailed summaries of the total estimated costs of the Track 4 and Track 1 remedies are included in **Tables 1** and **2**, respectively.

4.4 SITE PREPARATION

4.4.1 Mobilization

Prior to commencing remedial construction, the Remediation Contractor will mobilize to the Site and prepare for remedial activities. Mobilization and Site preparation activities may include the following:

- Identifying the location of aboveground and underground utilities (e.g., power, gas, water, sewer, and telephone), equipment, and structures as necessary to implement remediation;
- Mobilizing necessary remediation personnel, equipment, and materials to the Site;
- Constructing one or more stabilized construction entrance(s) consisting of non-hazardous material at or near the Site exit, which takes into consideration the Site setting and Site perimeter;
- Constructing an equipment decontamination pad for trucks, equipment, and personnel that come into contact with impacted materials during remediation; and/or,
- Mark-out excavation hotspot areas (if identified during the RI or preliminary waste characterization sampling event).

4.4.2 Monitoring Well Decommissioning

Monitoring wells will be decommissioned in accordance with NYSDEC CP-43 by an experienced driller with oversight from Haley & Aldrich of New York. Decommissioning documentation will be provided in the FER.

4.4.3 Erosion and Sedimentation Controls

Since the planned earthwork activities will be below the adjacent sidewalk grade, full-time erosion and sedimentation measures are not anticipated. BMPs for soil erosion will be implemented to minimize erosion and sedimentation off the Site.

4.4.4 Temporary Stabilized Construction Entrance(s)

Temporary stabilized construction entrances will be installed at the existing curb cuts along 4th Avenue, and/or 40th Street. The entrances will be covered with NYSDEC-approved gravel or RCA and graded so that runoff water will be directed on the Site. Vehicles exiting construction areas will be cleaned using clean water or dry brushing, as needed, to remove Site soil from the tires and undercarriages. The contractor will protect and maintain the existing sidewalks and roadways at both Site access points.

4.4.5 Utility Marker and Easements Layout

4 Ave Property LLC and its contractors are solely responsible for the identification of utilities and/or easements that might be affected by work under this RAWP and implementation of the required, appropriate, or necessary health and safety measures during the performance of the work under this RAWP. 4 Ave Property LLC and its contractors are solely responsible for the safe execution of the work performed under this RAWP. 4 Ave Property LLC and its contractors must obtain the necessary local, state, and/or federal permits or approvals that may be required to perform the work detailed in this RAWP. Approval of this RAWP by the NYSDEC does not constitute satisfaction of these requirements.

4.4.6 Excavation Support and Groundwater Cutoff Wall

Appropriate management of the structural stability of on-Site or off-Site structures during Site activities is the sole responsibility of 4 Ave Property LLC and its contractors. 4 Ave Property LLC and its contractors are solely responsible for the safe execution of the work performed under this RAWP. 4 Ave Property LLC and its contractors must obtain the necessary local, state, and/or federal permits or approvals that may be required to perform the work detailed in this RAWP. Additionally, 4 Ave Property LLC and its contractors are solely responsible for the implementation of the required, appropriate, or necessary health and safety measures during the performance of work conducted under this RAWP.

4.4.7 Equipment and Material Staging

The contractor will notify the RE and 4 Ave Property LLC in writing, with receipt confirmed, at least 30 calendar days in advance of pending Site work mobilization. During mobilization, construction equipment will be delivered to the Site, temporary facilities constructed, and temporary utilities installed. The contractor will place and maintain temporary toilet facilities within the work areas for usage by Site personnel.

4.4.8 Truck-Inspection Station

An outbound-truck inspection station will be set up at or near the Site exit. Before exiting the Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. If observed, soil and debris will be removed. Brooms, shovels, and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary. The contractor is responsible for collecting soil that is tracked immediately off the Site and returning the soil to the Site.

4.4.9 Site Fencing

The Site will continue to be secured with a gated fence, with appropriate signage added and maintained by the contractor. The fence will limit access to authorized personnel and protect pedestrians from Site activities.

4.4.10 Demobilization

After remediation and construction are completed, the contractor will be responsible for demobilizing equipment and materials not designated for off-Site disposal. The RE's representative will document that the contractor performs follow-up coordination and maintenance for the following activities:

- Removal of sediment and erosion control measures and disposal of materials in accordance with applicable rules and regulations;
- Equipment decontamination;
- Refuse disposal; and
- Removal of remaining contaminated material or waste.

4.5 REPORTING

Periodic reports and an FER will be required to document the remedial action. The RE, Suzanne M. Bell, will be responsible for certifying the FER and is licensed to practice engineering in the state of New York. Should Ms. Bell become unable to fulfill this responsibility, another suitably qualified New York State Professional Engineer will take her place. Field reports will be included as appendices to the FER. In addition to the periodic reports and the FER, copies of the relevant contractor documents will be submitted to the NYSDEC.

4.5.1 Daily Reports

Reports providing a summary of activities for each day of active remedial work will be emailed to the NYSDEC and NYSDOH Case Managers on a daily basis by noon the following business day. These reports will include:

- The project number, statement of activities, an update of the progress made, locations of excavation, and other remedial work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- Summation of any 15-minute exceedance with potential sources of the exceedance(s) and documentation of corrective actions within the daily report;
- Summary of hourly community roving PID readings will be placed in a log with photo documentation of the PID readings;
- Photos of all truck covers will be included in the daily reports;
- A summary of citizen complaints, including relevant details (i.e., name, phone number, basis of complaint, actions taken);
- A summary of CAMP results, noting exceedances; and
- Photographs of notable Site conditions and activities.

Reports are not intended to be the primary mode of communication for notifying NYSDEC of emergencies, requests for changes to the RAWP, or time-critical information. However, these

conditions, if they occur, will be included in the daily reports. Emergency conditions and changes to the RAWP will be directly communicated to the NYSDEC Case Manager. As outlined in the Corrective Action Memorandum, the following communication will be performed in real time:

- Immediate reporting directly via email to the NYSDEC Case Manager (Shawn Roberts) and NYSDOH Case Manager (Christopher Budd) of any 15-minute exceedance with potential sources of the exceedance and documentation of corrective actions; and
- Reporting via email to the NYSDEC and NYSDOH Case Managers summarizing any daily exceedances and associated corrective actions, including a discussion of why the exceedances may have occurred.

4.5.2 Weekly Reports

Weekly reports will consist of a summary of remedial work performed at the Site throughout the week and will include:

- Investigative or remedial actions related to the Site during the reporting period;
- Actions related to the Site anticipated for the next reporting period; and
- Inclusion of all the daily reports generated within the specified weekly timeline as an attachment to the report.

4.5.3 Monthly Reports

Monthly reports will consist of a summary of remedial work performed at the Site throughout the month and will include:

- Investigative or remedial actions relative to the Site during the reporting period;
- Actions relative to the Site anticipated for the next reporting period;
- Approved changes of work scope or schedule, if applicable;
- Results of sampling or testing;
- Deliverables submitted during the reporting period;
- The approximate percentage of completion of the project at the Site;
- Inclusion of all of weekly reports (which include the daily reports) generated within the specified monthly timeline as an attachment to the report
- Unresolved delays encountered that may affect the schedule; and
- CPP activities during this reporting period and activities anticipated in support of the CPP for the next reporting period.

4.5.4 Photographs

Photographs of the remedial activities will be taken and included in the daily reports and FER with descriptions of the representative photographs.

4.5.5 Complaint Management Plan

Complaints from the public regarding nuisance or other Site conditions will be addressed by notifying the NYSDEC of the complaint and investigating the cause/source of the issue. Records will be kept regarding the date and time of the complaint, the nature of the complaint, the type of communication (i.e., telephone, email, letter, etc.), and the name and contact information of the complaint provider. Corrective measures will then be formulated and put into place to address the complaint as soon as possible. The resolution will be documented and submitted to the NYSDEC. A representative of the Volunteer will reply within two weeks of receipt of the complaint to the complaint provider to ensure resolution.

Fact sheets will be posted at the entrance of the Site with a list of the remedial companies' Site contacts in English, Spanish, and Chinese.

4.5.6 Deviations from the RAWP

Deviations from the RAWP will be communicated to and coordinated with the NYSDEC in advance. Notification will be provided to the NYSDEC by telephone and email for conditions requiring immediate action (e.g., conditions judged to be a danger to the surrounding community). Based on the significance of the deviation, an addendum to this RAWP may be necessary and will include:

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

5. Remedial Action: Material Removal from Site

As part of the preferred Alternative I remedy, excavation, stockpiling, off-Site transport, and disposal of up to approximately 6,000 cu yd of contaminated fill/native material that exceed RRSCOs as defined by 6 NYCRR Part 375-6.8 will be required. Excavation of material that exceeds RRSCOs is estimated to range from approximately 2 ft bgs Sitewide, with a source excavation to 25 ft bgs. The soil will be screened for visual, olfactory, and instrumental evidence of environmental impacts.

5.1 SOIL CLEANUP OBJECTIVES

Soil Cleanup Objectives (SCOs) for the Site will be the Track 4 RRSCO concentrations listed in **Table 3**. Soil and materials management will be conducted in accordance with the S/MMP as described below. Soil sample locations and results that exceed the RRSCOs are shown on **Figure 5.** UST closures, as applicable, will, at a minimum, conform to the criteria defined in DER-10.

5.2 REMEDIAL PERFORMANCE EVALUATION (DOCUMENTATION SAMPLING)

5.2.1 Soil Sampling Frequency

One endpoint soil sample will be collected for every 900 sq ft of excavation base Sitewide in accordance with NYSDEC DER-10, or at an alternative frequency approved by NYSDEC. Endpoint samples will be collected to confirm that RRSCOs have been achieved. A total of 12 documentation soil samples, plus QA/QC samples, will be collected from the remedial excavation base. The proposed endpoint sample locations are shown on **Figure 10.**

5.2.2 Methodology

Documentation soil samples will be collected from the base of the remedial excavations in accordance with NYSDEC DER-10 to document remedial performance and will be analyzed for the Part 375 list of VOCs, SVOCs, pesticides, metals, PCBs, PFAS, and 1,4-dioxane. Samples will be collected into laboratory-provided bottle ware. VOCs will be collected into Terra Cores ® or Encores®. Samples will be transported under chain-of-custody protocol to an ELAP-certified laboratory. Should additional soil samples be deemed necessary (e.g., additional tank closure or an unknown environmental condition through visual evidence of a remaining source), documentation sampling will be conducted in accordance with NYSDEC DER-10.

5.2.3 QA/QC

QC procedures for documentation of soil sampling are included in the QAPP (refer to **Appendix I).** Documentation of analytical results will be provided in the NYSDEC's electronic data deliverable (EDD) format for EQuIS™. Guidance on the sampling frequency is presented in NYSDEC DER-10 Section 5.4.

The QA/QC procedures required by the NYSDEC Analytical Services Protocol (ASP) and SW-846 methods will be followed. This will include instrument calibration, standard compound spikes, surrogate compound spikes, and analysis of QC samples. The laboratory will provide sample bottles, which will be

pre-cleaned and preserved. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP will take precedence.

5.2.4 Data Validation

ASP Category B deliverables will be prepared for remedial performance samples collected during the implementation of this RAWP. Data Usability Summary Reports (DUSRs) will be prepared by a qualified data validator, and the findings will be reported in the FER.

5.2.5 Reporting

Analytical laboratories that analyze documentation soil samples, prepare results, and perform contingency sampling will be NYSDOH ELAP-certified.

5.3 ESTIMATED MATERIAL REMOVAL QUANTITIES

The preferred Alternative I remedy includes the excavation, stockpiling, off-Site transport, and disposal of 6,000 cu yd of contaminated fill material.

5.4 SOIL/MATERIALS MANAGEMENT PLAN

This section presents the approach to management, disposal, and reuse of soil, fill, and materials excavated from the Site. This plan is based on the current knowledge of Site conditions and will be altered as necessary. Field personnel, under the direction of the RE, will monitor and document the handling and transport of material removed from the Site for disposal as a regulated solid waste. Field personnel, under the direction of the RE, will assist the Remediation Contractor in identifying impacted materials during remediation, determining materials suitable for direct load out versus temporary on-Site stockpiling, selecting samples for waste characterization, if necessary, and determining the proper off-Site disposal facility. Separate stockpile areas will be constructed as needed for the various materials to be excavated or generated to avoid commingling impacted with non-impacted soil.

5.4.1 Soil Screening Methods

Visual, olfactory, and instrumental soil screening and assessment will be performed during remediation-related ground-intrusive activities into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include excavation and invasive work performed during the remedy, such as excavations for foundations and utility work.

5.4.2 Stockpile Methods

Stockpiles will be used as necessary to separate and stage excavated material pending loading or characterization sampling. Separate stockpile areas will be constructed to avoid commingling materials. Stockpile areas will meet the following minimum requirements:

- Excavated soil will be placed onto a minimum thickness of 6-mil low-permeability liner of sufficient strength and thickness to prevent puncture during use; separate stockpiles will be created where material types are different. The use of multiple layers of thinner liners is permissible.

- Efforts will be made to place and remove the soil to minimize the potential to jeopardize the integrity of the liner.
- Stockpiles will be covered at the designated times (see below) with minimum 6-mil plastic sheeting or tarps, which will be securely anchored to the ground. Stockpiles will be routinely inspected, and broken sheeting covers will be promptly replaced.
- Stockpiles will be covered upon reaching their capacity (approximately 1,000 cu yd) until ready for loading. Stockpiles that have not reached their capacity will be covered at the end of each workday.
- Each stockpile will be encircled with silt fences and hay bales, as needed, to contain and filter particulates from rainwater that has drained off the soils and to mitigate the potential for surface water run-off.
- Stockpiles will be inspected at a minimum of once daily and after every storm event.
- If hazardous material is encountered, stockpiling on the Site will be avoided to the extent possible, in favor of live-loading into trucks permitted to transport hazardous waste.

5.4.3 Materials Excavation and Load Out

Field personnel, under the supervision of the RE, will monitor ground-intrusive work and the excavation and load-out of excavated material.

Loaded vehicles leaving the Site will be appropriately lined, securely covered, manifested, and placarded in accordance with the appropriate federal, state, and local requirements, including applicable transportation requirements (i.e., New York State Department of Transportation [NYSDOT] and NYCDOT requirements). Trucks hauling contaminated fill material will not be lined unless free liquids are present or the material is grossly impacted. Hazardous wastes derived from the Site will be stored, transported, and disposed of in compliance with applicable local, state, and federal regulations.

An outbound-truck inspection and wash station will be operated on the Site. Trucks will be washed, as necessary, before leaving the Site, and Site ingress and egress points will be cleaned of dirt and other materials to prevent material generated during remediation and development from being tracked off the Site.

The Volunteer and its contractors are solely responsible for the safe performance of all invasive and other work performed under this QAPP and for the structural integrity of excavations and structures that may be affected by excavations (such as building foundations and bridge footings).

The Volunteers and associated parties will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this RAWP. 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 RAWP. Mechanical processing of contaminated fill and contaminated soil on the Site is prohibited unless otherwise approved by NYSDEC.

The excavation will be surveyed, and survey information will be shown on maps to be included with the FER.

5.4.4 Materials Transport Off Site

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. Trucks heading to disposal facilities will travel south on 4th Avenue and merge onto the Brooklyn-Queens Expressway (or other NYSDEC-approved routes). Truck routes are shown on **Figure 15.**

Loaded trucks will exit in the vicinity of the Site using approved truck routes. These routes are the most appropriate routes to and from the Site and take into account the following:

- Limiting transport through residential areas and past sensitive sites;
- Use of city-mapped truck routes;
- Prohibiting off-Site queuing of trucks entering the facility;
- Limiting total distance to major highways;
- Promoting safety in access to highways;
- Overall safety in transport; and
- Community input (where necessary).

Trucks will be prohibited from excessive stopping and idling in the neighborhood outside of the Site. 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 or hazardous metals-impacted material, truck liners will be used.

5.4.5 Materials Disposal Off Site

Disposal facilities have not been determined at the time of this report submittal; however, facility determination will be reported to the NYSDEC Case Manager prior to off-Site transport and disposal of excavated material. About 6,000 cu yd of impacted soil will be excavated and disposed of off Site. Soil, fill, or solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed of in accordance with local, state (including 6 NYCRR Part 360), and federal regulations.

Hazardous soil, if encountered, will be managed in accordance with applicable federal, state, and local regulations. As such, the handling, transport, and disposal of hazardous fill material is subject to USEPA and the OSHA HAZWOPER regulations. As such, the handling, transport, and disposal of this fill material is subject to USEPA and the OSHA HAZWOPER regulations. The presence of hazardous waste requires compliance with both federal and state regulations and the following requirements:

1. Hazardous waste disposal requires obtaining a USEPA RCRA generator ID number;
2. Hazardous waste must be transported to a facility permitted by RCRA to accept hazardous waste;

3. Hazardous waste must be segregated and cannot be commingled with other Site material; and
4. Hazardous waste must be transported and disposed by properly permitted (Part 364) transporters and facilities.

Unregulated off-Site management of materials from this Site is prohibited without formal NYSDEC approval. Material that does not meet RRSCOs, such as non-hazardous contaminated fill material, contaminated soil, and hazardous material, is prohibited from being taken to a New York State recycling facility (6 NYCRR Part 360-16 Registration Facility). Non-hazardous contaminated fill material, contaminated soil, and hazardous material transported off Site will be handled, at a minimum, as a solid waste per 6 NYCRR Part 360.

The following documentation, to be included in the FER, will be obtained for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms to applicable laws:

- A letter from the RE or one or more of the Volunteers to the receiving facility describing the material to be disposed of and requesting formal written acceptance of the material. This letter will state that material to be disposed of is contaminated material generated at an environmental remediation site located 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 chemical data for the material being transported (including waste characterization and RI data).
- A letter from each receiving facility stating that it is in receipt of the correspondence (above) and that acceptance of the material is approved.

5.4.6 Materials Reuse On Site

Materials reuse is not anticipated at the Site. If on-Site material is proposed for reuse, material will be stockpiled and sampled at a frequency consistent with the recommendations of Table 5.4(e)10 in DER-10 in order to confirm RRSCOs are achieved prior to placing backfill. It is noted that only soils meeting the requirements in this section may be reused. Soil proposed for reuse must be non-hazardous, must not be grossly contaminated, and must meet RRSCOs. Soil proposed for reuse will not contain organic matter, including wood, roots, stumps, etc., or other solid waste derived from clearing and grubbing. Soil removed during implementation of the remedy will not be reused in a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

5.4.7 Fluids Management

Liquids to be removed from the Site, including dewatering fluids, will be handled, transported, and disposed of 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. Based on the depth to water, dewatering is not anticipated to facilitate the excavation of material that exceeds the RRSCOs and construction of foundation components. If necessary, a dewatering and treatment system will be designed by the Remediation Contractor's New York State-licensed Professional Engineer.
Dewatered fluids will not be recharged back to the land surface or subsurface. Dewatering fluids will be managed off the Site. Discharge of water generated during remedial construction to surface waters (i.e., a local pond, stream, and/or river) is prohibited without an SPDES permit.

5.4.8 Backfill from Off-Site Sources

Materials proposed for import onto the Site are anticipated for the Track 4 remedy. Documentation of the material will be provided to the NYSDEC for approval prior to its use on the Site. Imported soil for backfill must meet the requirements of 6 NYCRR Part 375-6.7(d) and NYSDEC DER-10 Section 5.4(e), Table 5.4(e)10. Material from industrial sites, spill sites, other environmental remediation sites, or other potentially contaminated sites will not be imported to the Site. Solid waste will not be imported onto the Site.

Backfill material will consist of clean fill (as described in the following paragraph) or other acceptable fill material, such as virgin stone from a quarry or RCA. If RCA is imported to the Site, it will be from a NYSDEC-registered facility in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require chemical testing unless required by the NYSDEC under the terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete, with no more than 10 percent by weight passing through a No. 80 sieve. RCA is not acceptable for and will not be used as cover or drainage material.

Imported soil (i.e., clean fill) will meet the RRSCOs. Non-compliant soils will not be imported to the Site. Clean fill will be segregated at a source/facility that is free of environmental contaminants. Qualified environmental personnel will collect representative samples at a frequency consistent with NYSDEC CP-51. The samples will be analyzed for Part 375 VOCs, SVOCs, pesticides/herbicides, PCBs, cyanide, metals, including trivalent and hexavalent chromium, 1,4-dioxane, and PFAS by an NYSDOH ELAP-certified laboratory. Upon meeting these criteria, the certified-clean fill will be transported to the Site and segregated from impacted material, as necessary, on plastic sheeting until used as backfill. Trucks entering the Site with imported soils will be secured with tight-fitting covers.

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 the NYSDEC. The contents of this RAWP and NYSDEC approval of this RAWP should not be considered an approval for this purpose.

5.4.9 Stormwater Pollution Prevention

A silt fence or hay bales will be installed around the perimeter of the remedial construction area, as required. 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 maintained at the Site and available for inspection by the NYSDEC. Necessary repairs to the silt fence and/or hay bales will be made immediately. Accumulated sediments will be removed as required to keep the barriers and hay bale checks functional. The manufacturer's recommendations will be followed for replacing the silt fence damaged due to weathering. Erosion and sediment control measures identified in the RAWP will be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to the sewer system.

5.4.10 Contingency Plan

As discussed above in Section 4.3.7, if USTs or other previously unidentified contaminant sources are encountered, sampling will be performed on the product, if encountered, and surrounding subsurface materials (e.g., soil, stone). Chemical analyses will include Part 375 VOCs, SVOCs, PCBs, pesticides, metals, and PFAS. Analyses will not be otherwise limited without NYSDEC approval. Identification of unknown or unexpected contaminated media identified by screening during ground-intrusive work will be promptly communicated by phone to the NYSDEC Case Manager. These findings will also be detailed in the monthly BCP progress report.

5.4.11 Community Air Monitoring Plan

The CAMP will require real-time monitoring for particulates (i.e., dust) and VOCs at the upwind and downwind perimeters when ground-intrusive activities, including soil/waste excavation, soil handling, test pit excavation, and/or trenching, are in progress at the Site during remedial construction activities. The CAMP aims to provide protection for residents in the designated work area and residents of the downwind community from potential airborne releases that directly result from the remedial construction activities conducted at the Site. Adherence to the monitoring action levels specified in the CAMP requires monitoring and, when necessary, corrective actions to abate emissions, and/or shutdown work. The CAMP also helps to confirm that work activities do not spread contamination off the Site through the air. In addition, visual and olfactory observations will be made to keep dust and odors to a minimum around the work areas. VOCs and particulates will be monitored using Aeroqual® AQS1 Air Quality Monitors or other equivalent equipment. Readings will be recorded every 15 minutes at the Site by field personnel.

The following actions will be taken based on monitoring of particulate concentrations:

- If the level of downwind inhalable particles with diameters generally 10 micrometers and smaller (PM-10) is 100 µg/m^3 greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 µg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m^3 above the upwind level, work will be stopped, and a re-evaluation of activities initiated. Work will resume if dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.

The following actions will be taken based on VOC monitoring:

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over 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 ft downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less, but in no case less than 20 ft, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shut down.

5.4.12 Odor, Dust, and Nuisance Control Plan

Dust, odor, and nuisance controls will be accomplished by the Remediation Contractor as described in this section.

Odor Control

This odor control plan is capable of controlling emissions of nuisance odors off Site. Specific odor control methods to be used if needed will include the application of foam suppressants or tarps over the odor or VOC source areas. If nuisance odors are identified, work will be halted, and the source of the odors will be identified and corrected. Work will not resume until nuisance odors have been abated. The NYSDEC and NYSDOH will be notified of odor events and other complaints about the project. Implementation of odor controls is the responsibility of the contractor. Monitoring odor emission, including the halt of work, will be the responsibility of the RE or his/her designated representative.

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: (a) direct load-out of soils to trucks for off-Site disposal; (b) use of chemical odorants in spray or misting systems; and (c) use of staff to monitor odors in surrounding neighborhoods. Odor control suppressant will be available on Site during ground-intrusive work, as necessary.

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

A dust suppression plan that addresses dust management during demolition and ground-intrusive on-Site work will include, at a minimum: (a) use of a dedicated water distribution system, an on-Site water truck for road wetting, or an alternate source with suitable supply and pressure for use in dust control; (b) gravel used for on-Site roads to provide a clean and dust-free road surface; and (c) 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 used by the Remediation Contractor during Site preparation (including clearing and grubbing) and remedial work. A plan for noise control will be developed and used by the Remediation Contractor during Site preparation and remedial work and will conform, at a minimum, to the NYCDEP noise control standards.

6. Residual Contamination to Remain on the Site

Residual contaminated soil, groundwater, and soil vapor will exist beneath the Site after the remedy is complete; therefore, ECs/ICs are required to protect human health and the environment. These ECs/ICs are described hereafter. Long-term management of EC/ICs and residual contamination will be executed under a Site-specific SMP that will be included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Site will have at least four primary EC systems: (1) an active SSDS fitted with a blower system, (2) an SVE system fitted with a blower system, (3) groundwater monitoring wells associated with the ISCO injections, and (4) a composite cover system.

ICs, including recording of an EE and SMP, will provide long-term management and protection of human health and the environment from residual contamination remaining in place. If further development is proposed for this Site, the SMP will guide potential penetration of the cap and handling and disposal of contaminated materials.

Remaining contamination left on Site after implementation of the selected Track 4 remedy will be managed in place using EC/ICs and an NYSDEC-approved SMP to be included in the FER.

7. Engineering Controls

Following completion of the preferred Track 4 remedy, both ECs and ICs will be required as part of the remedial action, including installation of an active SSDS and SVE system.

7.1 ACTIVE SSDS

Installation of an active SSDS during construction will be considered an EC. The SSDS will consist of a horizontal perforated PVC pipeline within a permeable layer immediately beneath the building foundation slab and a vapor barrier system connecting to steel risers penetrating through the building to the roof and blower fans attached to each riser. At least six permanent sub-slab vapor monitoring points would be installed in the permeable layer to allow for the collection of sub-slab vapor samples. Field confirmation test results and as-builts will be provided in the FER. Pressure field extension testing will be performed no sooner than 30 days after system startup, prior to building occupancy and while HVAC systems are operating. BMPs that will be performed during the SSDS design and implementation may include, but are not limited to, evaluating if a remediation system could be protective with an intermittent energy supply, designing for efficiency to reduce indirect emissions of electricity production, designing an adaptable system, and integrating the design with the contemplated reuse of the Site. Three confirmatory indoor air samples will be collected post remedy and prior to occupancy over a 24-hour time period.

7.2 SVE SYSTEM

Installation of an SVE system during construction will be considered an EC. The SVE system will be in the soil vapor source area located within the historical UST area of the Site. This would be designed to remediate source petroleum-related VOCs in the vadose zone. Soil vapor will be removed with the SVE system and treated with GAC prior to discharge to the atmosphere. Field confirmation test results and as-builts will be provided in the FER. BMPs that will be performed during the SVE design and implementation may include, but are not limited to, evaluating if a remediation system could be protective with an intermittent energy supply, addressing sources more aggressively to reduce long-term operation and maintenance of the system, designing for efficiency to reduce indirect emissions of electricity production, design an adaptable system, and integrating the design with the contemplated reuse of the Site.

7.3 GROUNDWATER MONITORING

Volume and density application rates for AP-pH will be based on the manufacturer's recommendations. A letter from the manufacturer stating recommended dosage rates will be provided to NYSDEC and will be included in the FER. Monitoring well construction diagrams, injection calculations, and manufacturer documentation for the injections will be presented in the FER. BMPs that will be performed during the ISCO injections may include, but are not limited to, using a technology that permanently destroys contamination to reduce impacts associated with long-term Site management, addressing sources more aggressively to reduce long-term monitoring, and integrating the remedial design with the contemplated reuse of the Site.

Groundwater monitoring activities to assess the performance of the remedy, or natural attenuation following the removal of contaminant sources, will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have been asymptotic over an extended period. Monitoring will continue until permission is granted in writing by NYSDEC and NYSDOH. Monitoring activities will be outlined in the Monitoring Plan of the SMP. It is anticipated that, following remediation, a minimum of four quarterly monitoring events will be performed.

7.4 COMPOSITE COVER SYSTEM

To prevent exposure to residual contaminated soils under the building, a composite cover system would be installed, consisting of a minimum of 8 in. of clean subbase (virgin stone) overlain by a 6-in. concrete slab including installation of a waterproofing/vapor barrier (20-mil thick) to act as the sealing layer required to reduce the potential for a soil vapor exposure pathway.

8. Institutional Controls

Under Alternative I, anticipated to achieve a Track 4 remedy for proposed restricted residential use, ICs would: (1) restrict the Site's use to restricted residential, commercial, and industrial uses, although land use is subject to local zoning laws; and (2) restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDEC or NYSDOH.

8.1 ENVIRONMENTAL EASEMENT

An EE, as defined in Article 71 Title 36 of the ECL, is required when residual contamination is left on a site after the RA is complete. As part of this remedy, an EE approved by the NYSDEC will be filed and recorded with the New York County Office of the City Register. The EE will be submitted as part of the FER.

The EE renders the Site a Controlled Property. The EE must be recorded with the New York County Office of the City Register before the Certificate of Completion can be issued by NYSDEC. 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 use(s) only. These ICs are requirements or restrictions placed on the Site that are listed in, and required by, the EE. 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 associated with this Site include:

- Compliance with the EE by the Grantee and the Grantee's successors and adherence to all elements of the SMP are required.
- All ECs must be operated and maintained as specified in this SMP;
- A soil vapor mitigation system consisting of an SSDS under all building structures must be inspected, certified, operated, and maintained as required by the SMP;
- An SVE system in the west-central and eastern boundary of the Site must be inspected, certified, operated, and maintained as required by the SMP;
- All ECs on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Groundwater, soil vapor, 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 monitoring wells and soil vapor probes, must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP;

- ECs may not be discontinued without an amendment or extinguishment of the EE.

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

- 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 the 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 SMP;
- The Controlled Property may be used for restricted residential use only, provided the long-term ECs and ICs included in the SMP are employed; and
- The Controlled Property may not be used for a higher level of use, such as unrestricted use, without an amendment or extinguishment of the EE.

8.2 SITE MANAGEMENT PLAN

Site management is the last phase of remediation and begins with the approval of the FER and issuance of the Certificate of Completion for the RA. Site management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible for ensuring that all Site management responsibilities defined in the EE and the SMP are performed.

The SMP should include methods to incorporate and track GSR metrics. Measures should be taken to maintain a cost-effective, protective remedy that remains conscientious of the Site's environmental footprint. At a minimum, the following should be assessed: waste generation, energy usage, emissions, and water usage.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of ECs/ICs; (2) a Monitoring Plan for implementation of Site monitoring; (3) an Operation and Maintenance Plan for implementation of remedial mitigation and treatment systems; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. This 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 the certifying period relative to the date of issuance of the COC. The first submission will be due 16 months after the issuance of the Certificate of Completion, and annually (or at another frequency as approved by NYSDEC) thereafter.

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. Appropriately placed groundwater monitoring wells will also be installed upgradient, downgradient, and cross-gradient of the source/treatment area and in the source/treatment area for the purpose of evaluating the effectiveness of the remedy that is

implemented. 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.

As part of the SMP, following completion of the remediation, groundwater samples will be collected to document groundwater quality at the Site. An estimated eight groundwater samples, plus QA/QC samples, will be collected and analyzed for VOCs quarterly for a minimum of one-year post-remediation. The quarterly sampling program may be reduced with NYSDEC approval. Additionally, the Site management program will include an evaluation of the impact of climate change on the project Site and ECs.

9. Final Engineering Report

An FER will be submitted to the NYSDEC following the implementation of the remedy defined in this RAWP. The FER will be prepared in conformance with NYSDEC DER-10 and will include the following:

- Documentation that the remedial work required under this RAWP has been completed and has been performed in substantial conformance with this plan.
- A summary of the locations and characteristics of material removed from the Site, including the surveyed map(s) of each area, as necessary.
- As-built drawings for constructed elements, certifications, manifests, and bills of lading.
- A description of the changes to the remedy from the elements provided in the RAWP and associated design documents, if any.
- A tabular summary of performance evaluation sampling results, material characterization results, and other sampling and chemical analyses performed as part of the remedy.
- Written and photographic documentation of remedial work performed under this remedy.
- A summary of documentation sampling results to show that remaining soil left on the Site meets the Track 4 SCOs.
- Documentation of treatment and/or disposal of material removed from the Site, including excavated contaminated soil, historical fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with the disposal of material must also include records and approvals for receipt of the material.
- Documentation of the origin and chemical quality of each material type imported onto the Site.
- Discussion of the green remediation practices/technologies employed throughout the remedial program. A final footprint analysis using a DER-accepted model, and any tracking methods used through the construction, including restoration activities.

Before approval of the FER and issuance of a Certificate of Completion, the daily or weekly reports and monthly BCP progress reports must be submitted in digital format (i.e., PDF).

9.1 CERTIFICATIONS

The following certification will appear in front of the Executive Summary of the FER. The certification will be signed by the RE, Suzanne M. Bell, 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, _____, 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 4001 4th Avenue Redevelopment Site (NYSDEC BCA Index No. C224412-10-24 Site No. C224412).

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 4001 4th Avenue Redevelopment 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 [Applicant / Volunteer / Participant] 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 145 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 145, New York State Education Law.

10. Schedule

Mobilization for implementation of the RAWP is expected to take about one to two weeks. Once mobilization is complete, remediation of the Site will proceed. The remedy, which will be implemented in accordance with this RAWP, is anticipated to take about four months to complete. After completion of the remedy, an FER will be drafted and subsequently submitted to the NYSDEC for review and approval. A proposed project schedule is included in **Appendix J.**

References

1. Brownfield Cleanup Program Application. Proposed 4001 4th Avenue Redevelopment Site. 4001-4011 4th Avenue, Brooklyn, New York. Prepared for 4 Ave Property LLC by H & A of New York Engineering and Geology LLP for submission to the New York State Department of Environmental Conservation. Submitted May 2024.

2. Remedial Investigation Work Plan, 4001 4th Avenue Redevelopment Site, Brooklyn, New York, Prepared by Haley & Aldrich of New York Engineering and Geology, LLC, prepared March 2025.

3. New York State Department of Environmental Conservation, Part 375 of Title 6 of the New York Compilation of Codes, Rules, and Regulations, Effective December 14, 2006.

4. New York State Department of Environmental Conservation, Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), revised April 2023.

5. New York State Department of Health, Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 (February 2024 matrices).

6. New York State Division of Water Technical and Operational Guidance Series (TOGS) (1.1.1) dated June 1998.

7. Monitoring Report. 4001 4th Avenue, Brooklyn, New York. Prepared by Berninger Environmental, prepared for The Macchia Group, February 2024.

8. Phase I Environmental Site Assessment – 4001 4th Avenue, Brooklyn, New York. Prepared by Lesova Environmental Group, prepared for SLJ Management Group, LLC, 12 March 2024.

9. Phase II Environmental Site Assessment. 4001-4011 4th Avenue, Brooklyn, New York. Prepared by Castleton Environmental, prepared for Merritt Environmental Consulting Corp, 25 January 2019.

10. Program Policy DER-10, “Technical Guidance for Site Investigation and Remediation,” New York State Department of Environmental Conservation. May 2010.

11. Interim Remedial Measure Work Plan, 4001 4th Avenue Redevelopment Site, Brooklyn, New York, Prepared by Haley & Aldrich of New York Engineering and Geology, LLC, prepared February 2025.

12. Interim Remedial Measure Work Plan, 4001 4th Avenue Redevelopment Site, Brooklyn, New York, Prepared by Haley & Aldrich of New York Engineering and Geology, LLC, prepared November 2025.

13. Remedial Investigation Report, 4001 4th Avenue Redevelopment Site, Brooklyn, New York, Prepared by Haley & Aldrich of New York Engineering and Geology, LLC, prepared July 2026.

14. United States Environmental Protection Agency, Low Flow Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, EQASOP-GW 001, September 19, 2017.

\\haleyaldrich.com\share\CF\Projects\0210815\Deliverables\22. NYSDEC RAWP\1. Text\2026-0727_HANY_4001 4th Avenue (C224412) RAWP_F.docx

TABLES

TABLE 1
ALTERNATIVE I REMEDIAL COST ESTIMATE
4001 4TH AVENUE DEVELOPMENT
4001 4TH AVENUE, BROOKLYN, NEW YORK
BCP SITE NO. C224412

Consulting/Engineering Costs					
Task	**Description**	**Unit**	**Unit Cost**	**Quantity**	**Total Cost**
1	Waste Characterization and Lead Delineation	Lump Sum	$ 100,000	1	$ 100,000
2A	Support of Excavation Design	Lump Sum	$ 125,000	1	$ 125,000
2B	MTA Transit Approvals	Lump Sum	$ 50,000	1	$ 50,000
3	Program Management (NYSDEC/NYSDOH Correspondence, Daily/Weekly/Monthly Reporting, etc.)	Month	$ 13,000	6	$ 78,000
4	Remedial Oversight	Month	$ 30,000	6	$ 180,000
5	Confirmation Sampling	Sample	$ 2,000	13	$ 26,000
6	Soil Vapor Intrusion Evaluation	Allowance	$ 7,500	1	$ 7,500
7	Soil Vapor Intrusion Reporting	Lump Sum	$ 10,000	1	$ 10,000
8	Site Management (quarterly groundwater monitoring, engineering controls operation and maintenance, and	Year	$ 75,000	5	$ 375,000
9	Closure Reporting and COC Coordination	Allowance	$ 150,000	1	$ 150,000
				Consulting/Engineering Subtotal	$ 1,101,500
Contractor Costs					
Task	**Description**	**Unit**	**Unit Cost**	**Quantity**	**Total Cost**
1	Mobilization/Demobilization, Site Maintenance, Security, etc.	Allowance	$ 250,000	1	$ 250,000
2	Truck Wash Station	Month	$ 25,000	6	$ 150,000
3	Management/Handling Contaminated Material	Cubic Yard	$ 40	6,000	$ 240,000
4	Support of Excavation (25' excavation)	Linear Foot	$ 20,000	150	$ 3,000,000
5	Support of Excavation (2' excavation)	Linear Foot	$ 2,000	225	$ 450,000
6	Groundwater Cutoff Wall	Linear Foot	$ 10,000	300	$ 3,000,000
7	Transport and Disposal of Non-Hazardous Petroleum Impacted Fill Material	Ton	$ 70	9,000	$ 630,000
8	Underground Storage Tank (Contingency Budget)	Allowance	$ 50,000	1	$ 50,000
9	Composite Cover System (i.e., vapor barrier)	Allowance	$ 500,000	1	$ 500,000
10	In Situ Oxidation Injection	Each	$ 150,000	2	$ 300,000
11	Active Soil Vapor Extraction System	Lump Sum	$ 250,000	1	$ 250,000
12	Active Sub-slab Depressurization System (SSDS)	Allowance	$ 50,000	1	$ 50,000
				Contractor Subtotal	$ 8,870,000
				Total	$ 9,971,500
				15% Contingency	$ 1,495,725
				Estimated Total (Rounded to the nearest $1,000)	$ 11,467,000

Notes:

1. Assuming a Track 4 Remedy with site management

2. Assumes density of 1.5 tons per cubic yard of fill/soil.

3. Assumes shallow excavation sitewide with treatment of PGWSCO material via Soil Vapor Extraction.

4. Assumes dewatering will not be required.

5. SOE Costs are based on a conventional soldier pile and timber lagging system with lateral bracing provided by either steel rakers or tiebacks.

6. Costs are estimated and subject to change. Costs do not include new building construction.

7. RAWP implementation is assumed to take 4 to 6 months.

8. This cost estimate was prepared to compare various remedial alternatives as was based on available information at the time of preparation. The estimate may be +/- 30-50% of the actual cost. This estimate was not prepared for financial or legal consulting purposes and was not intended for use regarding compliance with financial reporting requirements or liability services.

9. The allowance of active sub-slab depressurization system includes the cost associated with converting a passive SSDS to active system.

TABLE 2
ALTERNATIVE II REMEDIAL COST ESTIMATE
4001 4TH AVENUE DEVELOPMENT
4001 4TH AVENUE, BROOKLYN, NEW YORK
BCP SITE NO. C224412

Consulting/Engineering Costs					
Task	**Description**	**Unit**	**Unit Cost**	**Quantity**	**Total Cost**
1	Waste Characterization	Lump Sum	$ 85,000	1	$ 85,000
2	Program Management (NYSDEC/NYSDOH Correspondence, Daily/Weekly/Monthly Reporting, etc.)	Month	$ 13,000	12	$ 156,000
3	Remedial Oversight	Month	$ 30,000	18	$ 540,000
4	Confirmation Sampling	Sample	$ 2,000	15	$ 30,000
5	Post-Excavation Groundwater Sampling Program	Quarter	$ 5,000	4	$ 20,000
6A	Support of Excavation Design	Lump Sum	$ 150,000	1	$ 150,000
6B	MTA Transit Approvals	Lump Sum	$ 100,000	1	$ 100,000
7	Dewatering Design	Lump Sum	$ 125,000	1	$ 125,000
8	Permitting (Long Island Well and NYCDEP)	Lump Sum	$ 75,000	1	$ 75,000
9	Soil Vapor Intrusion Evaluation	Allowance	$ 5,000	1	$ 5,000
10	Soil Vapor Intrusion Reporting	Lump Sum	$ 7,500	1	$ 7,500
11	Site Management (quarterly groundwater monitoring, engineering controls operation and maintenance, ar	Year	$ 35,000	5	$ 175,000
12	Closure Reporting and COC Coordination	Allowance	$ 75,000	1	$ 75,000
				Consulting/Engineering Subtotal	$ 1,543,500
Contractor Costs					
Task	**Description**	**Unit**	**Unit Cost**	**Quantity**	**Total Cost**
1	Mobilization/Demobilization, Site Maintenance, Security, etc.	Allowance	$ 750,000	1	$ 750,000
2	Truck Wash Station	Month	$ 25,000	18	$ 450,000
3	Management/Handling Contaminated Material	Cubic Yard	$ 95	24,620	$ 2,338,900
4A	Dewatering Installation (deep wells and treatment)	Lump Sum	$ 1,250,000	1	$ 1,250,000
4B	Operation and Maintenance of Dewatering System	Month	$ 125,000	24	$ 3,000,000
5	Support of Excavation	Linear Foot	$ 20,000	400	$ 8,000,000
6	Transport and Disposal of Non-Hazardous Petroleum Contaminated Material	Ton	$ 70	36,390	$ 2,547,300
7	Underground Storage Tank (Contingency Budget)	Allowance	$ 75,000	1	$ 75,000
8	Backfill	Cubic Yard	$ 30	16000	$ 480,000
				Contractor Subtotal	$ 18,891,200
				Total	$ 20,434,700
				15% Contingency	$ 3,065,205
				Estimated Total (Rounded to the nearest $1,000)	$ 23,500,000

Notes:

1. Assuming a conditional Track 1 Remedy requiring excavations to remove soil exceeding Track 1 UUSCOs.

2. Assumes density of 1.5 tons per cubic yard of fill/soil.

3. Assumes residual soil will meet Track 1 Unrestricted Use Soil Cleanup Objectives.

4. Assumes dewatering will not be required.

5. SOE Costs are based on a conventional soldier pile and timber lagging system with lateral bracing provided by either steel rakers or tiebacks to approximately 20' bgs and then secant piles for the remainder of the wall.

6. Costs are estimated and subject to change. Costs do not include new building construction.

7. RAWP implementation is assumed to take 18 months.

8. This cost estimate was prepared to compare various remedial alternatives as was based on available information at the time of preparation. The estimate may be +/- 30-50% of the actual cost. This estimate was not prepared for financial or legal consulting purposes and was not intended for use regarding compliance with financial reporting requirements or liability services.

9. This estimate does not include legal fees associated with attorneys involved in the project, insurance fees or outside consulting fees.

TABLE 3
TRACK 4 SOIL CLEANUP OBJECTIVES
4001 4TH AVENUE DEVELOPMENT
4001 4TH AVENUE, BROOKLYN, NEW YORK
BCP SITE NO. C224412

PCBs/Pesticides (mg/kg)	
4,4'-DDD	5
4,4'-DDE	3.4
4,4'-DDT	3.8
Aldrin	0.044
alpha-BHC	0.18
alpha-Chlordane (cis)	0.65
beta-BHC	0.18
delta-BHC	100
Dieldrin	0.075
Endosulfan I	35
Endosulfan II	35
Endosulfan sulfate	35
Endrin	5.3
gamma-BHC (Lindane)	0.21
Heptachlor	0.53
Polychlorinated biphenyls (total)	1

Volatile Organic Compounds (mg/kg)	
1,1,1-Trichloroethane	100
1,1-Dichloroethane	47
1,1-Dichloroethene	0.98
1,2,4-Trimethylbenzene	5.9
1,2-Dichlorobenzene	100
1,2-Dichloroethane	5.8
1,3,5-Trimethylbenzene	3.1
1,3-Dichlorobenzene	38
1,4-Dichlorobenzene	24
1,4-Dioxane	5.7
2-Butanone (Methyl Ethyl Ketone)	100
2-Phenylbutane (sec-Butylbenzene)	100
Acetone	100
Benzene	0.06
Carbon tetrachloride	7.1
Chlorobenzene	100
Chloroform (Trichloromethane)	24
cis-1,2-Dichloroethene	41
Ethylbenzene	1
Methyl Tert Butyl Ether (MTBE)	0.1
Methylene chloride (Dichloromethane)	81
Naphthalene	100
n-Butylbenzene	100
n-Propylbenzene	5
tert-Butylbenzene	100
Tetrachloroethene	18
Toluene	0.7
trans-1,2-Dichloroethene	100
Trichloroethene	6.4
Vinyl chloride	0.48
Xylene (Total)	1.2

Semi-Volatile Organic Compounds (mg/kg)	
1,2-Dichlorobenzene	100
1,3-Dichlorobenzene	38
1,4-Dichlorobenzene	24
1,4-Dioxane	5.7
2-Methylphenol (o-Cresol)	100
4-Methylphenol (p-Cresol)	100
Acenaphthene	100
Acenaphthylene	100
Anthracene	100
Benzo(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1.4
Benzo(g,h,i)perylene	4.9
Benzo(k)fluoranthene	4.9
Chrysene	4.9
Dibenz(a,h)anthracene	0.33
Dibenzofuran	18
Fluoranthene	100
Fluorene	100
Hexachlorobenzene	0.33
Indeno(1,2,3-cd)pyrene	1.4
Naphthalene	12
Nitrobenzene	1.8
Pentachlorophenol	1.3
Phenanthrene	4.9
Phenol	100
Pyrene	100

Metals (mg/kg)	
Arsenic, Total	16
Barium, Total	410
Beryllium, Total	43
Cadmium, Total	2.5
Chromium (hexavalent)	1.0
Chromium (trivalent)	110.0
Copper, Total	280
Lead, Total	400
Manganese, Total	2000
Mercury, Total	0.30
Nickel, Total	320
Selenium, Total	110
Silver, Total	110
Zinc, Total	6600

Per- and Polyfluoroalkyl Substances (µg/kg)	
Perfluorooctanesulfonic acid (PFOS)	44
Perfluorooctanoic acid (PFOA)	33

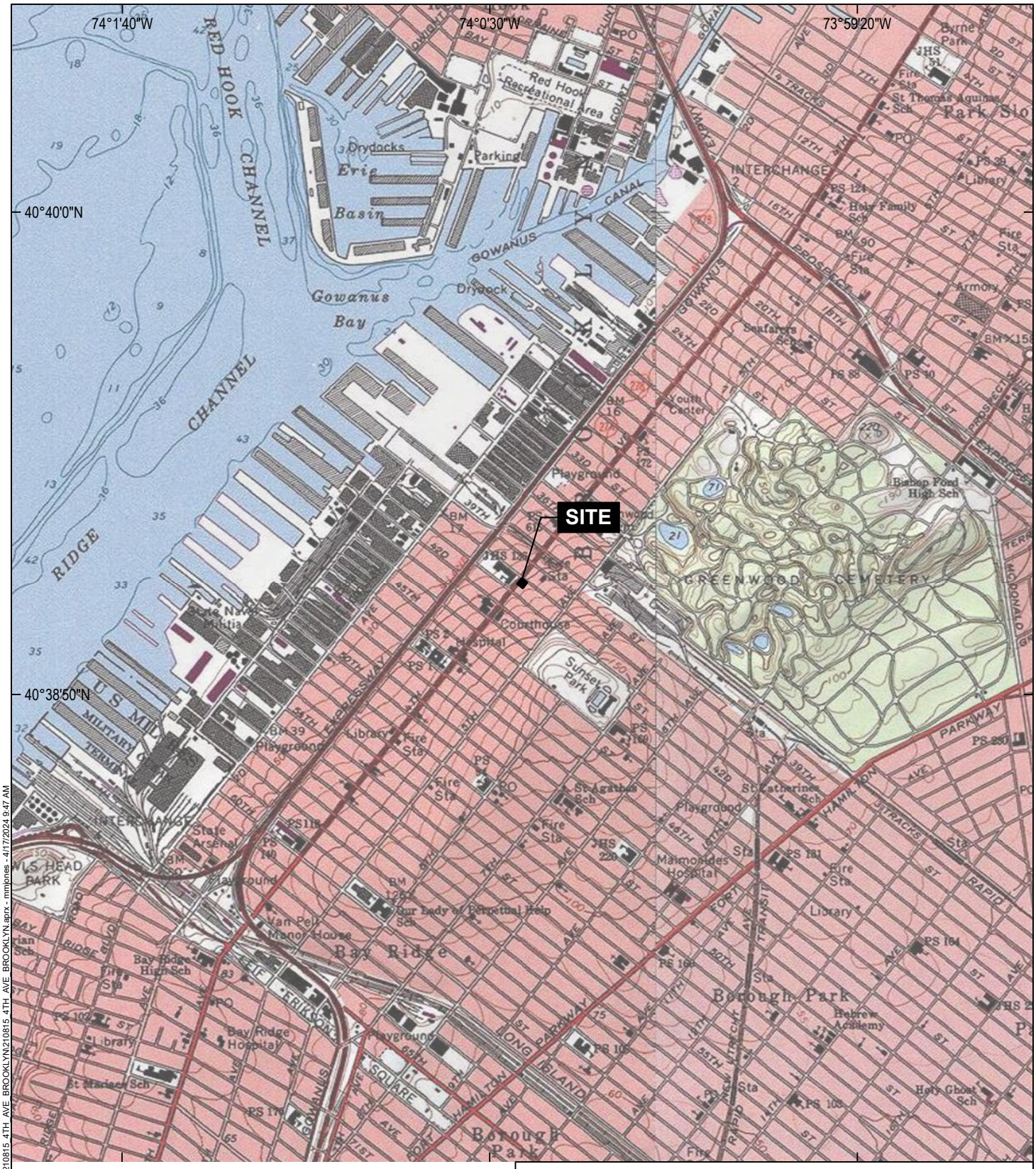
Notes:

1. Criteria are 6 NYCRR Part 375 Restricted Residential Soil Cleanup Objectives

2. mg/kg: milligram per kilogram

3. ug/kg: microgram per kilogram

FIGURES



GIS: \\haleyaldrich\share\CF\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - mmjones - 4/17/2024 9:47 AM

HALEY ALDRICH

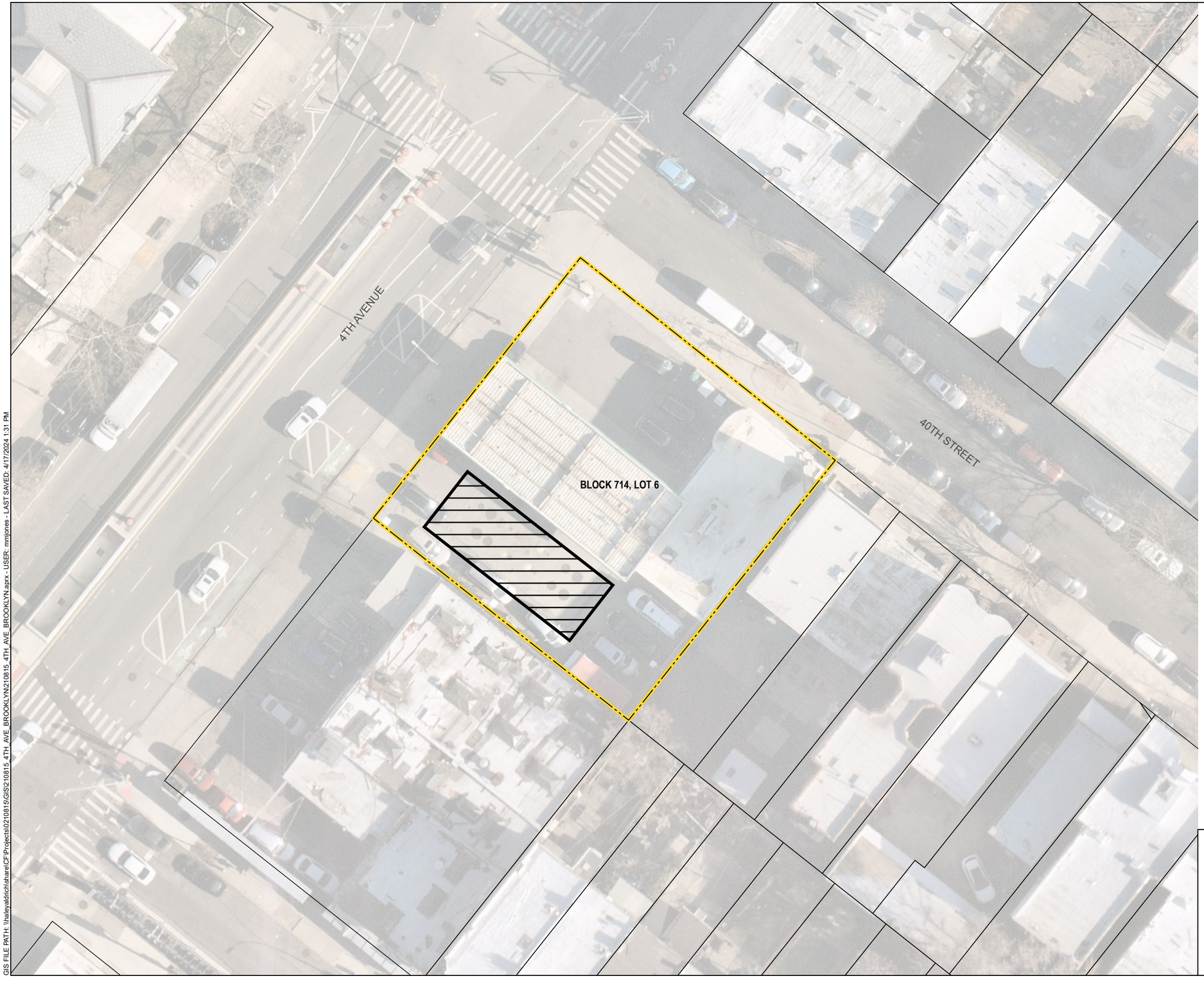
4001 4TH AVENUE
BROOKLYN, NEW YORK

PROJECT LOCUS

MAP SOURCE: USGS
SITE COORDINATES: 40°39'06"N, 74°00'24"W

APPROXIMATE SCALE: 1 IN = 2000 FT
OCTOBER 2024

FIGURE 1



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

SITE PLAN

JANUARY 2026

FIGURE 2

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjones - LAST SAVED: 4/17/2024 1:31 PM



LEGEND

- SOIL VAPOR POINT
- LNAPL DELINEATION BORING
- SOIL BORING
- SOIL BORING/MONITORING WELL
- OFF-SITE SOIL BORING
- OFF-SITE SOIL BORING/MONITORING WELL
- APPROXIMATE LOCATION OF 4,000-GALLON UST
- SITE BOUNDARY
- PARCEL BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. OFF-SITE INVESTIGATION LOCATIONS HAVE NOT BEEN COMPLETED DUE TO PROXIMITY TO THE NEW YORK CITY METROPOLITAN TRANSPORTATION AUTHORITY SUBWAY LINE LOCATED NORTHWEST-ADJACENT TO THE SITE.

3. PARCEL DATA SOURCE: KINGS COUNTY

4. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

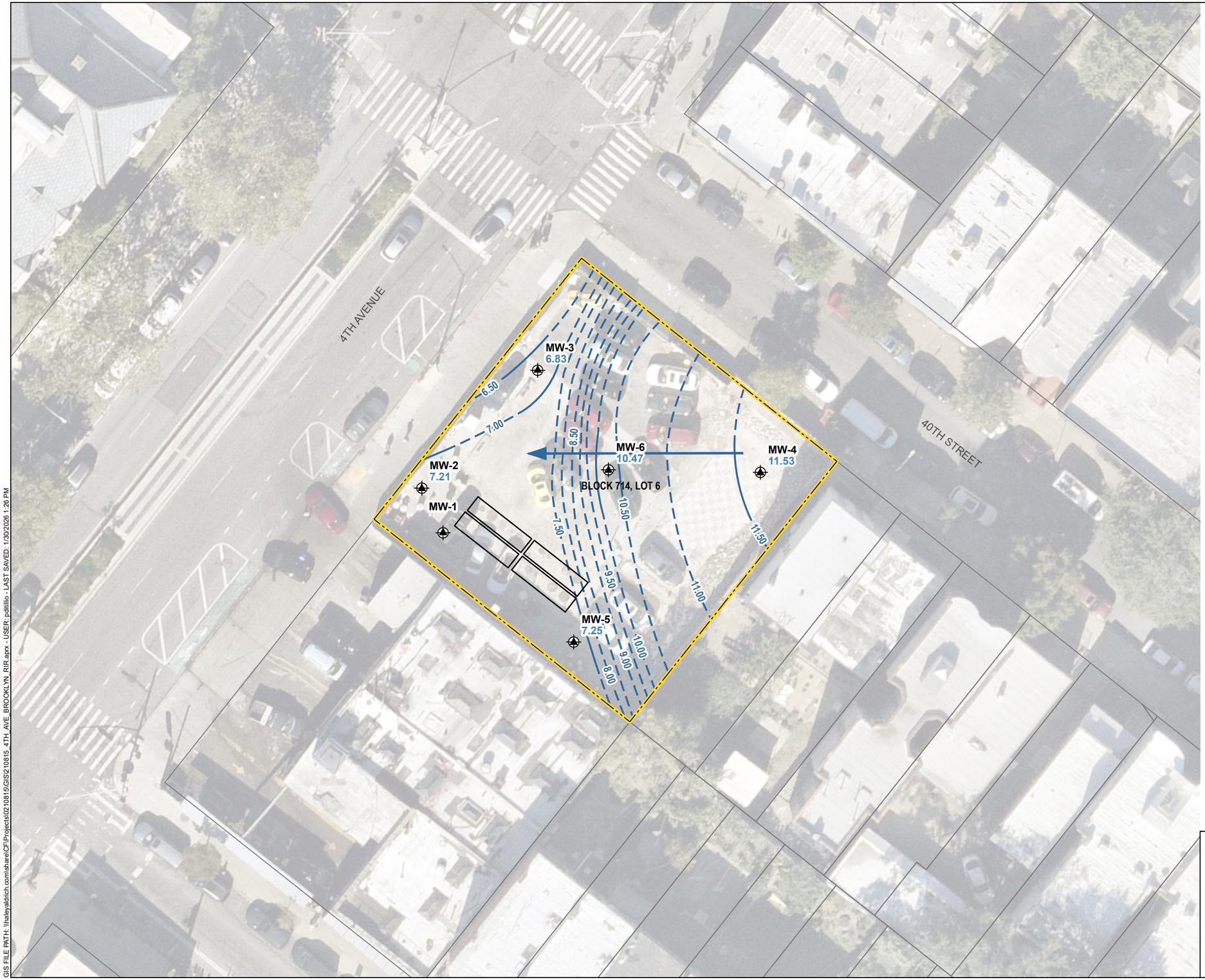
4001 4TH AVENUE
BROOKLYN, NEW YORK

SAMPLE LOCATION MAP

JANUARY 2026

FIGURE 3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\021815\GIS\210815_4TH_AVE_BROOKLYN_RIR.aprx - USER: pdilillio - LAST SAVED: 1/28/2026 2:58 PM



LEGEND

- MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR, IN FEET. DASHED WHERE INFERRED
- GROUNDWATER FLOW DIRECTION
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF 4,000-GALLON UST
- SITE BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. GROUNDWATER ELEVATIONS WERE MEASURED ON JANUARY 15, 2026.
3. GROUNDWATER ELEVATION DATA FROM MW-1 IS NOT INCLUDED DUE TO A PERCHED GROUNDWATER CONDITION OBSERVED DURING THE JANUARY 15, 2026, SYNOPTIC GAUGING EVENT.
4. PARCEL DATA SOURCE: KINGS COUNTY
5. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

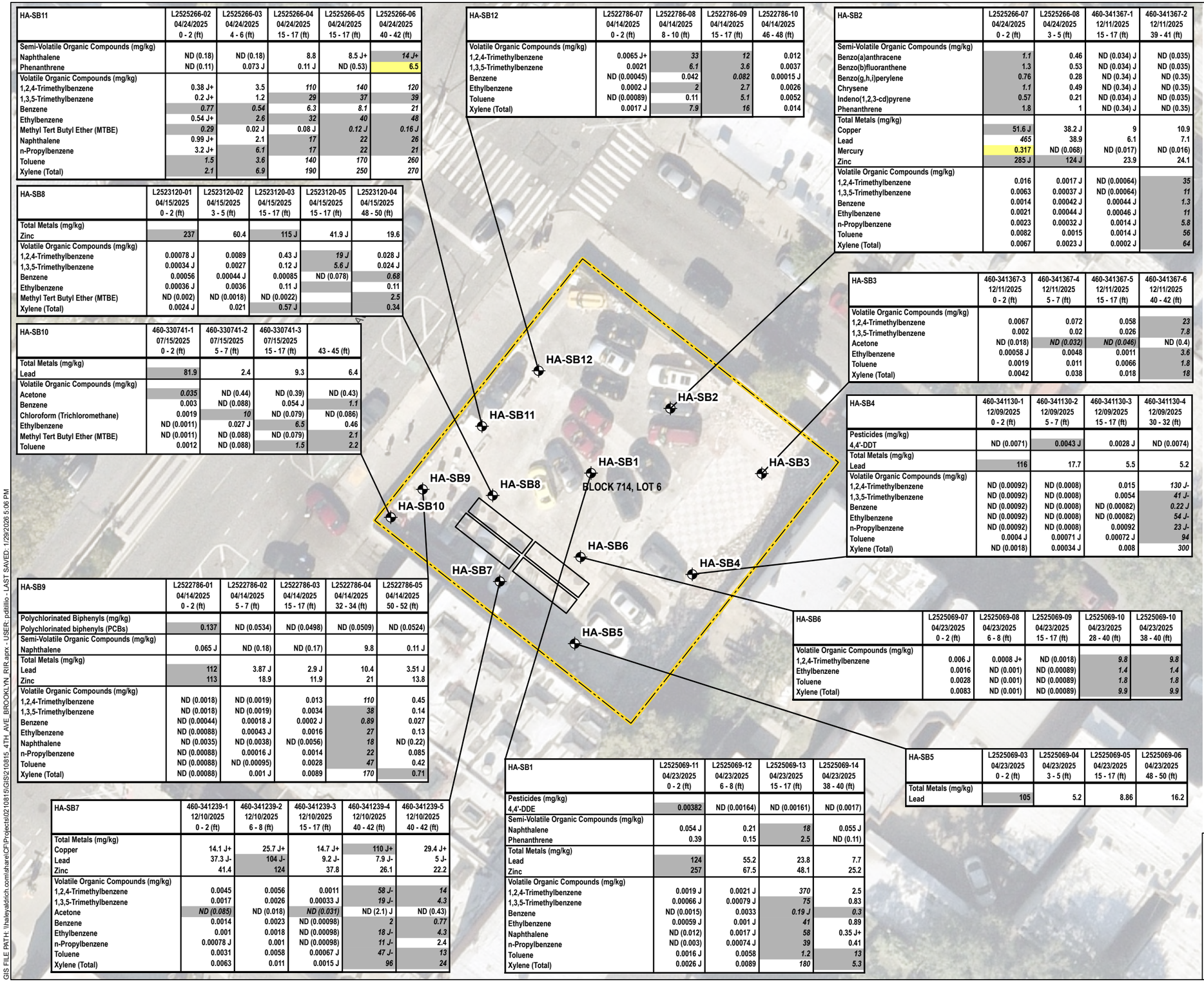
4001 4TH AVENUE
BROOKLYN, NEW YORK

GROUNDWATER CONTOUR MAP

JANUARY 2026

FIGURE 4

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\021081\5\GIS\210815_4TH_AVE_BROOKLYN_RIR.aprx - USER: pdilillo - LAST SAVED: 1/30/2026 1:26 PM



HA-SB11	L2525266-02 04/24/2025 0 - 2 (ft)	L2525266-03 04/24/2025 4 - 6 (ft)	L2525266-04 04/24/2025 15 - 17 (ft)	L2525266-05 04/24/2025 15 - 17 (ft)	L2525266-06 04/24/2025 40 - 42 (ft)
Semi-Volatile Organic Compounds (mg/kg)					
Naphthalene	ND (0.18)	ND (0.18)	8.8	8.5 J+	*14 J+*
Phenanthrene	ND (0.11)	0.073 J	0.11 J	ND (0.53)	6.5
Volatile Organic Compounds (mg/kg)					
1,2,4-Trimethylbenzene	0.38 J+	3.5	*110*	*140*	*120*
1,3,5-Trimethylbenzene	0.2 J+	1.2	*29*	*37*	*39*
Benzene	*0.77*	*0.54*	*6.3*	*8.1*	*21*
Ethylbenzene	0.54 J+	*2.6*	*32*	*40*	*48*
Methyl Tert Butyl Ether (MTBE)	*0.29*	0.02 J	0.08 J	*0.12 J*	*0.16 J*
Naphthalene	0.99 J+	2.1	*17*	*22*	*26*
n-Propylbenzene	3.2 J+	*6.1*	*17*	*22*	*21*
Toluene	*1.5*	*3.6*	*140*	*170*	*260*
Xylene (Total)	*2.1*	*6.9*	*190*	*250*	*270*

HA-SB12	L2522786-07 04/14/2025 0 - 2 (ft)	L2522786-08 04/14/2025 8 - 10 (ft)	L2522786-09 04/14/2025 15 - 17 (ft)	L2522786-10 04/14/2025 46 - 48 (ft)
Volatile Organic Compounds (mg/kg)				
1,2,4-Trimethylbenzene	0.0065 J+	*33*	*12*	0.012
1,3,5-Trimethylbenzene	0.0021	*6.1*	*3.6*	0.0037
Benzene	ND (0.00045)	0.042	*0.082*	0.00015 J
Ethylbenzene	0.0002 J	2	*2.7*	0.0026
Toluene	ND (0.00089)	0.11	*5.1*	0.0052
Xylene (Total)	0.0017 J	*7.9*	*16*	0.014

HA-SB2	L2525266-07 04/24/2025 0 - 2 (ft)	L2525266-08 04/24/2025 3 - 5 (ft)	460-341367-1 12/11/2025 15 - 17 (ft)	460-341367-2 12/11/2025 39 - 41 (ft)
Semi-Volatile Organic Compounds (mg/kg)				
Benzo(a)anthracene	*1.1*	0.46	ND (0.034) J	ND (0.035)
Benzo(b)fluoranthene	1.3	0.53	ND (0.034) J	ND (0.035)
Benzo(g,h,i)perylene	0.76	0.28	ND (0.34) J	ND (0.35)
Chrysene	*1.1*	0.49	ND (0.34) J	ND (0.35)
Indeno(1,2,3-cd)pyrene	0.57	0.21	ND (0.034) J	ND (0.035)
Phenanthrene	1.8	1	ND (0.34) J	ND (0.35)
Total Metals (mg/kg)				
Copper	51.6 J	38.2 J	9	10.9
Lead	*465*	38.9	6.1	7.1
Mercury	0.317	ND (0.068)	ND (0.017)	ND (0.016)
Zinc	285 J	124 J	23.9	24.1
Volatile Organic Compounds (mg/kg)				
1,2,4-Trimethylbenzene	0.016	0.0017 J	ND (0.00064)	*35*
1,3,5-Trimethylbenzene	0.0063	0.00037 J	ND (0.00064)	*11*
Benzene	0.0014	0.00042 J	0.00044 J	*1.3*
Ethylbenzene	0.0021	0.00044 J	0.00046 J	*11*
n-Propylbenzene	0.0023	0.00032 J	0.0014 J	*5.8*
Toluene	0.0082	0.0015	0.0014 J	*56*
Xylene (Total)	0.0067	0.0023 J	0.0002 J	*64*

HA-SB8	L2523120-01 04/15/2025 0 - 2 (ft)	L2523120-02 04/15/2025 3 - 5 (ft)	L2523120-03 04/15/2025 15 - 17 (ft)	L2523120-05 04/15/2025 15 - 17 (ft)	L2523120-04 04/15/2025 48 - 50 (ft)
Total Metals (mg/kg)					
Zinc	237	60.4	115 J	41.9 J	19.6
Volatile Organic Compounds (mg/kg)					
1,2,4-Trimethylbenzene	0.00078 J	0.0089	0.43 J	*19 J*	0.028 J
1,3,5-Trimethylbenzene	0.00034 J	0.0027	0.12 J	*5.6 J*	0.024 J
Benzene	0.00056	0.00044 J	0.00085	ND (0.078)	*0.68*
Ethylbenzene	0.00036 J	0.0036	0.11 J		0.11
Methyl Tert Butyl Ether (MTBE)	ND (0.002)	ND (0.0018)	ND (0.0022)		2.5
Xylene (Total)	0.0024 J	0.021	0.57 J		0.34

HA-SB3	460-341367-3 12/11/2025 0 - 2 (ft)	460-341367-4 12/11/2025 5 - 7 (ft)	460-341367-5 12/11/2025 15 - 17 (ft)	460-341367-6 12/11/2025 40 - 42 (ft)
Volatile Organic Compounds (mg/kg)				
1,2,4-Trimethylbenzene	0.0067	0.072	0.058	*23*
1,3,5-Trimethylbenzene	0.002	0.02	0.026	*7.8*
Acetone	ND (0.018)	*ND (0.032)*	*ND (0.046)*	ND (0.4)
Ethylbenzene	0.00058 J	0.0048	0.0011	*3.6*
Toluene	0.0019	0.011	0.0066	*1.8*
Xylene (Total)	0.0042	0.038	0.018	*18*

HA-SB10	460-330741-1 07/15/2025 0 - 2 (ft)	460-330741-2 07/15/2025 5 - 7 (ft)	460-330741-3 07/15/2025 15 - 17 (ft)	43 - 45 (ft)
Total Metals (mg/kg)				
Lead	81.9	2.4	9.3	6.4
Volatile Organic Compounds (mg/kg)				
Acetone	*0.035*	ND (0.44)	ND (0.39)	ND (0.43)
Benzene	0.003	ND (0.088)	0.054 J	*1.1*
Chloroform (Trichloromethane)	0.0019	*10*	ND (0.079)	ND (0.086)
Ethylbenzene	ND (0.0011)	0.027 J	*6.5*	0.46
Methyl Tert Butyl Ether (MTBE)	ND (0.0011)	ND (0.088)	ND (0.079)	*2.1*
Toluene	0.0012	ND (0.088)	*1.5*	*2.2*

HA-SB4	460-341130-1 12/09/2025 0 - 2 (ft)	460-341130-2 12/09/2025 5 - 7 (ft)	460-341130-3 12/09/2025 15 - 17 (ft)	460-341130-4 12/09/2025 30 - 32 (ft)
Pesticides (mg/kg)				
4,4'-DDT	ND (0.0071)	0.0043 J	0.0028 J	ND (0.0074)
Total Metals (mg/kg)				
Lead	116	17.7	5.5	5.2
Volatile Organic Compounds (mg/kg)				
1,2,4-Trimethylbenzene	ND (0.00092)	ND (0.0008)	0.015	*130 J-*
1,3,5-Trimethylbenzene	ND (0.00092)	ND (0.0008)	0.0054	*41 J-*
Benzene	ND (0.00092)	ND (0.0008)	ND (0.00082)	*0.22 J*
Ethylbenzene	ND (0.00092)	ND (0.0008)	ND (0.00082)	*54 J-*
n-Propylbenzene	ND (0.00092)	ND (0.0008)	0.00092	*23 J-*
Toluene	0.0004 J	0.00071 J	0.00072 J	*94*
Xylene (Total)	ND (0.0018)	0.00034 J	0.008	*300*

HA-SB9	L2522786-01 04/14/2025 0 - 2 (ft)	L2522786-02 04/14/2025 5 - 7 (ft)	L2522786-03 04/14/2025 15 - 17 (ft)	L2522786-04 04/14/2025 32 - 34 (ft)	L2522786-05 04/14/2025 50 - 52 (ft)
Polychlorinated Biphenyls (mg/kg)					
Polychlorinated biphenyls (PCBs)	0.137	ND (0.0534)	ND (0.0498)	ND (0.0509)	ND (0.0524)
Semi-Volatile Organic Compounds (mg/kg)					
Naphthalene	0.065 J	ND (0.18)	ND (0.17)	9.8	0.11 J
Total Metals (mg/kg)					
Lead	112	3.87 J	2.9 J	10.4	3.51 J
Zinc	113	18.9	11.9	21	13.8
Volatile Organic Compounds (mg/kg)					
1,2,4-Trimethylbenzene	ND (0.0018)	ND (0.0019)	0.013	*110*	0.45
1,3,5-Trimethylbenzene	ND (0.0018)	ND (0.0019)	0.0034	*38*	0.14
Benzene	ND (0.00044)	0.00018 J	0.0002 J	*0.89*	0.027
Ethylbenzene	ND (0.00088)	0.00043 J	0.0016	*27*	0.13
Naphthalene	ND (0.0035)	ND (0.0038)	ND (0.0056)	*18*	ND (0.22)
n-Propylbenzene	ND (0.00088)	0.00016 J	0.0014	*22*	0.085
Toluene	ND (0.00088)	ND (0.00095)	0.0028	*47*	0.42
Xylene (Total)	ND (0.00088)	0.001 J	0.0089	*170*	0.71

HA-SB6	L2525069-07 04/23/2025 0 - 2 (ft)	L2525069-08 04/23/2025 6 - 8 (ft)	L2525069-09 04/23/2025 15 - 17 (ft)	L2525069-10 04/23/2025 28 - 40 (ft)	L2525069-10 04/23/2025 38 - 40 (ft)
Volatile Organic Compounds (mg/kg)					
1,2,4-Trimethylbenzene	0.006 J	0.0008 J+	ND (0.0018)	*9.8*	*9.8*
Ethylbenzene	0.0016	ND (0.001)	ND (0.00089)	*1.4*	*1.4*
Toluene	0.0028	ND (0.001)	ND (0.00089)	*1.8*	*1.8*
Xylene (Total)	0.0083	ND (0.001)	ND (0.00089)	*9.9*	*9.9*

HA-SB1	L2525069-11 04/23/2025 0 - 2 (ft)	L2525069-12 04/23/2025 6 - 8 (ft)	L2525069-13 04/23/2025 15 - 17 (ft)	L2525069-14 04/23/2025 38 - 40 (ft)
Pesticides (mg/kg)				
4,4'-DDE	0.00382	ND (0.00164)	ND (0.00161)	ND (0.0017)
Semi-Volatile Organic Compounds (mg/kg)				
Naphthalene	0.054 J	0.21	*18*	0.055 J
Phenanthrene	0.39	0.15	2.5	ND (0.11)
Total Metals (mg/kg)				
Lead	124	55.2	23.8	7.7
Zinc	257	67.5	48.1	25.2
Volatile Organic Compounds (mg/kg)				
1,2,4-Trimethylbenzene	0.0019 J	0.0021 J	*370*	2.5
1,3,5-Trimethylbenzene	0.00066 J	0.00079 J	*75*	0.83
Benzene	ND (0.0015)	0.0033	*0.19 J*	*0.3*
Ethylbenzene	0.00059 J	0.001 J	*41*	0.89
Naphthalene	ND (0.012)	0.0017 J	*58*	0.35 J+
n-Propylbenzene	ND (0.003)	0.00074 J	*39*	0.41
Toluene	0.0016 J	0.0058	*1.2*	*13*
Xylene (Total)	0.0026 J	0.0089	*180*	*5.3*

HA-SB5	L2525069-03 04/23/2025 0 - 2 (ft)	L2525069-04 04/23/2025 3 - 5 (ft)	L2525069-05 04/23/2025 15 - 17 (ft)	L2525069-06 04/23/2025 48 - 50 (ft)
Total Metals (mg/kg)				
Lead	105	5.2	8.86	16.2

HA-SB7	460-341239-1 12/10/2025 0 - 2 (ft)	460-341239-2 12/10/2025 6 - 8 (ft)	460-341239-3 12/10/2025 15 - 17 (ft)	460-341239-4 12/10/2025 40 - 42 (ft)	460-341239-5 12/10/2025 40 - 42 (ft)
Total Metals (mg/kg)					
Copper	14.1 J+	25.7 J+	14.7 J+	110 J+	29.4 J+
Lead	37.3 J-	104 J-	9.2 J-	7.9 J-	5 J-
Zinc	41.4	124	37.8	26.1	22.2
Volatile Organic Compounds (mg/kg)					
1,2,4-Trimethylbenzene	0.0045	0.0056	0.0011	*58 J-*	*14*
1,3,5-Trimethylbenzene	0.0017	0.0026	0.00033 J	*19 J-*	*4.3*
Acetone	*ND (0.085)*	ND (0.018)	*ND (0.031)*	ND (2.1) J	ND (0.43)
Benzene	0.0014	0.0023	ND (0.00098)	2	*0.77*
Ethylbenzene	0.001	0.0018	ND (0.00098)	*18 J-*	*4.3*
n-Propylbenzene	0.00078 J	0.001	ND (0.00098)	*11 J-*	2.4
Toluene	0.0031	0.0058	0.00067 J	*47 J-*	*13*
Xylene (Total)	0.0063	0.011	0.0015 J	*96*	*24*

LEGEND

- SOIL BORING
- APPROXIMATE LOCATION OF 4,000-GALLON UST
- SITE BOUNDARY

Analyte	*NY-PGW*	NY-RESR	NY-UNRES
PCBs (mg/kg)			
Polychlorinated biphenyls (PCBs	3.2	1	0.1
Pesticides (mg/kg)			
4,4'-DDE	9.3	3.4	0.0033
4,4'-DDT	135	3.8	0.0033
Semi-Volatile Organic Compounds (mg/kg)			
Benzo(a)anthracene	1	1.4	1
Benzo(b)fluoranthene	2.1	1.4	1
Benzo(g,h,i)perylene	1000	4.9	0.64
Chrysene	1	4.9	1
Indeno(1,2,3-cd)pyrene	6.6	1.4	0.5
Naphthalene	12	100	12
Phenanthrene	1000	4.9	1.1
Total Metals (mg/kg)			
Copper	1720	280	50
Lead	450	400	63
Mercury	0.73	0.3	0.18
Zinc	2480	6600	109
Volatile Organic Compounds (mg/kg)			
1,2,4-Trimethylbenzene	5.9	100	5.9
1,3,5-Trimethylbenzene	3.1	100	3.1
Acetone	0.03	100	0.03
Benzene	0.06	3.7	0.06
Chloroform (Trichloromethane)	0.37	24	0.37
Ethylbenzene	1	76	1
Methyl Tert Butyl Ether (MTBE)	0.1	100	0.1
Naphthalene	12	100	12
n-Propylbenzene	5	100	5
Toluene	0.7	100	0.7
Xylene (Total)	1.2	100	0.26

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. SOIL ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (SCO), RESTRICTED-USE RESIDENTIAL SCOS, AND PROTECTION OF GROUNDWATER SCO'S.
3. EXCEEDANCES OF THE OF THE PROTECTION OF GROUNDWATER CRITERIA ARE SHOWN IN ***ITALICS***.
4. EXCEEDANCES OF THE OF THE UNRESTRICTED SCOS ARE SHADED GRAY..
5. EXCEEDANCES OF THE OF THE RESTRICTED SCOS ARE SHADED YELLOW.
6. NY-PGW - NYSDEC PART 375 PROTECTION OF GROUNDWATER CRITERIA
7. NY-RESR - NYSDEC PART 375 RESTRICTED-USE RESIDENTIAL SCOs
8. NY-UNRES - NYSDEC PART 375 UNRESTRICTED USE SCOs
9. DEFINITIONS:
   MG/KG: MILLIGRAM PER KILOGRAM
   ND (2.5): NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT
   J-: VALUE IS ESTIMATED, LOW BIAS.
   J: VALUE IS ESTIMATED.
   J+: VALUE IS ESTIMATED, HIGH BIAS.
10. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

SOIL RESULTS EXCEEDANCE MAP

JANUARY 2026

FIGURE 5

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\021081\5\GIS\210815_4TH_AVE_BROOKLYN_RIR.aprx - USER: pdilillio - LAST SAVED: 1/29/2026 5:06 PM

MW-03	07/31/2025
Metals, Dissolved (ug/L)	
Magnesium, Dissolved	56400
Manganese, Dissolved	3690
Sodium, Dissolved	489000
Metals, Total (ug/L)	
Iron, Total	5920
Magnesium, Total	59500
Manganese, Total	3860
Sodium, Total	495000
Semi-Volatile Organic Compounds (ug/L)	
1,4-Dioxane	ND (10)/1.6
Naphthalene	11 J
Volatile Organic Compounds (ug/L)	
1,2,4-Trimethylbenzene	60
1,3,5-Trimethylbenzene	21
Benzene	320
Ethylbenzene	96
Isopropylbenzene (Cumene)	12
m,p-Xylenes	170
Methyl Tert Butyl Ether (MTBE)	16000
n-Propylbenzene	17
o-Xylene	57
Toluene	380
Xylene (Total)	230
PFAS (ng/L)	
Perfluorooctanesulfonic acid (PFOS)	6.14 J
Perfluorooctanoic acid (PFOA)	102 J

MW-06	01/06/2026
Metals, Dissolved (ug/L)	
Manganese, Dissolved	2193 J+/2501 J+
Sodium, Dissolved	218000 J-/215000 J-
Metals, Total (ug/L)	
Antimony, Total	5.2/3.14 J
Iron, Total	12500/17500
Magnesium, Total	33400/36000
Manganese, Total	3109/2981
Sodium, Total	229000/231000
Semi-Volatile Organic Compounds (ug/L)	
Benzo(a)anthracene	0.03 J/ND (0.1)
Benzo(b)fluoranthene	0.03 J/ND (0.1)
Naphthalene	160 J+/150 J+
Phenol	10/8.4
Volatile Organic Compounds (ug/L)	
1,2,4-Trimethylbenzene	910 J/1000
1,3,5-Trimethylbenzene	ND (1000)/290 J
Benzene	1600/1900
Ethylbenzene	1000/1100
m,p-Xylenes	4800/5600
Methyl Tert Butyl Ether (MTBE)	100 J/100 J
Naphthalene	ND (1000)/220 J
o-Xylene	2400/2800
Toluene	32000/36000
Xylene (Total)	7200/8400
PFAS (ng/L)	
Perfluorooctanesulfonic acid (PFOS)	6.12 J/6.16 J
Perfluorooctanoic acid (PFOA)	8.44 J/8.4 J

MW-02	07/31/2025
Metals, Dissolved (ug/L)	
Manganese, Dissolved	2160
Sodium, Dissolved	707000
Metals, Total (ug/L)	
Iron, Total	562
Manganese, Total	2170
Sodium, Total	671000
Semi-Volatile Organic Compounds (ug/L)	
1,4-Dioxane	ND (10)/0.64 J
Volatile Organic Compounds (ug/L)	
1,2,4-Trimethylbenzene	6
Benzene	4
m,p-Xylenes	20 J
Methyl Tert Butyl Ether (MTBE)	27
o-Xylene	8.4
Toluene	39 J
Xylene (Total)	28
PFAS (ng/L)	
Perfluorooctanesulfonic acid (PFOS)	8.7 J
Perfluorooctanoic acid (PFOA)	77 J

MW-05	12/29/2025
Metals, Dissolved (ug/L)	
Sodium, Dissolved	58400
Metals, Total (ug/L)	
Antimony, Total	3.63 J
Chromium, Total	1337
Iron, Total	22900
Lead, Total	63.93
Manganese, Total	973.4
Nickel, Total	750.7
Sodium, Total	57700
Semi-Volatile Organic Compounds (ug/L)	
Benzo(a)anthracene	0.04 J
Naphthalene	42
Phenol	2.1 J
Volatile Organic Compounds (ug/L)	
1,2,4-Trimethylbenzene	620
1,3,5-Trimethylbenzene	250
Benzene	240
Ethylbenzene	660
Isopropylbenzene (Cumene)	39 J
m,p-Xylenes	2600
Naphthalene	73 J
n-Propylbenzene	83 J
o-Xylene	1800
Toluene	6100
Xylene (Total)	4400
PFAS (ng/L)	
Perfluorooctanesulfonic acid (PFOS)	6.96 J
Perfluorooctanoic acid (PFOA)	26.8 J

MW-04	01/06/2026
Metals, Dissolved (ug/L)	
Magnesium, Dissolved	57800 J+
Manganese, Dissolved	5536 J+
Sodium, Dissolved	266000 J-
Metals, Total (ug/L)	
Barium, Total	1287
Iron, Total	12800
Lead, Total	29.57
Magnesium, Total	61600
Manganese, Total	6329
Sodium, Total	269000
Semi-Volatile Organic Compounds (ug/L)	
1,4-Dioxane	1.04
Benzo(a)anthracene	0.05 J
Benzo(b)fluoranthene	0.05 J
Indeno(1,2,3-cd)pyrene	0.04 J
Naphthalene	38 J+
Phenol	1.6 J-
Volatile Organic Compounds (ug/L)	
1,2,4-Trimethylbenzene	710
1,3,5-Trimethylbenzene	180 J
1,4-Dioxane	ND (62000)
Benzene	480
Ethylbenzene	1100
m,p-Xylenes	4200
Methyl Tert Butyl Ether (MTBE)	43 J
Naphthalene	ND (620)
o-Xylene	2100
Toluene	20000
Xylene (Total)	6300
PFAS (ng/L)	
Perfluorooctanesulfonic acid (PFOS)	8.63 J
Perfluorooctanoic acid (PFOA)	31.9 J

MW-01	01/06/2026
Volatile Organic Compounds (ug/L)	
1,2,4,5-Tetramethylbenzene	88
1,2,4-Trimethylbenzene	1700
1,3,5-Trimethylbenzene	470
2-Phenylbutane (sec-Butylbenzene)	22 J
Benzene	78
Ethylbenzene	700
Isopropylbenzene (Cumene)	84
m,p-Xylenes	3000
Naphthalene	280
n-Butylbenzene	34 J
n-Propylbenzene	240
o-Xylene	1200
Toluene	2400
Xylene (Total)	4200
PFAS (ng/L)	
Perfluorooctanesulfonic acid (PFOS)	9.59 J
Perfluorooctanoic acid (PFOA)	17.8 J

4TH AVENUE

40TH STREET

MW-1

MW-2

MW-3

MW-4

MW-5

MW-6

BLOCK 714, LOT 6

LEGEND

- SOIL BORING/MONITORING WELL
- SITE BOUNDARY
- PARCEL BOUNDARY
- APPROXIMATE LOCATION OF 4,000-GALLON UST

	New York TOGS 111 Ambient Water Quality Standards	New York April 2023 Ambient Water Quality Guidance Values (AWQGV)
Metals, Dissolved (ug/L)		
Magnesium, Dissolved	35000	NA
Manganese, Dissolved	300	NA
Sodium, Dissolved	20000	NA
Metals, Total (ug/L)		
Antimony, Total	3	NA
Barium, Total	1000	NA
Chromium, Total	50	NA
Iron, Total	300	NA
Lead, Total	25	NA
Magnesium, Total	35000	NA
Manganese, Total	300	NA
Nickel, Total	100	NA
Sodium, Total	20000	NA
PFAS (ng/L)		
Perfluorooctanesulfonic acid (PFOS)	NA	2.7
Perfluorooctanoic acid (PFOA)	NA	6.7
Semi-Volatile Organic Compounds (ug/L)		
1,4-Dioxane	NA	0.35
Benzo(a)anthracene	0.002	NA
Benzo(b)fluoranthene	0.002	NA
Indeno(1,2,3-cd)pyrene	0.002	NA
Naphthalene	10	NA
Phenol	1	NA
Volatile Organic Compounds (ug/L)		
1,2,4,5-Tetramethylbenzene	5	NA
1,2,4-Trimethylbenzene	5	NA
1,3,5-Trimethylbenzene	5	NA
1,4-Dioxane	NA	0.35
2-Phenylbutane (sec-Butylbenzene)	5	NA
Benzene	1	NA
Ethylbenzene	5	NA
Isopropylbenzene (Cumene)	5	NA
m,p-Xylenes	5	NA
Methyl Tert Butyl Ether (MTBE)	10	NA
Naphthalene	10	NA
n-Butylbenzene	5	NA
n-Propylbenzene	5	NA
o-Xylene	5	NA
Toluene	5	NA
Xylene (Total)	5	NA

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DEFINITIONS:
   ND (2.5): NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT
   PFAS: PER- AND POLYFLUOROALKYL SUBSTANCES
   J-: VALUE IS ESTIMATED, LOW BIAS.
   J: VALUE IS ESTIMATED.
   J+: VALUE IS ESTIMATED, HIGH BIAS.
3. GROUNDWATER ANALYTICAL RESULTS ARE COMPARED TO NYSDEC TECHNICAL AND OPERATIONAL GUIDANCE SERIES (TOGS) 1.1.1 AMBIENT WATER QUALITY STANDARDS (AWQS) AND GUIDANCE VALUES (GVS) FOR CLASS GA WATER.
4. EXCEEDANCES OF THE CRITERIA ARE SHADED GRAY.
5. PARCEL DATA SOURCE: KINGS COUNTY
6. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

GROUNDWATER RESULTS EXCEEDANCES MAP

JANUARY 2026

FIGURE 6

GIS FILE PATH: \\haleyaldrich.com\share\CP\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN_RIR.aprx - USER: pdilillo - LAST SAVED: 1/29/2026 3:26 PM

SV-05	07/01/2025 L2541324-05
VOCs	
2,2,4-Trimethylpentane (Isooctane)	16200000
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	21500
Benzene	6770
Cyclohexane	626000
Hexane	2010000
N-Heptane	389000
Toluene	5880
Calculated Totals	
Total BTEXs	12650
Total CVOCs	ND
Total VOCs	19259150

SV-06	07/01/2025 L2541324-06
VOCs	
2,2,4-Trimethylpentane (Isooctane)	4350000
Benzene	696000
Cyclohexane	1030000
Hexane	2220000
N-Heptane	729000
Toluene	243000
Calculated Totals	
Total BTEXs	939000
Total CVOCs	ND
Total VOCs	9268000

SV-02	07/01/2025 L2541324-02
VOCs	
2,2,4-Trimethylpentane (Isooctane)	3810000
Cyclohexane	103000
Hexane	412000
N-Heptane	74600
Calculated Totals	
Total BTEXs	ND
Total CVOCs	ND
Total VOCs	4399600

SV-07	07/01/2025 L2541324-07
VOCs	
2,2,4-Trimethylpentane (Isooctane)	2690000
Benzene	4340
Cyclohexane	465000
Hexane	1150000
N-Heptane	566000
Calculated Totals	
Total BTEXs	4340
Total CVOCs	ND
Total VOCs	4875340

SV-01	07/01/2025 L2541324-03
VOCs	
1,2,4-Trimethylbenzene	4100
2,2,4-Trimethylpentane (Isooctane)	6540000
Benzene	19400
Cyclohexane	178000
Ethylbenzene	9990
Hexane	592000
m,p-Xylenes	27100
N-Heptane	184000
o-Xylene	4950
Toluene	27000
Calculated Totals	
Total BTEXs	88440
Total CVOCs	ND
Total VOCs	7586540

SV-04	07/01/2025 L2541324-04
VOCs	
1,2,4-Trimethylbenzene	85.5
1,3,5-Trimethylbenzene	25.2
1,3-Butadiene	156
2,2,4-Trimethylpentane (Isooctane)	16600
2-Butanone (Methyl Ethyl Ketone)	38
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	35.3
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	46.3
Acetone	487
Benzene	626
Carbon disulfide	205
Cyclohexane	1710
Ethanol	407
Ethylbenzene	119
Hexane	7930
Isopropyl Alcohol (2-Propanol)	88.5
m,p-Xylenes	452
N-Heptane	1860
o-Xylene	164
Tert-Butyl Alcohol (tert-Butanol)	88.2
Tetrahydrofuran	24.5
Toluene	1210
Calculated Totals	
Total BTEXs	2571
Total CVOCs	ND
Total VOCs	32357.5

SV-03	07/01/2025 L2541324-01
VOCs	
1,2,4-Trimethylbenzene	28.4
1,3,5-Trimethylbenzene	9.14
1,3-Butadiene	53.1
2,2,4-Trimethylpentane (Isooctane)	1000
2-Butanone (Methyl Ethyl Ketone)	20.4
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	11.7
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	8.61
Acetone	582
Benzene	85.9
Carbon disulfide	46.1
Chloromethane (Methyl Chloride)	1.6
Cyclohexane	170
Dichlorodifluoromethane (CFC-12)	3.15
Ethanol	260
Ethylbenzene	40.6
Hexane	617
Isopropyl Alcohol (2-Propanol)	55.1
m,p-Xylenes	161
N-Heptane	218
o-Xylene	60.8
Tert-Butyl Alcohol (tert-Butanol)	76.1
Tetrachloroethene	572
Tetrahydrofuran	13.8
Toluene	254
Trichloroethene	19.7
Calculated Totals	
Total BTEXs	602.3
Total CVOCs	591.7
Total VOCs	4368.2

SV-1
SV-2
SV-3
SV-4
SV-5
SV-6
SV-7

4TH AVENUE
40TH STREET
BLOCK 714, LOT 6

LEGEND

- SOIL VAPOR POINT
- APPROXIMATE LOCATION OF 4,000-GALLON UST
- SITE BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. RESULTS ARE DISPLAYED IN MICROGRAMS PER CUBIC METER (ug/m3)
3. DEFINITIONS:
   CVOCS: CHLORINATED VOLATILE ORGANIC COMPOUNDS
   TOTAL BTEX IS THE SUM OF BENZENE, TOLUENE, ETHYLBENZENE, XYLENES
   TOTAL CVOCS IS THE SUM OF ALL THE DETECTED CONCENTRATIONS OF CARBON TETRACHLORIDE, 1,1- DICHLOROETHENE, CIS-1,2-DICHLOROETHENE, TRICHLOROETHENE, METHYLENE CHLORIDE, TETRACHLOROETHENE, 1,1,1-TRICHLOROETHANE, AND VINYL CHLORIDE
   TOTAL VOCS IS THE SUM OF ALL THE DETECTED CONCENTRATIONS
   ND (2.5): NOT DETECTED, NUMBER IN PARENTHESES IS THE LABORATORY REPORTING LIMIT
4. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

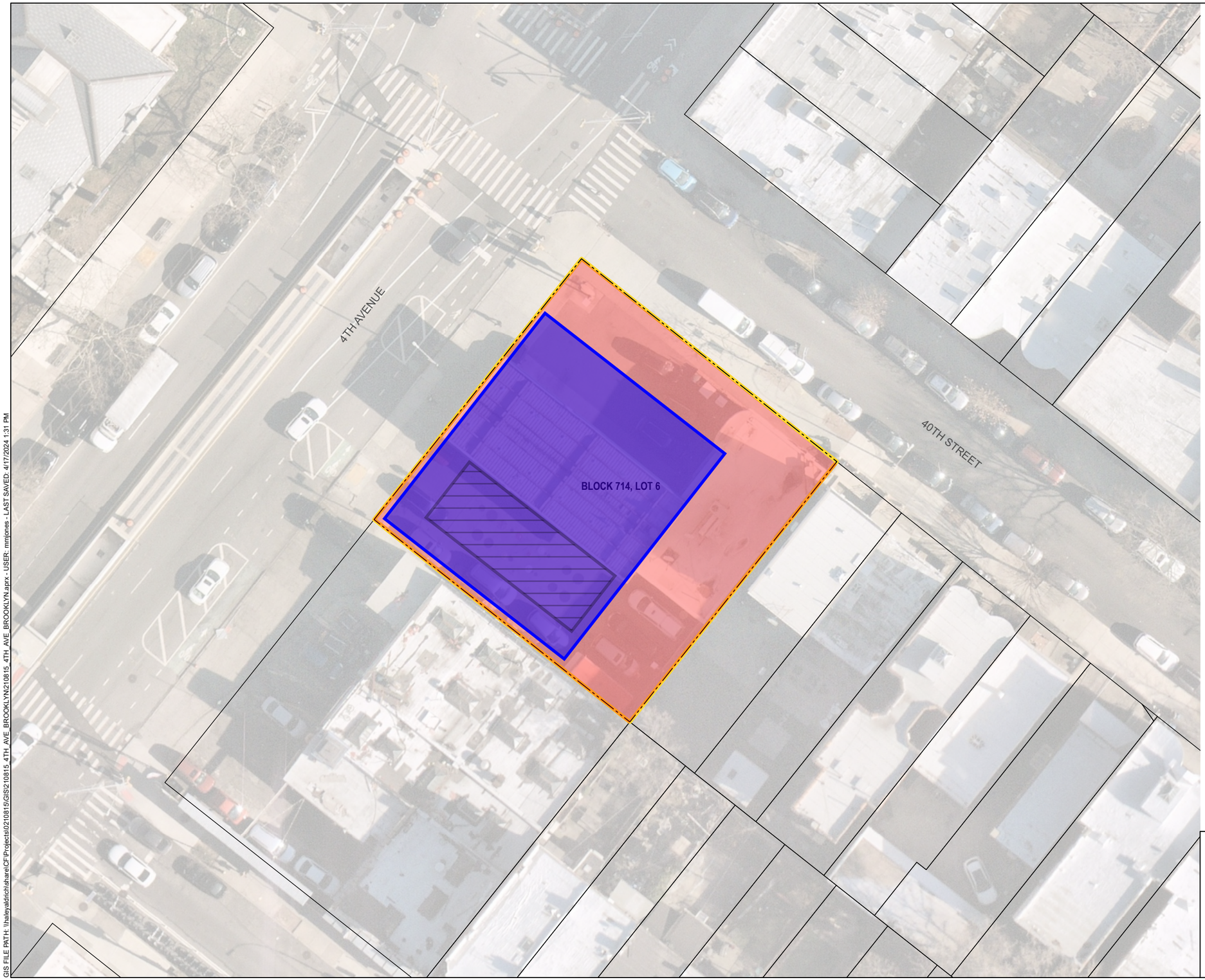
4001 4TH AVENUE
BROOKLYN, NEW YORK

SOIL VAPOR RESULTS SUMMARY MAP

MAY 2026

FIGURE 7

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN_RIR.aprx - USER: pdilillo - LAST SAVED: 5/18/2026 11:16 AM



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA
- EXCAVATION TO 2' BGS
- EXCAVATION TO 25' BGS
- APPROXIMATE LOCATION OF GROUNDWATER CUTOFF WALL

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

ALTERNATIVE I EXCAVATION PLAN

JANUARY 2026

FIGURE 8

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjones - LAST SAVED: 4/17/2024 1:31 PM



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA
- EXCAVATION TO 60' BGS

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

ALTERNATIVE II EXCAVATION PLAN

JANUARY 2026

FIGURE 9

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjones - LAST SAVED: 4/17/2024 1:31 PM



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA
- PROPOSED DOCUMENTATION SAMPLE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

DOCUMENTATION SAMPLE PLAN

JANUARY 2026

FIGURE 10

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjones - LAST SAVED: 4/17/2024 1:31 PM



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA
- PROPOSED INJECTION POINT
- APPROXIMATE RADIUS OF INFLUENCE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

CONCEPTUAL IN SITU INJECTION PLAN

JANUARY 2026

FIGURE 11

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\021081\5\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjones - LAST SAVED: 4/17/2024 1:31 PM



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA
- IN SITU GROUNDWATER TREATMENT AREA
- PROPOSED OFFSITE BORING
- PROPOSED OFFSITE BORING/MONITORING WELL
- PROPOSED POST REMEDIATION MONITORING WELL

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024

N

0 30 60

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

POST REMEDIATION BORING AND GROUNDWATER WELL PLAN

JANUARY 2026

FIGURE 12

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjones - LAST SAVED: 4/17/2024 1:31 PM



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA
- APPROXIMATE LOCATION OF GROUNDWATER CUTOFF WALL
- PROPOSED CELLAR (FOR REMEDIAL EQUIPMENT)
- PROPOSED SSDS PIPING
- PROPOSED SSDS MONITORING POINT
- PROPOSED RISER TO ROOF

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024
4. LOOP 1 OF THE SSDS TO BE INSTALLED APPROXIMATELY 4' BGS
5. LOOP 2 OF THE SSDS TO BE INSTALLED BELOW PROPOSED CELLAR

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

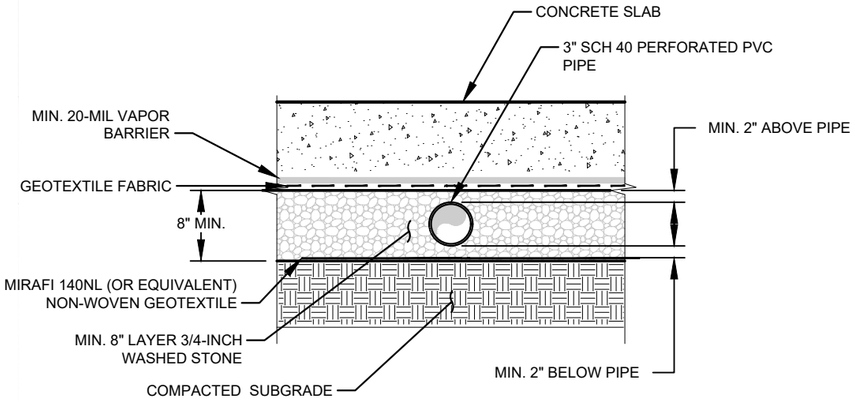
4001 4TH AVENUE
BROOKLYN, NEW YORK

CONCEPTUAL SSDS PLAN

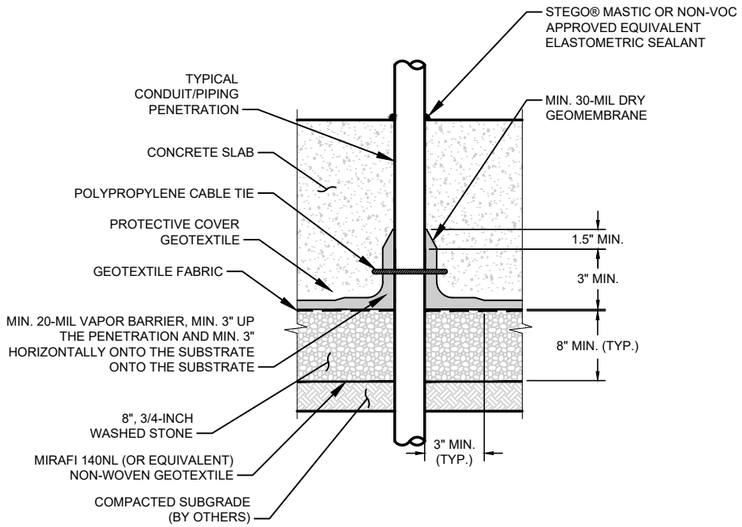
JANUARY 2026

FIGURE 13A

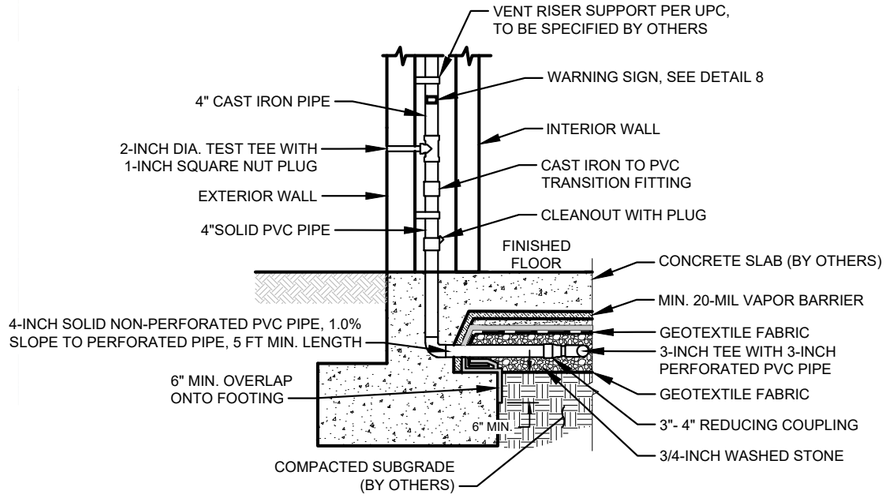
GIS FILE PATH: \\haleyaldrich\share\CF\Projects\021081\5\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjores - LAST SAVED: 4/17/2024 1:31 PM



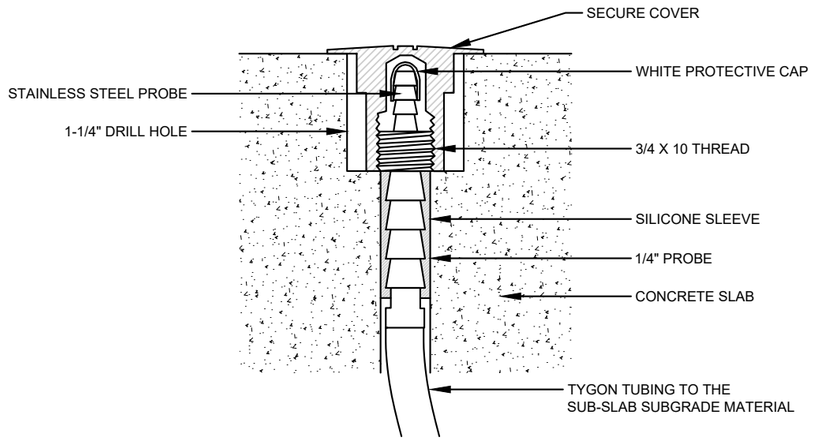
1 **SUB-SLAB PIPING WITHIN GAS PERMEABLE LAYER (TYP.)**
NTS



3 **PIPE PENETRATION SEAL - CABLE TIE (TYP.)**
NTS



11 **FOOTING WITH VERTICAL RISER WITHIN WALL CHASE (TYP.)**
NTS



8 **TYPICAL VACUUM MONITORING PROBE DETAIL - BELOW CONCRETE SLAB, ABOVE VAPOR BARRIER (VAPOR PIN® TYPE OR APPROVED EQUIVALENT)**
NTS

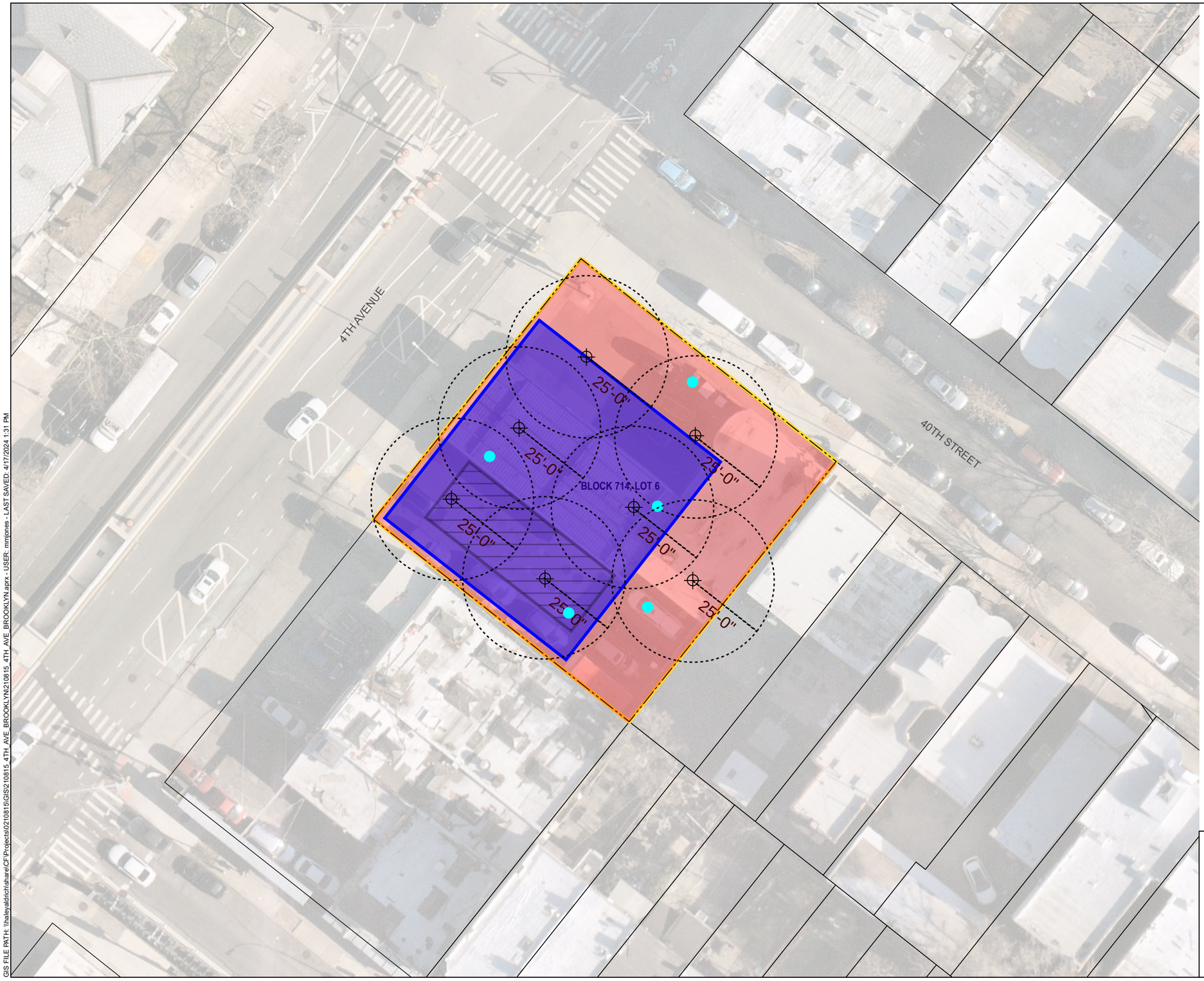
HALEY ALDRICH
4001 4TH AVENUE
BROOKLYN, NEW YORK

TYPICAL SSDS DESIGN DETAILS

JANUARY 2026

FIGURE 13B

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0201577\GIS\Maps\2022_03_204642\202164_001_0002_SITE_PLAN.mxd — USER: hwachholz — LAST SAVED: 3/28/2022 3:32:12 PM



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- FORMER UST AREA
- EXCAVATION TO 2' BGS
- EXCAVATION TO 25' BGS
- APPROXIMATE LOCATION OF GROUNDWATER CUTOFF WALL
- PROPOSED SVE WELL
- APPROXIMATE EXTENT OF SVE RADIUS OF INFLUENCE
- PROPOSED SVE MONITORING POINT

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

ALTERNATIVE I SVE LAYOUT PLAN

JANUARY 2026

FIGURE 14

GIS FILE PATH: \\haleyaldrich\share\CF Projects\0210815\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: mmjones - LAST SAVED: 4/17/2024 1:31 PM



LEGEND

- TRUCK INGRESS
- TRUCK EGRESS
- CONSTRUCTION ENTRANCE
- SITE BOUNDARY
- PARCEL BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, JULY 3, 2025

N

0 20 40

SCALE IN FEET

HALEY ALDRICH

4001 4TH AVENUE
BROOKLYN, NEW YORK

PROPOSED TRUCK ROUTE

JANUARY 2026

FIGURE 15

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\021081S\GIS\210815_4TH_AVE_BROOKLYN\210815_4TH_AVE_BROOKLYN.aprx - USER: gwilde - LAST SAVED: 8/26/2025 10:23 AM

APPENDIX A
Survey Map

JOB NUMBER: B714-6

PROPERTY ADDRESS: 4001 4th AVENUE

BUILDING DEPARTMENT PURPOSES ONLY

SYMBOLS AND ABBREVIATIONS

FENCES — C.L.FENCE — METAL FENCE — WOOD FENCE

UTILITY POLE — U.P. — GUY WIRE — U.P.

CATCH BASIN — C.B. WITH INLET — C.B.

PARKING METER — P.M.

TRAFFIC LIGHT — T.L. — WITH STREET LIGHT

LIGHT

STREET LIGHT

FIRE HYDRANT — HYD. — HYD.

SIAMESE CONNECTION

SHUT OFF VALVE — G.V. — G.V. — W.V. — W.V.

HANDICAPPED PARKING

EXISTING TREE — Ø12" — TREE GROUP

DRAINS — DR. — DR.

TRAFFIC SIGN — T.S.

CURB AND CURB CUT — CURB CUT

OVERHEAD SERVICE — O.H.S.W.

CABLE TV MANHOLE — C.TV.

MANHOLES — G — E — T — W — S — RIM EL. / INV.EL.

CITY MONUMENT

CUT CROSS

SET NAIL

SET STAKE

SET MARK (PAINTED)

SET BENCHMARK

F.E. — FIRE ESCAPE

PL. or PLTF. — PLATFORM

C.E. — CELLAR ENTRANCE

A.W. — AIR WAY

CONC. — CONCRETE

PVMT. — PAVEMENT

AC — AIR CONDITION

MET. — METAL

N — NORTH OF PROPERTY LINE

S — SOUTH OF PROPERTY LINE

E — EAST OF PROPERTY LINE

W — WEST OF PROPERTY LINE

1"=30'

GRAPHIC SCALE 0 5 10 15 20 25 30 35 40 45 50

AREA=10016.7 SQ.FT.

GENERAL NOTES

SUBSURFACE UTILITIES ARE NOT GUARANTEED BY SURVEYOR. HIGH CAUTION RECOMMENDED AND VERIFICATION WITH PROPER CITY AGENCIES, IS MANDATORY BEFORE COMMENCING ALL NEW WORK.

ALL SUBSURFACE AND OVERHEAD UTILITIES (AS TO SIZE , TYPE AND DEPTH) SHOWN ON THIS SURVEY ARE TAKEN FROM RECORDS OF GOVERNMENTAL AGENCIES AND UTILITY COMPANIES, UNLESS OTHERWISE NOTED AND SHOWN. COVER OR DEPTH OF UTILITIES WHICH DERIVED FROM FIELD MEASUREMENTS SHOWN ON THIS SURVEY SHOULD BE VERIFIED WITH PROPER AGENCY PRIOR TO CONSTRUCTION OF PROJECT. INVERT ELEVATIONS ARE DERIVED FROM CITY AGENCY RECORDS WHEN NOT AVAILABLE BY FIELD SURVEY AND NOTED AS "PER RECORD" ON THE SURVEY.

ALL SUBSURFACE UTILITY AS TO LOCATION AND DEPTH, SHOULD BE RECHECKED AND LEGAL GRADES SHOULD BE VERIFIED WITH THE TOPOGRAPHICAL BUREAU, PREFERABLY IN WRITING BEFORE COMMENCING CONSTRUCTION.

THIS IS TO CERTIFY THAT THERE ARE NO STREAMS OR NATURAL WATER COURSES ON THE SURVEYED PROPERTY EXCEPT AS SHOWN AND/OR DESCRIBED ON THIS SURVEY.

ALL OPERATIONS OF UNDERGROUND FACILITIES AND ALL EXCAVATORS ARE OBLIGATED TO COMPLY WITH ARTICLE 36 OF THE GENERAL BUSINESS LAW AND WITH PROVISIONS OF INDUSTRIAL CODE PART (RULE NO.35) BEFORE ANY EXCAVATION OR DEMOLITION IS COMMENCED. EVERY EXCAVATOR IS REQUIRED BY THESE LAWS TO GIVE ADVANCE NOTICE TO EVERY OPERATOR OF UNDERGROUND FACILITIES OF HIS INTENT TO PERFORM EXCAVATION OR DEMOLITION WORK IN THE SPECIFIED AREA.

THE USER OF THE SURVEY EXPRESSLY UNDERSTANDS AND AGREES THAT THE SURVEYOR MAKES NO CLAIM AND DOES NOT GUARANTEE THAT THE SEWERS SHOWN HEREON ARE PUBLIC OR THAT ANY PROPERTIES SHOWN ON THE SURVEY WILL BE ABLE TO CONNECT TO SAME.

THE USER OF THIS SURVEY EXPRESSLY AGREES AND UNDERSTANDS THAT SHOULD JAROSLAW KRAWCZYK OR KABA LAND SURVEYING, PC. BE FOUND LIBEL IN A COURT OF LAW FOR ERRORS OR EMISSIONS ARISING FROM THIS SURVEY THAT THE LIMIT OF LIABILITY IS THE PRICE PAID FOR THIS SURVEY.

DO NOT USE THIS SURVEY UNLESS YOU AGREE AND CONSENT TO ALL OF THE ABOVE.

ALL ELEVATIONS SHOWN REFER TO NAVD 88 DATUM.

LEGAL GRADES SHOWN ON THE SURVEY REFER TO NAVD 88 DATUM.

NOTES:

SURVEYED AS IN POSSESSION. OFFSETS AND/OR DIMENSIONS SHOWN BETWEEN THE STRUCTURES AND PROPERTY LINES ARE FOR SPECIFIC PURPOSE AND USE AND THEREFORE ARE NOT INTENDED TO GUIDE ERECTION OF FENCES, RETAINING WALLS, POOLS, PLANTING AREAS, ADDITIONS TO STRUCTURES, SHEDS, GARAGES AND ANY OTHER CONSTRUCTION AND/OR DESIGN..

PLUMBNESS OF WALLS NOT VERIFIED.

UNDERGROUND AND SIDEWALK VAULTS NOT LOCATED AS PART OF THIS SURVEY.

PROPERTY CORNER MONUMENTS WERE NOT PLACED AS PART OF THIS SURVEY.

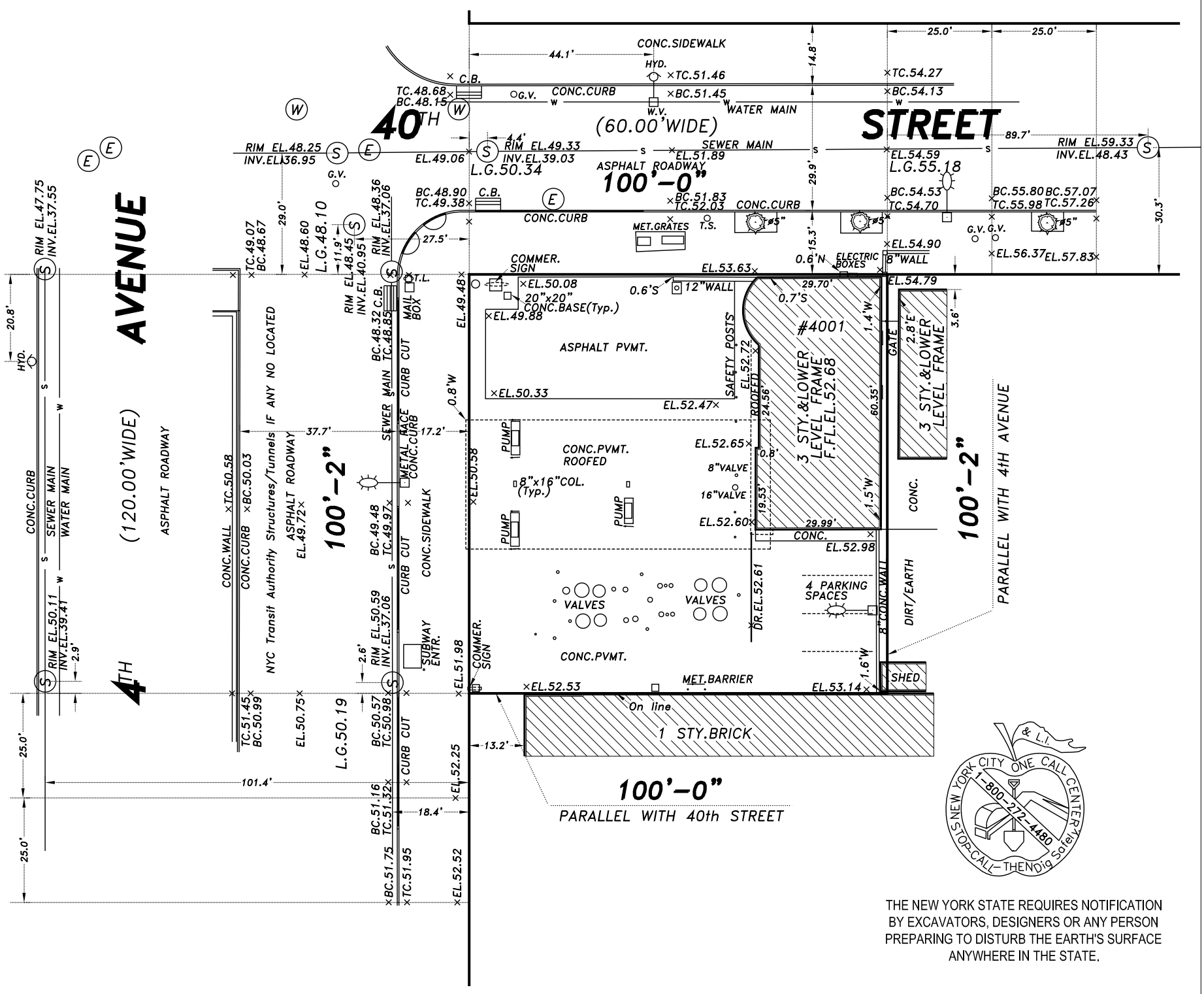
THIS SURVEY HAS BEEN PREPARED WITHOUT A FULL ABSTRACT OF TITLE. OTHER AGREEMENTS, COVENANTS AND/OR RESTRICTIONS AFFECTING AND/OR BENEFITING PARCEL SURVEYED, IF ANY, NOT INDICATED HEREON.

EASEMENTS IF ANY IF NOT SHOWN ON THIS SURVEY ARE NOT GUARANTEED.

SOME DIMENSIONS, FEATURES AN/OR LOCATIONS MAY NOT BE DRAWN TO SCALE TO PROVIDE CLARITY.

PARTY WALL(S) HEREON ARE SHOWN SCHEMATICALLY ONLY AND WERE NOT SURVEYED. LOCATION AND EXTENTS OF PARTY WALL(S) ARE NOT SHOWN ON THE SURVEY AND DENOTED BASED UPON RECORD DOCUMENTS IF AVAILABLE AND/OR EXTERIOR OBSERVATION ONLY, IF POSSIBLE. PARTY WALL(S) AND LOCATION/EXTENTS OF SAME MUST BE CONFIRMED AND VERIFIED BY THE USER OF THIS SURVEY. PARTY WALL(S) AND LOCATION/EXTENTS OF SAME ARE NOT VERIFIED OR CERTIFIED BY THE LAND SURVEYOR.

DO NOT USE THIS SURVEY UNLESS YOU AGREE AND CONSENT TO ALL OF THE ABOVE.



THE NEW YORK STATE REQUIRES NOTIFICATION BY EXCAVATORS, DESIGNERS OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE STATE.

kaBA surveying

phone:718-354-7279 718-470-2358

fax:718-247-5854 718-470-2264

338 JERICHO TURNPIKE, FLORAL PARK, NY 11001

SURVEYS@KABAPLS.COM

SURVEYED & GUARANTEED FOR:

DEPARTMENT OF BUILDINGS

STATE OF NEW YORK JAROSLAW W. KRAWCZYK No. 050750 LICENSED LAND SURVEYOR

BOROUGH:KINGS

TOWN:BROOKLYN

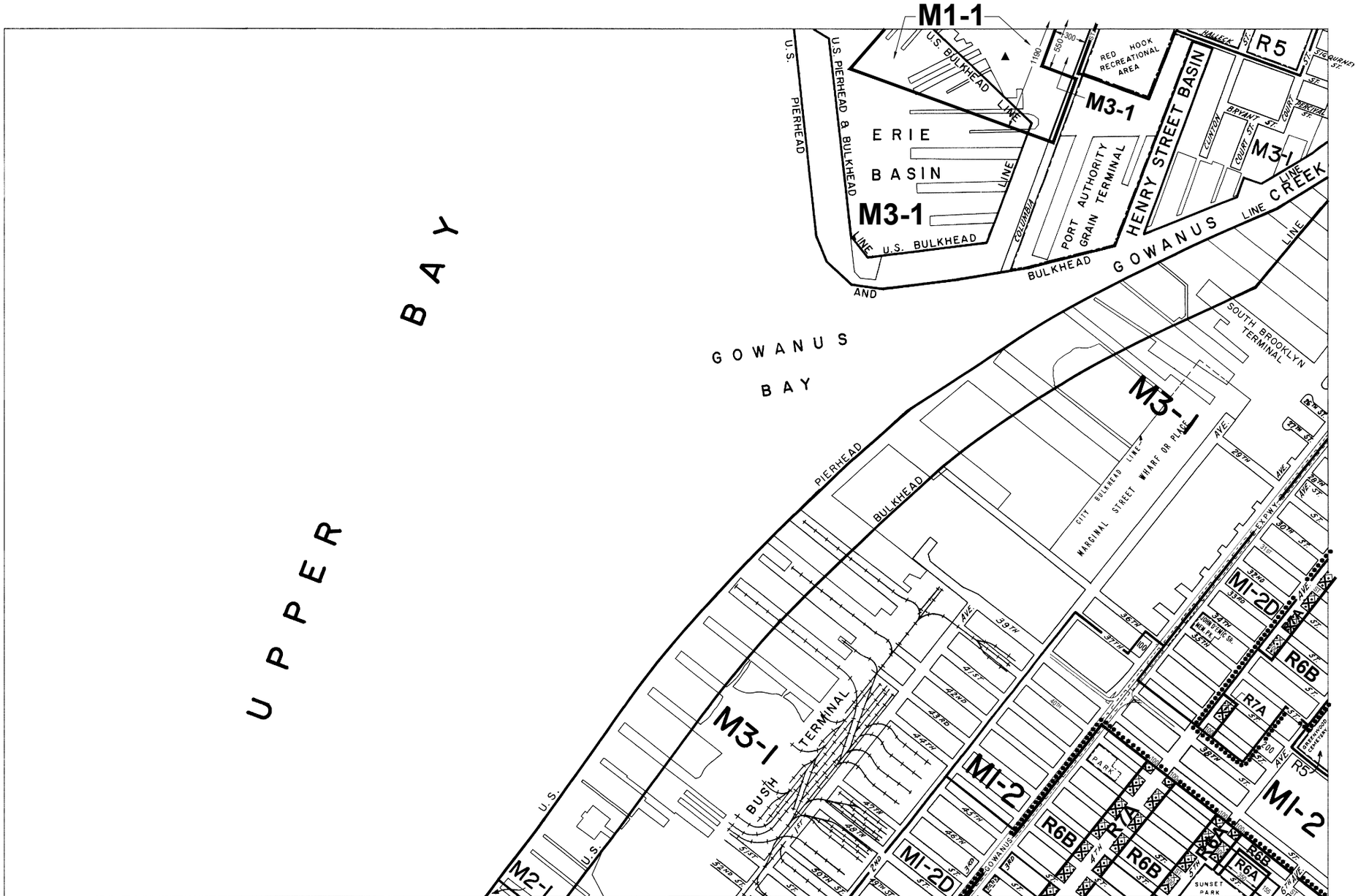
BLOCK: 714 LOT:6

SURVEYED:

AUGUST 10, 2023-ARCHITECTURAL SURVEY

UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF **THE NEW YORK STATE EDUCATION LAW.** COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYOR'S INKED SEAL OR EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE A VALID COPY. GUARANTEES OR CERTIFICATIONS INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED AND ON HIS BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. GUARANTEES OR CERTIFICATIONS ARE NOT TRANSFERRABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

APPENDIX B
Zoning Map



600 0 600 1200 1800 FEET

C1-1 C1-2 C1-3 C1-4 C1-5 C2-1 C2-2 C2-3 C2-4 C2-5

NOTE: Where no dimensions for zoning district boundaries appear on the zoning maps, such dimensions are determined in Article VII, Chapter 6 (Location of District Boundaries) of the Zoning Resolution.

ZONING MAP

THE NEW YORK CITY PLANNING COMMISSION

Major Zoning Classifications:

The number(s) and/or letter(s) that follows an R, C or M District designation indicates use, bulk and other controls as described in the text of the Zoning Resolution.

R – RESIDENTIAL DISTRICT

C – COMMERCIAL DISTRICT

M – MANUFACTURING DISTRICT

SPECIAL PURPOSE DISTRICT
The letter(s) within the shaded area designates the special purpose district as described in the text of the Zoning Resolution.

AREA(S) REZONED

Effective Date(s) of Rezoning:

09–30–2009 C 090387 ZMK

Special Requirements:

For a list of lots subject to CEQR environmental requirements, see APPENDIX C.

For a list of lots subject to "D" restrictive declarations, see APPENDIX D.

For Inclusionary Housing designated areas and Mandatory Inclusionary Housing areas on this map, see APPENDIX F.

CITY MAP CHANGE(S):

▲ 7–18–2009 C 030412 MMK

N

MAP KEY

	16a	16c
	16b	16d
21c	22a	22c

© Copyrighted by the City of New York

ZONING MAP **16b**

NOTE: Zoning information as shown on this map is subject to change. For the most up-to-date zoning information for this map, visit the Zoning section of the Department of City Planning website: **www.nyc.gov/planning** or contact the Zoning Information Desk at (212) 720-3291.

APPENDIX C
Construction Health and Safety Plan

HALEY & ALDRICH, INC.
CONSTRUCTION HEALTH AND SAFETY PLAN

FOR

4001 4th Avenue Redevelopment Site

4001 4th Avenue, Brooklyn, New York 11232

Project/File No. 0210815

Gensuite EZ Scan®
BI - Developers

Prepared By: Owen Hennigan	**Date: 2/12/2026**
Approvals: The following signatures constitute approval of this Health & Safety Plan.	
Insert Field Safety Managers electronic signature.	
Field Safety Manager: Luke McCartney Choose an item.	**Date:** Click or tap to enter a date.
Insert Project Manager's electronic signature.	
Project Manager: Thomas Giordano	**Date:** Click or tap to enter a date.
HASP Valid Through: 12-31-2026	

Table of Contents

		Page
	STOP WORK AUTHORITY	i
	STOP WORK AUTHORITY	i
ISSUANCE AND COMPLIANCE		**II**
	Emergency Event Procedures	iii
EMERGENCY EVENT PROCEDURES		**III**
	PROJECT INFORMATION AND CONTACTS	iv
PROJECT INFORMATION AND CONTACTS		**IV**
DIRECTIONS TO THE NEAREST HOSPITAL		**V**
DIRECTIONS TO THE NEAREST URGENT CARE		**VI**
1.	**WORK SCOPE**	**1**
	Project Task Breakdown	1
	Subcontractor(s) Tasks	1
2.	**SITE OVERVIEW / DESCRIPTION**	**2**
	Site Classification	2
	Site Description	2
	Background and Historic Site Usage	2
	Site Status	2
	Site Plan	2
	Work Areas	2
3.	**HAZARD ASSESSMENT**	**4**
	Site Chemical Hazards	4
	Site Hazards Checklist	6
	Weather	6
	High Winds	7
	Biological	7
	Location/Terrain	11
	Miscellaneous	12
	Task Hazard Summary	14
	Task Physical Hazards Checklist	18
	Summary of Physical Hazards & Controls	19
4.	**PROTECTIVE MEASURES**	**27**
	Required Safety & Personal Protective Equipment	27
5.	**TRAINING REQUIREMENTS**	**28**
	Site Specific Training Requirements	28
	Task Specific Training Requirements	28
6.	**AIR MONITORING PLAN AND EQUIPMENT**	**29**
	Air Monitoring/Screening Equipment Requirements	29

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

Monitoring Plans 29

7. DECONTAMINATION & DISPOSAL METHODS 31

Personal Hygiene Safeguards 31
Decontamination Supplies 31
Location of Decontamination Station 31
Standard Personal Decontamination Procedures 32
Disposal Methods 33
Disposal of Single Use Personal Protective Equipment 33

8. SITE CONTROL 34

Communication 34
Visitors 34
Zoning 34

9. SITE SPECIFIC EMERGENCY RESPONSE PLAN 35

Pre-Emergency Planning 35
Onsite Emergency Response Equipment 35
EVACUATION ALARM 36
EVACUATION ROUTES 36
EVACUATION MUSTER POINT(S)/ SHELTER AREA(S) 36
EVACUTION RESPONSE DRILLS 36
Emergency Type 37
Notification 37
Response Action 37
Evacuation Plan/Route 37

10. HASP ACKNOWLEDGEMENT FORM 38

ATTACHMENT A 1
ATTACHMENT B 1
ATTACHMENT C 1
ATTACHMENT D 1
ATTACHMENT E 1
ATTACHMENT F 1

Attachments

Attachment A	HASP Amendment Form
Attachment B	Training Requirements
Attachment C	Roles and Responsibilities
Attachment D	Job Safety Analyses
Attachment E	Project Site Forms

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

STOP WORK AUTHORITY

In accordance with the H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York; hereinafter referred to as Haley & Aldrich in this document) Stop Work Authority Operating Procedure (OP1035), any individual has the right to refuse to perform work that he or she believes to be unsafe without fear of retaliation. He or she also has the authority, obligation, and responsibility to stop others from working in an unsafe manner.

STOP Work Authority is the stop work policy for all personnel and subcontractors on the Site. When work has been stopped due to an unsafe condition, Haley & Aldrich site management (e.g., Project Manager [PM], Site Health & Safety Officer [SHSO], etc.) and the Haley & Aldrich Senior Project Manager (SPM) will be notified immediately.

Reasons for issuing a stop work order include, but are not limited to:

- The belief/perception that injury to personnel or accident causing significant damage to property or equipment is imminent.
- A Haley & Aldrich subcontractor is in breach of site safety requirements and/or their own site Health and Safety Plan (HASP).
- Identifying a substandard condition (e.g., severe weather) or activity that creates an unacceptable safety risk as determined by a qualified person.

Work will not resume until the unsafe act has been stopped OR sufficient safety precautions have been taken to remove or mitigate the risk to an acceptable degree. Stop work orders will be documented as part of an on-site stop work log, on daily field reports to include the activity/activities stopped, the duration, the person stopping work, the person in charge of stopped activity/activities, and the corrective action agreed to and/or taken. Once work has been stopped, only the Haley & Aldrich SPM or SHSO can give the order to resume work. Haley & Aldrich senior management is committed to supporting anyone who exercises his or her “Stop Work” authority.

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

ISSUANCE AND COMPLIANCE

This HASP has been prepared in accordance with Occupational Safety and Health Administration (OSHA) regulations (CFR 29, Parts 1904, 1910, and 1926) if such are applicable.

The specific requirements of this HASP include precautions for hazards that exist during this project and may be revised as new information is received or as site conditions change.

- This HASP must be signed by all Haley & Aldrich personnel involved in the implementation of the Statement of Work (SOW) (Section 2 of this HASP).
- This HASP, or a current signed copy, must be retained at all times when Haley & Aldrich staff are present.
- Revisions to this HASP must be outlined within the contents of the HASP. If immediate or minor changes are necessary, the Field Safety Manager (FSM), Haley & Aldrich, Site Safety Officer (SSO), and/or PM may use Attachment 1 (HASP Amendment Form), presented at the end of this HASP. Any revision to the HASP requires employees and subcontractors to be informed of the changes so that they understand the requirements of the change.
- Deviations from this HASP are permitted with approval from the Haley & Aldrich FSM, PM, or Senior Health & Safety Manager (SHSM). Unauthorized deviations may constitute a violation of Haley & Aldrich company procedures/policies and may result in disciplinary action.
- This HASP will be relied upon by Haley & Aldrich's subcontractors and visitors to the site. Haley & Aldrich's subcontractors must have their own HASP which will address hazards specific to their trade that are not included in this HASP. This HASP will be made available for review to Haley & Aldrich's subcontractors and other interested parties (e.g. facility personnel and regulatory agencies) to ensure that Haley & Aldrich has properly informed our subcontractors and others of the potential hazards associated with the implementation of the SOW to the extent that Haley &Aldrich is aware.

This site-specific HASP provides only site-specific descriptions and work procedures. General safety and health compliance programs in support of this HASP (e.g., injury reporting, medical surveillance, personal protective equipment [PPE] selection, etc.) are described in detail in the Haley &Aldrich Corporate Health and Safety Program Manual and within Haley & Aldrich's Standard Operating Procedures (SOPs). Both the manual and SOPs can be located on Haley & Aldrich's Company Intranet. When appropriate, users of this HASP should always refer to these resources and incorporate them to the extent possible. The manual and SOPs are available to clients and regulators upon request.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

EMERGENCY EVENT PROCEDURES

1 - ASSESS THE SCENE

- **STOP WORK**
- Review the situation and ascertain if it is safe to enter the area.
- Evacuate the site if the conditions are unsafe.

2 - EVALUATE THE EMERGENCY

- **Call 911, or designated emergency number, if required.**
- **Provide first aid for the victim if qualified and safe to do so.**
  - First aid will be addressed using the onsite first aid kit. *
    - If providing first aid, remember to use proper first aid universal precautions if blood or bodily fluids are present.
- For all injuries or illnesses (including exposure to ticks) not requiring 911 or similar emergency response, staff shall contact the Acuity Injury Illness Hotline (888-397-8099) to initiate a health assessment and receive guidance.
- **If exposure to hazardous substance is suspected, immediately vacate the contaminated area.**
  - Remove any contaminated clothing and/or equipment.
  - Wash any affected dermal/ocular area(s) with water for at least 15 minutes.
  - Seek immediate medical assistance if any exposure symptoms are present.

** Note: Haley & Aldrich employees are not required or expected to administer first aid / CPR to any Haley & Aldrich staff member, Contractor, or Civilian personnel at any time; it is Haley & Aldrich´s position that those who do are doing so on their own behalf and not as a function of their job.*

3 - SECURE THE AREA

- **Cordon off the incident area, if possible.**
  - Notify any security personnel, if required.
  - Escort all non-essential personnel out of the area, if able.

4 - REPORT ON-SITE ACCIDENTS / INCIDENTS TO PM / SSO

- **Notify the PM and SSO as soon as it is safe to do so.**
  - Assist PM and SSO in completing any additional tasks, as required.

5 - INVESTIGATE / REPORT THE INCIDENT

- **Record details of the incident for input to the Gensuite.**
  - Complete any additional forms as requested by the PM and SSO.

6 - TAKE CORRECTIVE ACTION

- **Implement corrective actions per the PM following root cause analysis.**
  - Complete Lessons Learned form.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

PROJECT INFORMATION AND CONTACTS	
Project Name: 4001 4th Avenue Redevelopment Site	**Haley & Aldrich File No.:** 0210815
Location: 4001 4th Avenue, Brooklyn, New York	
Client/Site Contact: Phone Number:	4 Ave Property LLC Ari Schwartz 718-408-8778
Haley & Aldrich Field Representative: Phone Number: Emergency Phone Number:	**Zavier Richards** 929-696-2279 332-236-9927
Haley & Aldrich Project Manager: Phone Number: Emergency Phone Number:	**Thomas Giordano** 929-243-6762 646-277-5692
Field Safety Manager: Phone Number: Emergency Phone Number:	**Brian Ferguson** 617-886-7439 617-908-2761
Nearest Hospital: Address: (see map on next page) Phone Number:	NYU Langone Hospital – Brooklyn – Emergency Department 5500 2nd Ave Brooklyn, New York 11220 718-630-7185
Nearest Occ. Health Clinic: http://www.talispoint.com/liberty/ext/ Address: (see map on next page) Phone Number:	CityMD Sunset Park Urgent Care – Brooklyn 5024 5th Ave Brooklyn, NY 11220 718-571-9251
Acuity Injury and Illness Hotline	**888-397-8099**
Emergency Response Number:	**911**
Other Local Emergency Response Number:	N/A
Other Ambulance, Fire, Police, or Environmental Emergency Resources:	911

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

DIRECTIONS TO THE NEAREST HOSPITAL

Liberty Mutual Medical Location Directory



Directions to the Nearest Hospital:

10 min (1.4 miles)

via 41st St and 2nd Ave

Best route, despite the usual traffic

4001 4th Ave
Brooklyn, NY 11232

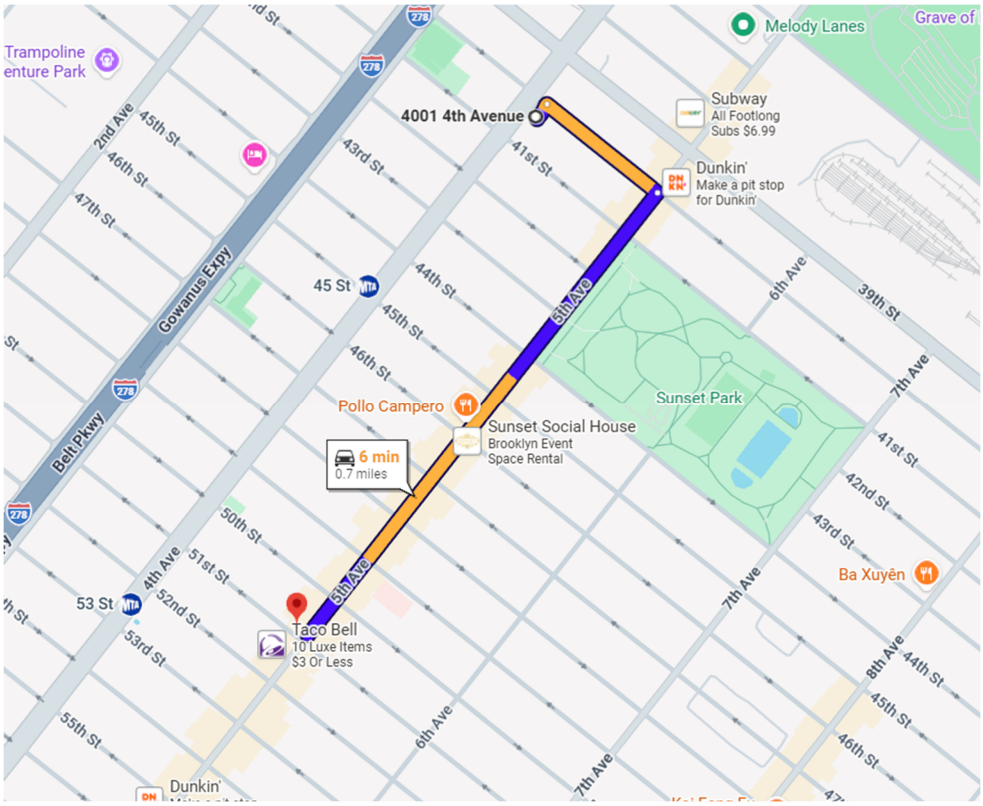
- Head toward 40th St — 89 ft
- Turn right onto 40th St — 0.1 mi
- Turn right at the 1st cross street onto 5th Ave — 259 ft
- Turn right at the 1st cross street onto 41st St — 0.4 mi
- Turn left onto 2nd Ave — Destination will be on the right — 0.7 mi

5500 2nd Ave
Brooklyn, NY 11220

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

DIRECTIONS TO THE NEAREST URGENT CARE

Liberty Mutual Medical Location Directory



6 min (0.7 mile)

via 5th Ave

Fastest route, despite the usual traffic

4001 4th Ave
Brooklyn, NY 11232

↑ Head toward 40th St
89 ft

↱ Turn right onto 40th St
0.1 mi

↱ Turn right at the 1st cross street onto 5th Ave
Destination will be on the right
0.5 mi

5024 5th Ave
Brooklyn, NY 11220

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

1. WORK SCOPE

This Site-Specific HASP addresses the health and safety practices and procedures that will be exercised by all Haley & Aldrich employees participating in all work on the Project Site. This plan is based on an assessment of the site-specific health and safety risks available to Haley & Aldrich and Haley & Aldrich's experience with other similar project sites. The scope of work includes the following:

Remedial Oversight activities on the Site will require equipment mobilization, removal of underground storage tanks (USTs) and/or associated appurtenances if encountered, removal of the concrete building slabs, support of excavation (SOE) installation, excavation and off-site disposal of historic fill and contaminated soil up to 25 feet below ground surface (ft bgs), collection of confirmation endpoint samples, and installation of an active sub-slab depressurization system (SSDS).

Project Task Breakdown

Task No.	Task Description	Employee(s) Assigned	Work Date(s) or Duration
1	Remedial Oversight	Zavier Richards	8 months
2	Soil Sampling	Zavier Richards	8 months
3	In-situ Chemical Oxidation Reagent Injection Oversight	Zavier Richards	2 weeks
4	SSDS/SVE Installation Oversight	Zavier Richards	4 weeks
5	Air Sampling	Zavier Richards	1 week
6	Soldier Pile and Lagging	Zavier Richards	4 months
7	Secant Pile Walls Installation	Zavier Richards	4 weeks

Subcontractor(s) Tasks

Firm Name	Work Activity	Work Date(s) or Duration
N/A	N/A	N/A

Projected Start Date: 5/1/2026

Projected Completion Date: 1/31/2027

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

2. SITE OVERVIEW / DESCRIPTION

Site Classification

Commercial

Site Description

The Site is located in the Sunset Park neighborhood of Brooklyn and is identified as Block 714, Lot 6 on the New York City tax map. The Site is approximately 10,017 square feet (sq ft) (0.23 acres) and is currently improved with a retail petroleum station with a one-story convenience store and associated parking lot. The Site is bound by 40th Street followed by mixed-use commercial and residential buildings to the north, a commercial car wash and auto repair to the south, residential apartment buildings to the east, and 4th Avenue followed by Intermediate School (I.S.) 136 to the west.

Background and Historic Site Usage

Based on the findings of the March 2024 Phase I ESA prepared by Lesova Environmental Group (LEG), the Site was comprised of one tax lot developed with a one-story concrete structure and a gasoline filling/auto service station with one (1) UST circa 1926 and a second lot which was vacant. The 1942 Sanborn map depicted the Site merged as one (1) lot with previous use similar to the 1926 map with a garage to the south of the lot. The Site was operated as an automotive service station, lubrication, minor repair, and office use with parking area until at least August 1965. The configuration of Site changed and was identified with a cement brick one-story construction with a gasoline filling station circa 1970. A historical City Directory search indicated that the Site was previously operated as a gasoline filling station and auto service station.

Site Status

Indicate current activity status and describe operations at the site:

Active

The Site is currently operated as a BP Gas Station. Operations are planned to cease in November 2024 and vacated in December 2024, prior to the execution of the proposed work scope.

Site Plan

Is a site plan or sketch available? Yes

Work Areas

List and identify each specific work areas(s) on the job site and indicate its location(s) on the site plan:

The entire Site will be utilized as an active work area

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Site Plan



Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

3. HAZARD ASSESSMENT

Indicate all hazards that may be present at the site and for each task. If any of these potential hazards are checked, it is the Project Manager's responsibility to determine how to eliminate / minimize the hazard to protect onsite personnel.

Site Chemical Hazards

Is this Site impacted with chemical contamination? Yes

Source of information about contaminants: Previous Investigation

Contaminant of Concern	Location/Media	Concentration	Units
1,2,4-Trimethylbenzene	**Soil**	**1,200**	**mg/kg**
Benzene	**Soil**	**20**	**mg/kg**
Ethylbenzene	**Soil**	**1,100**	**mg/kg**
Naphthalene	**Soil**	**89**	**mg/kg**
Xylenes	**Soil**	**2,300**	**mg/kg**
Toluene	**Soil**	**1,500**	**mg/kg**
BTEX/VOCs	**Groundwater**	**40,200**	**ug/L**
1,2,4-Trimethylbenzene	**Groundwater**	**790**	**ug/L**
Naphthalene	**Groundwater**	**160**	**ug/L**
BTEX	**Soil Vapor**	**939,000**	**ug/m3**
Volatile Organic Compounds (VOCs)	**Soil Vapor**	**19,259,150**	**ug/m3**
Chlorinated Volatile Organic Compounds (CVOCs)	**Soil Vapor**	**591.7**	**ug/m3**
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units
Choose an item.	Select Media.		Select Units

1,2,4-Trimethylbenzene: is a colorless liquid chemical with a strong, pleasant scent. 1,2,4-trimethylbenzene is a major part of what is known in the petroleum industry as the 'C9 fraction.' Oil refineries produce large amounts of C9 fraction each year for use as a gasoline additive.

BTEX/VOCs: BTEX is an acronym for benzene, toluene, ethylbenzene and xylenes. These compounds are VOCs, are common in petroleum-related products (e.g., oil, gasoline, coal-tar DNAPL, etc.), and frequently co-occur at hazardous waste sites. Benzene, toluene, ethylbenzene, and xylenes have acute and chronic harmful effects on the central nervous system. Benzene is classified as a carcinogen. Short-term health effects of low-level BTEX exposure include drowsiness, dizziness, accelerated heart rate, headaches, tremors, confusion, and unconsciousness.

Benzene: Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death. The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection. Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men. Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Naphthalene: is a colorless or white/brown solid in flake or cake form, with mothball odor. Commonly found in coal tar, gasoline, or diesel fuels. Used to make mothballs and lubricants. This is a carcinogen and should be handled with extreme caution. Is a combustible solid and when heated is a dangerous fire hazard. Finely dispersed particles can form explosive mixtures. Absorption will cause irritation or burning to skin or eyes. Inhalation will cause irritation to nose and throat. High exposures will lead to headache, fatigue, tremors, and nausea. May also cause damage to liver and kidneys. The PEL 10 ppm averaged over an 8 hour shift.

Xylenes: are colorless liquids with a faint, sweet odor. There are three forms of xylene (meta-, ortho-, and para-), which are referred to as isomers. They are chemically classified as hydrocarbons, meaning they contain hydrogen and carbon atoms. These are chemicals of serious flammability and will easily ignite with heat, sparks or flames. Their flash point range is between 85-115 degrees F. The PEL is 10 ppm averaged over an 8 hour shift.

Typically, these are solvents in making paint, adhesives, and other chemicals. Their odor threshold varies greatly, and this should not be the sole indicator in exposures. Their vapors are heavier than air, but less dense than water, therefore they float. Can be inhaled or absorbed through the skin. Inhalation can irritate throat and nose and cause coughing, headache or dizziness. Absorption can cause skin rash, dryness or redness. Repeated exposures may affect concentration, memory, vision, and muscle coordination.

Click + Add Additional Chemical Language

Click + Add Additional Chemical Language

Click + Add Additional Chemical Language

Click + Add Additional Chemical Language

Click + Add Additional Chemical Language

Site Hazards Checklist			
Weather			
High Winds	Cold Temperatures	Hot Temperatures	Lightning Storms

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

High Winds

While high winds are commonly associated with severe thunderstorms and hurricanes they may also occur as a result of differences in air pressures, such as when a cold front passes across the area. They can cause downed trees and power lines, and flying debris (such as dust or larger debris), which adds additional risks and could lead to power outages, transportation disruptions, damage to buildings and vehicles, and serious injury.

Wind Advisories are issued for sustained winds 25 to 39 mph and/or gusts to 57 mph. High Wind Warnings are issued by the National Weather Service when high wind speeds may pose a hazard or are life threatening. The criteria for this warning will varies by state. The Beaufort Wind Scale is a helpful tool to when dealing with high winds.

Cold Temperatures

Cold stress may occur at any time work is being performed at low ambient temperatures and high-velocity winds. Because cold stress is common and has potentially serious illnesses associated with outdoor work during cold seasons, regular monitoring and other preventative measures are vital.

Refer to OP1003-Cold Stress for additional information and mitigation controls.

Hot Temperatures

Heat stress may occur at any time work is being performed at elevated ambient temperatures. Because heat stress is one of the most common and potentially serious illnesses associated with outdoor work during hot seasons, regular monitoring and other preventative measures are vital. Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventative heat stress management.

H&A employees and their subcontractors should be aware of potential health effects and/or physical hazards of working when there are hot temperatures or a high heat index. Refer OP1015-Heat Stress for a discussion on hot weather hazards.

Lightning Storms

Where the threat of electrical storms and the hazard of lightning exist staff shall ensure site procedures exist to: (1) detect when lightning is in the near vicinity and when there is a potential for lightning and (2) to notify appropriate site personnel of these conditions and (3) implement protocols to stop work and seek shelter.

The 30-30 Rule states that if time between seeing the lightning and hearing the thunder is less than 30 seconds, you are in danger and must seek shelter. You must also stay indoors for more than 30 minutes after hearing the last clap of thunder.

Biological			
Mosquitoes	Stinging Insects	Large/Small Mammals	Wildlife Droppings

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Mosquitos

Work outdoors with temperatures above freezing will likely bring staff into contact with mosquitos. There are a variety of mosquito species that can transmit a range of diseases. Birds act as reservoirs for the viruses that can be collected by the mosquito and transmitted to a person. Majority of mosquitos are mainly a nuisance but staff need to take appropriate precautions to minimize the potential transmission of a virus that can result in one of the following diseases: West Nile, Eastern Equine Encephalitides and Western Encephalitides. Knowing some key steps that can minimize the risk of mosquito bites is, therefore, important in reducing the risks. Workers working outdoors should be aware that the use of PPE techniques is essential to preventing mosquito bites especially when working at sites where mosquitoes may be active and biting.

Use repellents containing DEET, picaridin, IR3535, and some oil of lemon eucalyptus and para-menthane-diol products provide longer-lasting protection. To optimize safety and effectiveness, repellents should be used according to the label instructions. Cover as much of your skin as possible by wearing shirts with long-sleeves, long pants, and socks whenever possible. Avoid use of perfumes and colognes when working outdoors during peak times when mosquitoes may be active; mosquitoes may be more attracted to individuals wearing perfumes and colognes.

Stinging Insects

Stinging Insects fall into two major groups: Apidae (honeybees and bumblebees) and vespids (wasps, yellow jackets, and hornets). Apidae are docile and usually do not sting unless provoked. The stinger of the honeybee has multiple barbs, which usually detach after a sting. Vespids have few barbs and can inflict multiple stings.

There are several kinds of stinging insects that might be encountered on the project site. Most stings will only result in a temporary injury. However, sometimes the effects can be more severe, even life-threatening depending on where you are stung and what allergies you have. Being stung in the throat area of the neck may cause edema (swelling caused by fluid build-up in the tissues) around the throat and may make breathing difficult.

In rare cases, a severe allergic reaction can occur. This can cause "anaphylaxis" or anaphylactic shock with symptoms appearing immediately or up to 30 minutes later. Symptoms include; Hives, itching and swelling in areas other than the sting site, swollen eyes/eyelids, wheezing, chest tightness, difficulty breathing, hoarse voice, swelling of the tongue, dizziness or sharp drop in blood pressure, shock, unconsciousness or cardiac arrest. Reactions can occur the first time you are stung or with subsequent stings. If you see any signs of reaction, or are unsure, call or have a co-worker call emergency medical services (e.g., 911) right away. Get medical help for stings near the eyes, nose or throat. Stay with the person who has been stung to monitor their reaction.

Staff who are allergic to bee stings are encouraged to inform their staff/project manager. If staff member carries an Epi-pen (i.e., epinephrine autoinjector) they are encouraged to inform their colleagues in case they are stung and are incapable of administering the injection. Examine site for any signs of activity or a hive/nest. If you see several insects flying around, see if they are entering/exiting

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

from the same place. Most will not sting unless startled or attacked. Do not swat, let insects fly away on their own. If you must, walk away slowly or gently "blow" them away. If a nest is disturbed and you hear "wild" buzzing, protect your face with your hands and run from the area immediately. Wear long sleeves, long pants, and closed-toed boots. Wear light colored clothes such as khakis. Avoid brightly colored, patterned, or black clothing. Tie back long hair to avoid bees or wasps from entanglement. Do not wear perfumes, colognes or scented soaps as they contain fragrances that are attractive. If bee or wasp is found in your car, stop and leave windows open.

Small Mammals

Rodents, are the most abundant order of mammals. There are hundreds of species of rats; the most common are the black and brown rat. Other rodents you may encounter are mice, beavers, squirrels, guinea pigs, capybaras and coypu.

The Brown Rat has small ears, blunt nose, and short hair. It is approximately 14-18” long (with tail). They frequently infest garbage/rubbish, slaughterhouses, domestic dwellings, warehouses, and supermarkets. They also frequent any space with an easy meal and potential nesting sites. The Black Rat is identified by its tail, that is always longer than the length from the head to the body. It is also slimmer and more agile than the Brown rat. Its size varies according to its environment and food supply.

The House Mouse has the amazing ability to adapt and can frequently be found in human dwellings. In buildings, mice will live anywhere and difficult to keep out. Mice are omnivorous, they will eat anything. Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

Some major problems caused by rats and mice are contaminating the food they eat with urine and excrement. Gnawing into materials such as paper, wood, or upholstery, to use as nest material. Also gnawing plastic, cement, soft metals such as lead and aluminum, and wiring, which may cause a fire hazard. Occasionally biting people and may kill small animals. They, or the parasites they carry, like fleas, mites and worms, spread many diseases such as salmonella, trichinosis, rat bite fever, hantavirus, Weil's disease, and bubonic plague. They damage ornamental plants by burrowing among the roots or feeding on new growth. They also eat garden vegetables, such as corn and squash. These rodents have been a problem for centuries, because of their incredible ability to survive and are so difficult to eliminate. In addition, they are extremely compatible with human behavior and needs.

Avoid contact with rodents, if possible. Avoid contact with rodent excrement. Do not eat food or water that may have encountered rodent excrement. If exposed, wash hands and avoid touching your face with your hands.

Large Mammals

When working in remote locations staff may come near wild or stray dogs, coyotes, foxes or other large animals. It is important that staff avoid contact with these animals.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

There are increasing reports of wild dog attacks on household pets, attacks on human are uncommon and rare or infrequent at best. However, attacks by individual or small groups of domestic dogs occur frequently resulting in injury or a fatality on rare occasion. Wild dogs may become skilled at hunting in groups for small game and large game from rabbits and hares to deer and moose. The impact of wild dogs, on livestock and wildlife, varies by location and is influenced by factors such as availability of other food, number of dogs, and competition by other predators. Wild dogs kill house cats and may injure or kill domestic dogs. Areas where people have not hunted and trapped wild dogs, a fear of humans may not have developed and in such dogs may attack people and children. This can be a serious problem in areas where feral dogs feed at and live around garbage dumps near human dwellings. Such situations occur most frequently around small remote towns. In urban settings domestic dogs can be territorial and exhibit aggressive behavior such as barking and snarling when their area is encroached. It is not uncommon for domestic dogs to travel in small packs.

If the pack displays aggressive behavior and charges do not run or turn your back. When confronted by one or more dog it is important not to run or exhibit any behavior that may be construed as a challenge (e.g., looking the dog in the eyes, showing your teeth, or attempting to pet the dog).Stand still and place your work bag between you and the dog and then begin to move slowly away from the dog(s) while not turning your back. If you see a stray dog approaching from a distance, look for a place that's secure. Step inside a fenced area, enter a place of business, or knock on a neighbor's door. It is always better to be safe than risk a potentially dangerous situation.

Wildlife Droppings

Project sites involving abandoned buildings may bring staff into contact with animal droppings. There are many diseases that one can be exposed to from a variety of animals.

Mice and Rats
Hantavirus is transmitted to humans from dried droppings, urine, or saliva of mice and rats. The disease begins as a flu-like illness with fever, chills, and muscle aches, but can rapidly progress to a life-threatening condition marked by respiratory failure as fluids fill the lungs. Persons working in infested buildings are at increased risk to this disease, particularly during dusty clean-up activities.

Birds and Bats
Large populations of roosting birds may present a disease risk. The most serious health risks arise from disease organisms that grow in the nutrient-rich accumulations of bird droppings, feathers and debris under a roost, particularly if roosts have been active for years.

Histoplasmosis and Cryptococcosis are the most common fungal diseases associated with bird and bat dropping. Infection occurs when spores, carried by the air, are inhaled, especially after a roost has been disturbed. The active and inactive roosts of blackbirds, starlings and cowbirds have also been found to be heavily contaminated with fungus spores. Most infections are mild and produce either no symptoms or a minor influenza-like illness. Occasionally the disease can cause high fever, blood abnormalities, pneumonia and even death.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Do not touch droppings with unprotected hands. Avoid disturbing the droppings and generating dust. Employee work practices and dust control measures that eliminate or reduce dust generation during removal of manure from a building will also reduce risks of infection and development of disease. Use an industrial vacuum cleaner with a high-efficiency (HEPA) filter to bag contaminated material.

Location/Terrain			
Slip/Trip/Falls	SIMOPS	Economically Depressed	Choose an item.

Slips, Trips & Falls

Slip and trip injuries are the most frequent injuries to workers. Statistics show most falls happen on the same level resulting from slips and trips. Both slips and trips result from unintended or unexpected change in the contact between the feet and the ground or walking surface. Good housekeeping, quality of walking surfaces (flooring), awareness of surroundings, selection of proper footwear, and appropriate pace of walking are critical for preventing fall accidents.

Site workers will be walking on a variety of irregular surfaces, that may affect their balance. Extra care must be taken to walk cautiously near rivers because the bottom of the riverbed maybe slick and may not be visible. Rocks, gradient changes, sandy bottoms, and debris may be present but not observable.

Take your time and pay attention to where you are going. Adjust your stride to a pace that is suitable for the walking surface and the tasks you are doing. Check the work area to identify hazards - beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain. Establish and utilize a pathway free of slip and trip hazards. Choose a safer walking route. Carry loads you can see over. Keep work areas clean and free of clutter. Communicate hazards to on-site personnel and remove hazards as appropriate.

SIMOPS

SIMOPS are described as the potential class of activities which could bring about an undesired event or set of circumstances, e.g., safety, environment, damage to assets, schedule, commercial, financial, etc. SIMOPS are defined as performing two or more operations concurrently.

SIMOPS should be identified at an early stage before operations commence to understand issues such as schedule and physical clashes, maintenance activities, failure impacts, interferences between vessels, contracts and third part interfaces and environmental impacts.

Coordinate project with site activities. Identify and understand the hazards associated with the host and client's activities. Integrate site emergency response protocols where appropriate and communicate to all project staff. Integrate site communication protocols and communicate to all project staff.

Economically Depressed Areas

Economically depressed areas may have high crime rates. Projects involving work in and around inactive industrial sites may bring staff into contact with indigent and homeless persons. Staff could be

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

subjected to crime that includes but may not be limited to thievery, vandalism, and violence. Prior to the start of work staff need to understand the work locations and the potential for exposure to low level crime.

Staff members should never work alone in these areas. A buddy system is required. Conduct during daylight hours. Secure equipment and vehicles. If warranted, contact the local police department for a security detail. Leave the work area immediately and contact the local authorities if staff members feel threatened or are threatened.

Miscellaneous			
Extended Shift	Night Work	Choose an item.	Choose an item.

Extended Shift

An extended shift can include extending a workday beyond eight hours. Extended or unusual work shifts may be more stressful physically, mentally, and emotionally. Non-traditional shifts and extended work hours may disrupt the body's regular schedule, leading to increased fatigue, stress, and lack of concentration. This leads to an increased risk of operator error, injuries and/or accidents. The degree to which an individual is exposed to fatigue risk factors depends upon the work schedule. As both the duration of the workday and the number of days worked increase so does the fatigue risk factors. Staff Managers need to be aware of the fatigue risk factors and ensure projects are structured to mitigate these factors. Staff Members also have a responsibility to manage the personal fatigue risk factors that they can control outside of work (e.g, duration and quality of sleep, diet, drugs, and alcohol)

Fatigue is a message to the body to rest and can be eliminated with proper rest. However, if rest is not possible, fatigue can increase and becomes distressing and eventually debilitating. Fatigue symptoms, both mental and physical, vary and depend on the person and degree of overexertion. Examples include: weariness, sleepiness, irritability, reduced alertness, lack of memory, concentration and motivation, increased susceptibility to illness, depression, headache, loss of appetite, and digestive problems.

When possible, managers should limit use of extended shifts and increase the number of days worked. Working shifts longer than 8 hours generally result in reduced productivity and alertness. Additional breaks and meals should be provided when working extended shift periods. Tasks requiring heavy physical labor or intense concentration should be performed at the beginning of the shift if possible. This is an important consideration for pre-emergency planning.

Make efforts, when feasible, to ensure that unavoidable extended work shifts and shift changes allow affected employees time for adequate rest and recovery. Project Managers need to plan to have an adequate number of personnel available to enable workers to take breaks, eat meals, relax, and sleep.

Plan for regular and frequent breaks throughout the work shift. If at remote sites, ensure if possible, that there is a quiet, secluded area designated for rest and recuperation. In addition to formal breaks such as lunch or dinner, encourage use of micro breaks to change positions, move about, and shift concentration. Personnel should look to obtain an adequate quantity and quality of sleep.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Night Work

The way work is planned and scheduled can increase the risk of fatigue. Scheduling work in a way that fails to allow staff members enough time for travel to and from work and/or allow for sufficient time for sleep can cause fatigue. Working at times when staff members are biologically programmed to sleep and working for long periods of time can also produce fatigue. Working night shift, including the number of consecutive nights can be a significant fatigue risk factor if not managed properly.

Night shifts may be more stressful physically, mentally, and emotionally. They can disrupt the body's regular schedule, leading to increased fatigue, stress, and lack of concentration. These effects lead to an increased risk of operator error, injuries and/or accidents. The degree which an individual is exposed to fatigue risk factors depends upon the work schedule. As both the duration of the workday and number of days worked increase so does the exposure to fatigue risk factors. Staff Managers need to be aware of the fatigue risk factors and ensure projects are structured to mitigate these risk factors.

Employers must ensure that employees are not exposed to hazardous chemicals or other agents in excess of health standards. Working extended shifts may involve prolonged exposures to hazards which exceed established standards. Employers should implement measures to monitor and limit exposures. Controls may include limiting time employees may remain at the project site; having clean locations for employee rest areas; or rest areas located sufficiently up wind of contaminated sites.

Minimize or redesign routine administrative tasks to ensure staff members can focus on core duties during their night work. Limit consecutive night shifts worked. If a project requiring staff to work beyond four nights requires a fatigue management plan. Ensure that rosters allow for at least two full night's sleep after the last night shift before returning to day shift. Regular and frequent breaks are needed. Comprehensive training on fatigue risk factors for the staff members assigned to the project. Optimal sleeping conditions during the day (e.g., dark/quiet rooms, minimize distractions, light meal prior to sleep).

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Task Hazard Summary

Task 1 – Excavation/Trenching (Remedial Oversight)

There are multiple hazards associated with working in and around excavations and trenches including cave-ins, potential running soils, dislodged excavated soils, lack of proper access and egress. Nonfatal, and even fatal, injuries may occur in association with excavation and trenching activities with a greater frequency than one might expect. Causes of bodily injury, illness, or death include asphyxiation, internal injuries due to physical crushing, falling objects and toxic exposures.

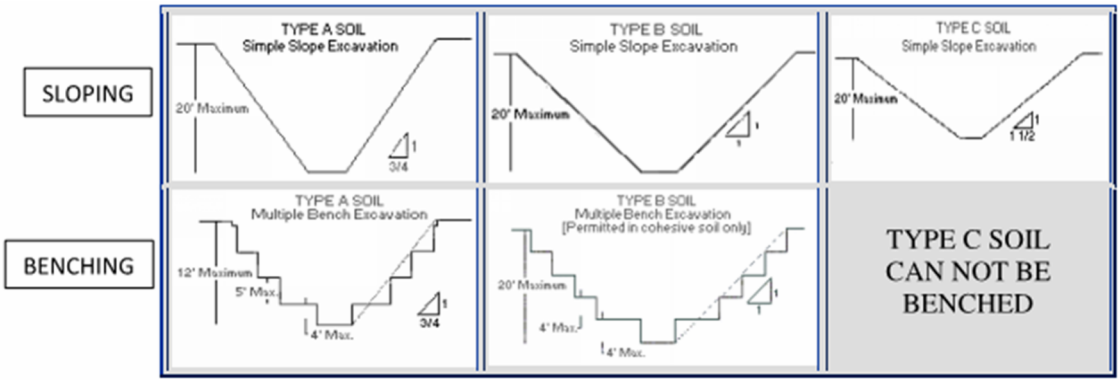
Excavations five (5) feet deep or greater require a protective system unless the excavation is made entirely in stable rock. If the depth is less than five (5) feet deep, a competent person may determine that a protective system is not required. Trenches 20 feet deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/or approved by a registered professional.

H&A Staff Members shall not enter a trench that is five feet deep or greater unless a protective system is used or the soil(s) have been characterized and benched and/or sloped appropriately.

The following are list identifies the types of protective measures that can be used in the event a staff member is required to enter an excavation or trench.

- **Sloping** involves cutting back the trench wall at an angle inclined away from the excavation.

- **Benching** means a method of protecting workers from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels. Benching cannot be done in Type C soil. Below is a diagram indicating the appropriate slope angle for both sloping and benching.



- **Shoring** requires installing aluminum hydraulic or other types of supports to prevent soil movement and cave-ins.
- **Shielding** protects workers by using trench boxes or other types of supports to prevent soil cave-ins.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of soil, changes caused by weather or climate, surcharge loads (e.g., spoil, other materials to be used in the trench) and other operations in the vicinity.

See OP 1001 Excavation and Trenching Safety for more information.

Task 1 - Hauling Soils Off-site (Remedial Oversight)

Hauling Soils Off-site is conducted for a range of services that can include but are not limited to: building, foundation, utility excavation and environmental cleanup. Familiarity with basic heavy construction safety is an essential component of all hauling projects. Potential hazards related to hauling soils off-site operations include, but are not limited to encountering underground or overhead utilities, traffic and heavy equipment, generated waste, and the use or unexpected encountering of toxic or hazardous substances. While staff members do not operate heavy equipment, they may work in close proximity to the equipment and may be exposed to many of the same hazards as the Contractor. Care should be taken during loading of truck/container that the staff is not in the line of fire of the loading equipment (swing radius/traffic pattern) or of the falling spoils/soil from the loading bucket or truck bed. The staff should be aware at all times of subsurface stability as a truck may tip during truck loading and unloading due items such as but not limited to uneven surface, poorly or uncompacted subsurface, thawing soils, saturated soils and proximity to excavation. It is imperative that staff are aware of emergency / communication protocols with the Contractor prior to the start of work.

Task 1 - Stockpiling (Remedial Oversight)

Stockpiling of soils is conducted for a range of services that can include but are not limited to: building, foundation, utility excavation, drilling spoils containment and environmental cleanup. Familiarity with basic heavy construction safety is an essential component of all hauling projects. Potential hazards related to stockpiling operations include, but are not limited to encountering underground or overhead utilities, traffic and heavy equipment, and the use or unexpected encountering of toxic or hazardous substances. While staff members do not operate heavy equipment, they may work in close proximity to the equipment and may be exposed to many of the same hazards as the Contractor. Care should be taken during material stockpiling that the staff is not in the line of fire of the loading equipment (swing radius/traffic pattern). The staff should be aware of any setback requirements of stockpile surcharges near trenches and excavations.

Task 2 – Soil Sampling

Soil sampling by H&A staff on active construction sites can be conducted in conjunction with a wide range activities such as building construction, earthwork and soil management related activities. These activities can include, but are not limited to: drill spoil characterization and management during building foundation element installation, characterization of excavated soils for management/disposal/reuse during earthwork activities, and as part of environmental remedial activities such as delineation and confirmation sampling. Familiarity with basic heavy construction safety, site conditions (geotechnical and environmental), and potential soil contaminants are essential components of soil sampling

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

performed on active sites. Potential hazards related to soil sampling at construction sites include, but are not limited to: encountering site vehicle traffic and heavy equipment operations, manual lifting, generated waste, contact or exposure to impacted soil, and encountering unknown toxic or hazardous substances. Although soil sampling is commonly performed within active excavations, from stockpiles, or within trench excavations, sampling locations and situations will vary depending on site conditions. Care should be taken while entering and exiting excavations or trenches, and when accessing (climbing up or down) soil stockpiles, ensuring that the sampling area is not being actively accessed by construction equipment. Care should also be taken with handling of potentially environmentally impacted soil during sampling, with appropriate PPE identified and used. At no time during classification activities are personnel to reach for debris near machinery that is in operation, place any samples in their mouth, or come in contact with the soils without the use of gloves. Staff will have to carry and use a variety of sampling tools, equipment, containers, and potentially heavy sample bags. It is imperative that staff are aware of emergency / communication protocols with the Contractor prior to the start of work.

Task 3 – ISCO Injection Oversight

Soil treatment and material abatement is commonly conducted at construction sites as part of building construction, earthwork, soil management and environmental remedial activities. Types of treatment and abatement include, but are not limited to: metals treatment in soil, ex-situ treatment and processing of petroleum impacted soils, in-situ stabilization of soils, and asbestos and PCB abatement and removal in building materials and associated soils. These activities are often conducted during demolition activities, building and utility excavations, foundation installation, soil preparation for offsite disposal, and other environmental remedial processes. Familiarity with basic heavy construction safety and site conditions are essential components during soil treatment or abatement performed on active sites. Potential hazards related to soil treatment and abatement operations include, but are not limited to: exposure to dust or water generated from treatment and abatement, underground or overhead utilities, site vehicle traffic and heavy equipment operations, familiarity with non-typical processing and abatement equipment (such as pug mills, processing plants, soil mixers, abatement enclosures, etc.), contact or exposure to impacted soil, water or materials, and encountering unknown toxic or hazardous substances. While staff members do not operate heavy equipment, they may work in close proximity to the equipment and can be exposed to the same hazards as the Contractor. Staff should maintain a safe distance from dust and spray generated from treatment/abatement of materials and from the variety of heavy construction equipment used to treat the soil and materials (excavators, excavator mounted mixers, plants, pug mills). It is imperative that staff are aware of emergency / communication protocols with the Contractor prior to the start of work.

Task 4 – SSDS/SVE Installation

An active SSDS/SVE will be installed beneath the building slab. The SSDS/SVE will consist of a horizontal and vertical perforated piping installed in a permeable layer under the vapor barrier. The permeable layer will consist of washed aggregate, or similar permeable material. The horizontal piping will consist of perforated schedule 40 PVC pipes with leader pipes connecting to the vertical risers. The vertical risers will be constructed of solid steep pipe risers and exit through the cover systems with sealed penetrations. Each riser will have a sample port assembly installed in the cellar. Potential hazards

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

related to SSDS/SVE installation oversight include, but are not limited to: potential running soils, dislodged excavated soils, and lack of proper access and egress. Care should be taken while entering and exiting excavations or trenches, and when assessing the SSDS/SVE installation.

Task 5 – Air Sampling

Air sampling is conducted to monitor levels of air contaminants. Air is the most transient environmental medium and subject to extreme spatial and temporal heterogeneity. Air sampling matrices include: Ambient (outdoor) air, indoor air, point sources (stacks, exhausts, and other emission sources), fugitive emissions (sources of air pollutants other than stacks or vents), and monitor and evaluate remediation processes. Samples can be collected in tedlar bags, sorbent tubes, or summa canisters.

Safety precautions during air sampling include a review of possible environmental hazards before entering the site and the use of proper clothing and equipment. Workers performing stack sampling and air monitoring during emergency situations may be exposed to hazardous levels of air pollutants. Therefore, the JHA must specify what kind of real-time air monitoring will be performed, the action levels for the use of respirators, and the types of respirators to be worn if action levels are exceeded. Safety must always be considered to ensure that the chosen field measurement instrument is compatible with the potential hazard. For example, some instruments are capable of detecting explosive hazards, but not all are safe for operations under these conditions. If the atmospheric concentration is potentially greater than 25% of the lower explosive limit, the meter itself must be certified safe for operation (FM, UL or MSHA certified). Operators should be thoroughly familiar with the instrument and operating instructions before use. Always read or review the manual prior to using an instrument in the field.

Safety concerns are of critical importance in performing sampling at heights due to the possibility of, falling, dropping equipment on workers below, and possibly weather related hazards such as ice, snow, and rain if sampling outdoors.

Gases used to calibrate and operate some instruments come in pressurized cylinders and many are flammable. Proper care should be taken when handling these materials. Light sources from some instruments can cause eye damage when viewed directly.

Task 6 - Soldier Pile and Lagging

Installation of soldier pile and lagging is typically conducted for foundations and utility trenches. Familiarity with basic heavy construction safety is an essential component of all piles installation. Potential hazards related to soldier pile and lagging installation include, but are not limited to encountering line of fire, underground or overhead utilities, noise, traffic and heavy equipment, and overhead work, Cranes or Lifting Equipment. While staff members do not operate heavy equipment, they will work in close proximity to the equipment and may be exposed to many of the same hazards as the Contractor. Care should be taken during unloading of piles from delivery trucks or hoisting of piles onto the rig as staff may often be in the line of fire or swing radius of the cranes. Staff should be aware at all times of all overhead hoisting operations even during pile installation. Staff should always

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

maintain a safe distance to the pile driving rig during installation as the pile/hammer/accessories may break free of the rig due to vibration/impact. Always have an "exit strategy" in mind when working near the pile driving hammer or drill rig. During soil excavation and installation of the lagging the staff should be aware of the slope stability on both the up and down hill side of the excavation if applicable. It is imperative that staff are aware of emergency / communication protocols with the Contractor prior to the start of work.

Task 7 - Secant Piles Walls

Installation of secant piles is typically conducted for docks and building foundations. Familiarity with basic heavy construction safety is an essential component of all pile installation. Potential hazards related to secant pile installation include, but are not limited to encountering line of fire, underground or overhead utilities, noise, traffic and heavy equipment, overhead work, cranes or lifting equipment, slippery surfaces, and rotating equipment. While staff members do not operate heavy equipment, they will work in close proximity to the equipment and may be exposed to many of the same hazards as the Contractor. Staff should always maintain a safe distance to the drill rig as the installation may create all or some of the following; airborne debris, slippery/wet/muddy surfaces, limited access/egress, close proximity to rotating equipment. Care should be taken during and after drilling of trip and fall hazards into the shaft. An engineered barrier is often but not always used to prevent falls. It is imperative that staff are aware of emergency / communication protocols with the Contractor prior to the start of work.

Task Physical Hazards Checklist				
Potential Task Hazards	**Task 1** **Remedial Oversight**	**Task 2** **Soil Sampling**	**Task 3** **In-Situ Oxidation Reagent Injection Oversight**	**Task 4** **SSDS/SVE Installation Oversight**
Congested Area	☒	☒	☒	☒
Energized Equipment	☒	☒	☐	☐
Ergonomics	☒	☒	☒	☒
Excavation/Trenching	☒	☒	☐	☐
Generated Wastes	☒	☐	☒	☐
Ground Disturbance	☒	☐	☒	☒
Hand/Power Tools	☐	☒	☒	☒
Heavy Equipment	☒	☐	☒	☒

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Line of Fire	☒	☒	☒	☐
Manual Lifting	☒	☒	☐	☐
Noise	☒	☐	☒	☒
Overhead Utilities	☒	☐	☒	☐
Slippery Surfaces	☒	☒	☒	☒
Sharp Objects	☒	☒	☐	☐
Underground Utilities	☒	☐	☒	☒
Other: Specify	☐	☐	☐	☐

Summary of Physical Hazards & Controls

Congested Areas

Working in congested areas can expose both workers and the public to a wide range of hazards depending upon the specific activities taking place. Staff Members need to understand the work scope, work areas, equipment on-site, and internal traffic patterns to minimize or eliminate exposure potential.

Controls

- Provide barricades, fencing, warning signs/signals and adequate lighting to protect people while working in or around congested areas.
- Vehicles and heavy equipment with restricted views to the rear should have functioning back-up alarms that are audible above the surrounding noise levels. Whenever possible, use a signaler to assist heavy equipment operators and/or drivers in backing up or maneuvering in congested areas.
- Lay out traffic control patterns to eliminate excessive congestion.
- Workers in congested areas should always wear high visibility clothing.
- Be aware of Line of Fire hazards when performing work activities in congested areas.
- Hazards associated with SIMOPs should be discussed daily at Tailgate Safety Meetings.

Energized Equipment

Energy sources including electrical, mechanical, hydraulic, pneumatic, or other sources in machines and equipment can be hazardous to workers. During servicing and maintenance of machines and equipment, the unexpected startup or release of stored energy can result in serious injury or death to workers.

Staff members that are required to work on energized equipment must first ensure that the source of energy is isolated and/or de-energized. In addition, any stored energy must also be released. Staff must ensure that the process to de-energize and isolate energy sources is documented and communicated to those who are working on the equipment. Staff must be trained on and understand the procedure.

See OP 1032 Control of Hazardous Energy for more information.

Controls

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

- Document process to de-energize or isolate energy sources.
- Ensure staff are appropriately trained to conduct work requiring LOTO.
- Affix log or tag to equipment to ensure improper start-up or release of energy.
- Execute an Energy Isolation Permit.

Ergonomics

Most Work-related Musculoskeletal Disorders (WMSDs) are caused by Ergonomic Stressors. Ergonomic Stressors are caused by poor workplace practices and/or insufficient design, which may present ergonomic risk factors. These stressors include, but not limited to, repetition, force, extreme postures, static postures, quick motions, contact pressure, vibration, and cold temperatures.

WMSDs are injuries to the musculoskeletal system, which involves bones, muscles, tendons, ligaments, and other tissues in the system. Symptoms may include numbness, tightness, tingling, swelling, pain, stiffness, fatigue, and/or redness. WMSD are usually caused by one or more Ergonomic Stressors. There may be individual differences in susceptibility and symptoms among employees performing similar tasks. Any symptoms are to be taken seriously and reported immediately.

See OP1053 Ergonomics for more information.

Controls

- Ensure workstations are ergonomically correct so bad posture is not required to complete tasks.
- Take periodic breaks over the course of the day.
- Stretch during break times.
- Break up tasks that require repetitive motion.
- Contact Corporate H&S with any ergonomic concerns

Excavation & Trenches

There are multiple hazards associated with working in and around excavations and trenches including cave-ins, potential running soils, dislodged excavated soils, lack of proper access and egress. Nonfatal, and even fatal, injuries may occur in association with excavation and trenching activities with a greater frequency than one might expect. Causes of bodily injury, illness, or death include asphyxiation, internal injuries due to physical crushing, falling objects and toxic exposures.

See OP1001 Excavation and Trenching Safety for more information.

Controls

- Do not enter an exaction unless it has been inspected and has appropriate protective measures in place: shoring, benching, or sloping.
    - Protective measures are required for excavations that are 5 feet or deeper.
- If entry is required verify with the on-site competent person that:
    - no atmospheric hazards exist or have the potential to exist
    - there is no standing water or water removal operations are in place
    - the daily inspection has occurred
    - spoil piles, equipment or other is at least 2 feet from the edge
    - There is safe access and egress to the excavation which can include ladders, steps, ramps or other safe means. The means of access and egress shall be no more than 25’ away.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

- If there is any doubt about the safety of the excavation personnel will not enter the excavation or trench and will contact the PM and the Regional Safety Manager.
- Do not stand on the long side of the cut. If required ensure there are no tension cracks.

Generated Waste

Activities on environmental sites may generate waste that requires regulated handling and disposal. Excess sample solids, decontamination materials, poly sheeting, used PPE, etc. that are determined to be free of contamination through field or laboratory screening can usually be disposed into client-approved, on-site trash receptacles. Uncontaminated wash water may be discarded onto the ground surface away from surface water bodies in areas where infiltration can occur. Contaminated materials must be segregated into liquids or solids and drummed separately for off-site disposal.

Controls

- Manage waste properly through good work practices.
- Collect, store, containerize waste, and dispose of it properly.
- All wastes generated shall be containerized in an appropriate container (i.e. open or closed top 55-gallon drum, roll-off container, poly tote, cardboard box, etc.) as directed by the PM.
- Containers should be inspected for damages or defects
- Waste containers should be appropriately labeled indicating the contents, date the container was filled, owner of the material (including address) and any unique identification number, if necessary.
- Upon completion of filling the waste container, the container should be inspected for leaks and an appropriate seal.

Ground Disturbance

Ground disturbance is defined as any activity disturbing the ground. Ground disturbance activities include, but are not limited to, excavating, trenching, drilling (either mechanically or by hand), digging, plowing, grading, tunneling and pounding posts or stakes.

Because of the potential hazards associated with striking an underground utility or structure, the operating procedure for underground utility clearance shall be followed prior to performing any ground disturbance activities.

See OP1020 Working Near Utilities

Controls

Prior to performing ground disturbance activities, the following requirements should be applied:

- Confirm all approvals and agreements (as applicable) either verbal or written have been obtained.
- Request for line location has been registered with the applicable One-Call or Dial Before You Dig organization, when applicable.
  - Whenever possible, ground disturbance areas should be adequately marked or staked prior to the utility locators site visit.
- Notification to underground facility operator/owner(s) that may not be associated with any known public notification systems such as the One-Call Program regarding the intent to cause ground disturbance within the search zone.
- Notifications to landowners and/or tenant, where deemed reasonable and practicable.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

- Proximity and Common Right of Way Agreements shall be checked if the line locator information is inconclusive.

Hand and Power Tools

Hand and power tools can expose staff to a wide range of hazards depending upon the tool used. Hazards can include but are not limited to: falling, flying, abrasive, and splashing objects, or harmful dusts, fumes, mists, vapors, or gases.

Serious accidents often occur before steps are taken to evaluate and avoid or eliminate tool-related hazards. Staff must recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent those hazards.

See OP 1026 Hand and Power Tools for more information.

Controls

- Keep all tools in good condition with regular maintenance.
- Use the right tool for the job. Do not use a tool for a task which it was not designed for.
- Examine each tool for damage before use and do not use damaged tools.
- For tools that are damaged or defective, red tag the tool and take out of service.
- Operate tools per the manufacturers' instructions.
- Use the appropriate personal protective equipment.
- All electrically powered tools will be connected through a ground fault circuit interrupter (GFCI).
- All personnel must be trained on the use of the tool they are utilizing.

Heavy Equipment

Staff must be careful and alert when working around heavy equipment, failure or breakage and limited visibility can lead to accidents and worker injury. Heavy equipment such as cranes, drills, haul trucks, or other can fail during operation increasing chances of worker injury. Equipment of this nature shall be visually inspected and checked for proper working order prior to commencement of field work. Those operating heavy equipment must meet all requirements to operate the equipment. Haley & Aldrich, Inc. staff that supervise projects or are associated with high risk projects that involve digging or drilling should use due diligence when working with a construction firm.

See OP1052 Heavy Equipment for additional information.

Controls

- Only approach equipment once you have confirmed contact with the operator (e.g., operator places the bucket on the ground).
- Always maintain visual contact with operators and keep out of the strike zone whenever possible.
- Always be alert to the position of the equipment around you.
- Always approach heavy equipment with an awareness of the swing radius and traffic routes of all equipment and never go beneath a hoisted load.
- Avoid fumes created by heavy equipment exhaust.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Line of Fire

Line of fire refers to the path an object will travel. Examples of line of fire situations typically observed on project sites include lifting/hoisting, lines under tension, objects that can fall or roll, pressurized objects or lines, springs or stored energy, work overhead, vehicles and heavy equipment.

Controls

- Never walk under a suspended load.
- Be aware and stay clear of tensioned lines such as cable, chain and rope.
- Be cautious of torque stresses that drilling equipment and truck augers can generate. Equipment can rotate unexpectedly long after applied torque force has been stopped.
- Springs and other items can release tremendous energy if compressed and suddenly released
- Items under tension and pressure can release tremendous energy if it is suddenly released.
- Not all objects may be overhead; be especially mindful of top-heavy items and items being transported by forklift or flatbed.
- Secure objects that can roll such as tools, cylinders, and pipes.
- Stay clear of soil cuttings or soil stockpiles generated during drilling operations and excavations, be aware that chunks of soil, rocks, and debris can fall or roll.

Manual Lifting/Moving

Most materials associated with investigation, remedial, or construction-related activities are moved by hand. The human body is subject to damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process.

Controls

- Under no circumstances should any one person lift more than 49 pounds unassisted.
- Always push, not pull, the object when possible.
- Size up the load before lifting. If it is heavy or clumsy, get a mechanical aid or help from a worker.
- Bend the knees; it is the single most important aspect of lifting.
- When performing the lift:
    - Place your feet close to the object and center yourself over the load.
    - Get a good handhold.
    - Lift straight up, smoothly and let your legs do the work, not your back!
    - Avoid overreaching or stretching to pick up or set down a load.
    - Do not twist or turn your body once you have made the lift.
    - Make sure beforehand that you have a clear path to carry the load.
    - Set the load down properly.

Noise

Working around heavy equipment (drill rigs, excavators, etc.) often creates excessive noise. The effects of noise include physical damage to the ear, pain, and temporary and/or permanent hearing loss. Workers can also be startled, annoyed, or distracted by noise during critical activities. Noise monitoring data that indicates that working within 25 feet of operating heavy equipment result in exposure to hazardous levels of noise (levels greater than 85 dBA).

See OP 1031 Hearing Conservation for additional information.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Controls

- Personnel are required to use hearing protection (earplugs or earmuffs) within 25 feet of any operating piece of heavy equipment.
- Limit the amount of time spent at a noise source.
- Move to a quiet area to gain relief from hazardous noise sources.
- Increase the distance from the noise source to reduce exposure.

Overhead Utilities

When work is undertaken near overhead electrical lines, the distance maintained from those lines shall also meet the minimum distances for electrical hazards as defined in Table 1 below. Note: utilities other than overhead electrical utilities need to be considered when performing work.

Table 1 Minimal Radial Clearance Distances *

Normal System Voltage Kilovolts (kV)	Required Minimal Radial Clearance Distance (feet/meters)
0 – 50	10/3.05
51 – 100	12/3.66
101 – 200	15/4.57
201 – 300	10/6.1
301 – 500	25/7.62
501 – 750	35/10.67
750 - 1000	45/13.72

* For those locations where the utility has specified more stringent safe distances, those distances shall be observed.

Controls

- To prevent damage, guy wires shall be visibly marked and work barriers or spotters provided in those areas where work is being conducted.
  - When working around guy wires, the minimum radial clearance distances for electrical power shall be observed.
- The PM shall research and determine if the local, responsible utility or client has more restrictive requirements than those stated in Table 1.
- If equipment cannot be positioned in accordance with the requirements established in Table 1 the lines need to be de-energized.

Slippery Surfaces

Both slips and trips result from unintended or unexpected change in the contact between the feet and ground or walking surface. Good housekeeping, quality of walking surfaces, selection of proper footwear, and appropriate pace of walking are critical for preventing fall accidents. Slips happen where there is too little friction or traction between the footwear and walking surface.

Common causes of slips are wet or oily surfaces, spills, weather hazards, loose unanchored rugs or mats and flooring or other walking surfaces that do not have same degree of traction in all areas.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Weather-related slips and falls become a serious hazard as winter conditions often make for wet or icy surfaces outdoors. Even wet organic material or mud can create hazardous walking conditions. Spills and leaks can also lead to slips and falls.

Controls

- Evaluate the work area to identify any conditions that may pose a slip hazard.
- Address any spills, drips or leaks immediately.
- Mark areas where slippery conditions exist.
- Select proper footwear or enhance traction with additional PPE.
- Where conditions are uncertain or environmental conditions result in slippery surfaces walk slowly, take small steps, and slide feet on wet or slippery surfaces.

Sharp Objects

Workers who handle sharp edged objects like sheets of steel or glass are at risk of cuts. Workers who handle sharp edged objects are also at risk of cuts. Injuries may occur to hands, fingers, or legs when they are in the way of the blade, when the blade slips, or if an open blade is handled unexpectedly. Other hazards at job sites include stepping on sharp objects (e.g. wooden boards with protruding nails, sharp work-tools, chisels, etc.) and colliding with sharp and/or protruding objects.

Controls

Always be alert when handling sharps. Never look away or become distracted while handling sharp objects. Use caution when working with tools; use right tool for the job. Keep tools sharp, dull blades are a safety hazard, requiring more force to make cuts which can lead to tool slippage. Wear appropriate PPE and do not handle sharp objects (i.e., broken glass) with bare hands. Use mechanical devices, when possible. Stay away from building debris; avoid handling site debris or placing your hand where you cannot see. Watch out for barbed wire and electrical fences; cover with a car mat or equivalent to cross or walk around; use the buddy system to avoid entanglement; wear gloves. Do not leave unprotected sharps unattended. Use protective shields, cases, styrofoam blocks, etc. Pass a sharp by handing it over carefully by the handle with the blade down or retracted. Fixed open blades are prohibited. Always cut away from the body, making several passes when cutting thicker materials. Make sure blades are fitted properly into the knife. Never cut items with a blade or other sharp object on your lap. Never try to catch a blade or cutting tool that is falling.

Underground Utilities

Various forms of underground/overhead utility lines or conveyance pipes may be encountered during site activities. Prior to the start of intrusive operations, utility clearance is mandated, as well as obtaining authorization from all concerned public utility department offices. Should intrusive operations cause equipment to come into contact with utility lines, the SHSO, Project Manager, and Regional H&S Manager shall be notified immediately. Work will be suspended until the client and applicable utility agency is contacted and the appropriate actions for the situation can be addressed.

See OP1020 Work Near Utilities for complete information.

Controls

- Obtain as-built drawings for the areas being investigated from the property owner;
- Visually review each proposed soil boring locations with the property owner or knowledgeable site representative;

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

- Perform a geophysical survey to locate utilities;
- Hire a private line locating firm to determine location of utility lines that are present at the property;
- Identifying a no-drill or dig zone;
- Hand dig or use vacuum excavation in the proposed ground disturbance locations if insufficient data is unavailable to accurately determine the location of the utility lines.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

4. PROTECTIVE MEASURES

The personal protective equipment and safety equipment (if listed) is specific to the associated task. The required PPE and equipment listed must be onsite during the task being performed. Work shall not commence unless the required PPE or Safety Equipment is present.

Required Safety & Personal Protective Equipment

Required Personal Protective Equipment (PPE)	**Task 1**	**Task 2**	**Task 3**	**Task 4**
	Remedial Oversight	Soil Sampling	ISCO Oversight	SSDS/SVE Installation Oversight
Hard hat	☒	☒	☒	☐
Safety Glasses	☒	☒	☒	☒
Safety Toed Shoes	☒	☒	☒	☐
Nitrile Gloves	☒	☒	☐	☒
Class 2 Safety Vest	☒	☒	☒	☒
Hearing Protection	☒	☐	☒	☒
Cut Resistant Gloves	☒	☒	☒	☒
Level of protection required	D	D	D	D
Required Safety Equipment				
First Aid Kit	☒	☒	☒	☒

Required Personal Protective Equipment (PPE)	**Task 5**	**Task 6**	**Task 7**
	Air Sampling	Soldier Pile and Lagging	Secant Pile Wall Installation
Hard hat	☒	☒	☒
Safety Glasses	☒	☒	☒
Safety Toed Shoes	☒	☒	☒
Nitrile Gloves	☒	☐	☐
Class 2 Safety Vest	☒	☒	☒
Hearing Protection	☐	☒	☒
Cut Resistant Gloves	☒	☒	☒
Level of protection required	D	D	D
Required Safety Equipment			
First Aid Kit	☒	☒	☒

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

5. TRAINING REQUIREMENTS

The table below lists the training requirements staff must have respective to their assigned tasks and that are required to access the Site.

Site Specific Training Requirements
HAZWOPER - 40 Hour (Initial)
HAZWOPER - 8 Hour (Annual Refresher)
40-hour Site Safety Training
Site Specific Orientation
Choose an item.

Task Specific Training Requirements				
Required Training Type	**Task 1**	**Task 2**	**Task 3**	**Task 4**
	Remedial Oversight	Soil Sampling	ISCO Oversight	SSDS/SVE Installation Oversight
RCRA Haz Waste Generator	☒	☐	☐	☐
		Task 5	**Task 6**	**Task 7**
		Air Sampling	Soldier Pile and Lagging	Secant Pile Wall Installation
RCRA Haz Waste Generator		☐	☐	☐

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

6. AIR MONITORING PLAN AND EQUIPMENT

Exposures to airborne substances shall be fully characterized throughout project operations to ensure that exposure controls are effectively selected and modified as needed.

Is air/exposure monitoring required at this work site for personal protection? Yes

Is perimeter monitoring required for community protection? Yes

Air monitoring plan not applicable No

Air Monitoring/Screening Equipment Requirements

Photo-Ionization Detector (PID) 10.6eV

TSI Dusttrak II Desktop 8530 Dust/Aerosol Monitor

The required equipment listed above must be on site. Work shall not commence unless the equipment is present and in working order.

Dust Suppression Techniques

Preventative measures for dust generation may include wetting site fill and soil, construction of an engineered construction entrance with gravel pad, a truck wash area, covering soils with tarps, and limiting vehicle speeds to five miles per hour.

Personal Exposure Monitoring

No asbestos, lead-based paint, or radiological hazards have been identified within the vicinity of the proposed excavation area at the Site (see Section 2.0). Therefore, personal exposure monitoring is not required during excavation.

Monitoring Plans

Parameter/ Contaminant	Equipment	Action Level	Response Activity
VOCs	PID 10.6 eV	< 10 ppm	Continue work and monitoring.
		>10 ppm for 5 minutes	Clear Instrument and Re-Monitor the Area. Implement PPE upgrades
		>10 ppm for >5 minutes	Evacuate the area and call the FSM and/or PM for further guidance. Implement engineering controls.

Zone Location and Monitoring Interval
Breathing zone and edge of Exclusion Zone.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

***If chemical does not have an action level use TLV or REL, whichever is lowest, to be used as an action level. If TLV or REL are the same as PEL, cut the PEL in half for an action level.**

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

7. DECONTAMINATION & DISPOSAL METHODS

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment through or over, tracking, or splashing potential or known contaminated/impacted materials.)

Personal Hygiene Safeguards

The following minimum personal hygiene safeguards shall be adhered to:

1. No smoking or tobacco products in any project work areas.
2. No eating or drinking in the exclusion zone.
3. It is required that personnel present on site wash hands before eating, smoking, taking medication, chewing gum/tobacco, using the restroom, or applying cosmetics and before leaving the site for the day.

It is recommended that personnel present on site shower or bathe at home at the end of each day of working on the site.

Decontamination Supplies

All decontamination should be conducted at the project site in designated zones or as dictated by Client requirements. Decontamination should not be performed on Haley & Aldrich owned or leased premises.

☐ Acetone	☒ Distilled Water	☐ Polyethylene Sheeting
☒ Alconox Soap	☒ Drums	☐ Pressure/Steam Cleaner
☐ Brushes	☐ Hexane	☒ Tap Water
☒ Disposal Bags	☐ Methanol	☐ Wash tubs
☒ 5 Gallon Buckets	☒ Paper Towels	☐ Other: Specify

Location of Decontamination Station

To be communicated during Site kick-off meeting.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Standard Personal Decontamination Procedures

Outer gloves and boots should be decontaminated periodically as necessary and at the end of the day. Brush off solids with a hard brush and clean with soap and water or other appropriate cleaner whenever possible. Remove inner gloves carefully by turning them inside out during removal. Wash hands and forearms frequently. It is good practice to wear work-designated clothing while on-site which can be removed as soon as possible. Non-disposable overalls and outer work clothing should be bagged onsite prior to laundering. If gross contamination is encountered on-site contact the Project Manager and Field Safety Manager to discuss proper decontamination procedures.

The steps required for decontamination will depend upon the degree and type of contamination but will generally follow the sequence below.

1. Remove and wipe clean hard hat
2. Rinse boots and gloves of gross contamination
3. Scrub boots and gloves clean
4. Rinse boots and gloves
5. Remove outer boots (if applicable)
6. Remove outer gloves (if applicable)
7. Remove Tyvek coverall (if applicable)
8. Remove respirator, wipe clean and store (if applicable)
9. Remove inner gloves (if outer gloves were used)

PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles.

Small Equipment Decontamination

Pretreatment of heavily contaminated equipment may be conducted as necessary:

1. Remove gross contamination using a brush or wiping with a paper towel
2. Soak in a solution of Alconox and water (if possible)
3. Wipe off excess contamination with a paper towel

Standard decontamination procedure:

4. Wash using a solution of Alconox and water
5. Rinse with potable water
6. Rinse with methanol (or equivalent)
7. Rinse with distilled/deionized water

Inspect the equipment for any remaining contamination and repeat as necessary.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Disposal Methods

Procedures for disposal of contaminated materials, decontamination waste, and single use personal protective equipment shall meet applicable client, locate, State, and Federal requirements.

Disposal of Single Use Personal Protective Equipment

PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles. PPE that is grossly contaminated must be bagged (sealed and field personnel should communicate with the Project Manager to determine proper disposal.

Disposal Method for Contaminated Soil

- Contaminated soil cuttings and spoils must be containerized for disposal off-site unless otherwise specifically directed.
- Soil cuttings and spoils determined to be free of contamination through field screening can usually be returned to the boreholes or excavations from which they came.

Standard Disposal Methods for Contaminated Materials

- Excess sample solids, decontamination materials, rags, brushes, poly-sheeting, etc. that are determined to be free of contamination through field screening can usually be disposed into client-approved, on-site trash receptacles.
- Uncontaminated wash water may be discarded onto the ground surface away from surface water bodies in areas where infiltration can occur.
- Contaminated materials must be segregated into liquids or solids and containerized separately for offsite disposal.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

8. SITE CONTROL

The overall purpose of site control is to minimize potential contamination of workers, protect the public from the site's hazards, and prevent vandalism. Site control is especially important in emergency situations. The degree of site control necessary depends on site characteristics, site size, and the surrounding community. The following information identifies the elements used to control the activities and movements of people and equipment at the project site.

Communication

Internal
Haley & Aldrich site personnel will communicate with other Haley & Aldrich staff member and/or subcontractors or contractors with:

Face to Face Communication

External
H&S site personnel will use the following means to communicate with off-site personnel or emergency services.

Cellular Phones

Visitors

Project Site
Will visitors be required to check-in prior to accessing the project site?

Yes

Visitor Access
Authorized visitors that require access to the project site need to be provided with known information with respect to the site operations and hazards as applicable to the purpose of their site visit. Authorized visitors must have the required PPE and appropriate training to access the project site.

Site Safety Officer is responsible for facilitating authorized visitor access.

Zoning

Work Zone
The work zone will be clearly delineated to ensure that the general public or unauthorized worker access is prevented. The following will be used:

Temporary Fencing
Cones
Flagging Tape
Barricades

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

9. SITE SPECIFIC EMERGENCY RESPONSE PLAN

The Emergency Response Plan addresses potential emergencies at this site, procedures for responding to these emergencies, roles, responsibilities during emergency response, and training. This section also describes the provisions this project has made to coordinate its emergency response with other contractors onsite and with offsite emergency response organizations (as applicable).

During the development of this emergency response plan, local, state, and federal agency disaster, fire, and emergency response organizations were consulted (if required) to ensure that this plan is compatible and integrated with plans of those organizations. Documentation of the dates of these consultations are the names of individuals contacted is kept on file and available upon request.

The site has been evaluated for potential emergency occurrences, based on site hazards, and the major categories of emergencies that could occur during project work are:

- Fire(s)/Combustion
- Hazardous Material Event
- Medical Emergency
- Natural Disaster

A detailed list of emergency types and response actions are summarized in Table X below. Prior to the start of work, the SSO will update the table with any additional site-specific information regarding evacuations, muster points, or additional emergency procedures. The SSO will establish evacuation routes and assembly areas for the Site. All personnel entering the Site will be informed of these routes and assembly areas.

Pre-Emergency Planning

Before the start of field activities, the Project Manager will ensure preparation has been made in anticipation of emergencies. Preparatory actions include the following:

Meeting with the subcontractor/and or client concerning the emergency procedures in the event a person is injured. Appropriate actions for specific scenarios will be reviewed. These scenarios will be discussed, and responses determined before the sampling event commences. A form of emergency communication (i.e.; Cell phone, Air horn, etc.) between the Project Manager and subcontractor and/or client will be agreed on before the work commences.

A training session (i.e., “safety meeting”) given by the Project Manager or their designee informing all field personnel of emergency procedures, locations of emergency equipment and their use, and proper evacuation procedures.

Ensuring field personnel are aware of the existence of the emergency response HASP and ensuring a copy of the HASP accompanies the field team(s).

Onsite Emergency Response Equipment

Emergency procedures may require specialized equipment to facilitate work rescue, contamination control and reduction or post-emergency cleanup. Emergency response equipment stocked.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Table 9.1 Emergency Equipment and Emergency PPE			
Emergency Equipment	**Specific Type**	**Quantity Stocked**	**Location Stored**
First Aid Kit	General First Aid Kit	1 Kit	Throughout Site
Fire Extinguisher	Post-emergency cleanup	At least 1	Throughout Site
Emergency PPE	**Specific Type**	**Quantity Stocked**	**Location Stored**
Gloves - "Nitrile"	General Nitrile Glove	1 Box	With H&A Personnel

EVACUATION ALARM
Will be communicated during the Onsite Kickoff Meeting
EVACUATION ROUTES
Will be given a map after site specific training
EVACUATION MUSTER POINT(S)/ SHELTER AREA(S)
Will be given a location after site specific training
EVACUTION RESPONSE DRILLS
The Site relies on outside emergency responders and a drill is not required.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

Table 9-2 – Emergency Planning

Emergency Type	Notification	Response Action	Evacuation Plan/Route
Chemical Exposure	Report event to SSO immediately	Refer to Safety Data Sheet for required actions	Remove personnel from work zone
Fire - Small	Notify SSO and contact 911	Use fire extinguisher if safe and qualified to do so	Mobilize to *Muster Point*
Fire – Large/Explosion	Notify SSO and contact 911	Evacuate immediately	Mobilize to *Muster Point*
Hazardous Material – Spill/Release	Notify SSO; SSO will contact PM to determine if additional agency notification is	If practicable don PPE and use spill kit and applicable procedures to contain the release	See Evacuation Map for route, move at least 100 ft upwind of spill location
Medical – Bloodborne Pathogen	Notify SSO	If qualified dispose in container or call client or city to notify for further instruction.	None Anticipated
Medical – First Aid	Notify SSO	If qualified perform first aid duties	None Anticipated
Medical – Trauma	If life threatening or transport is required call 911, immediately	Wait at site entrance for ambulance	Noe Anticipated
Security Threat	Notify SSO who will call 911 as warranted	Keep all valuables out of site and work zones delineated.	None Anticipated
Weather – Earthquake/Tsunami's	STOP WORK and evacuate Site upon any earthquake	Turn off equipment and evacuate as soon as is safe to do so	Mobilize to *Shelter Location*
Weather – Lightning Storm	STOP WORK	Work may resume 30 minutes after the last observed lightning.	None Anticipated
Weather – Tornadoes/Hurricanes	Monitor weather conditions STOP WORK and evacuate the site	Evacuate to shelter location or shelter in place immediately	Mobilize to *Shelter Location*
MUSTER POINT Will be given location after site-specific training		*SHELTER LOCATION* Will be given location after site-specific training	
In case of site emergencies, site personnel shall be evacuated per this table and will not participate in emergency response activities. Site emergencies shall be reported to local, state, and federal governmental agencies as required.			

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

10. HASP ACKNOWLEDGEMENT FORM

All Haley & Aldrich employees onsite must sign this form prior to entering the site.

I hereby acknowledge receipt of, and briefing on, this HASP prior to the start of on-site work. I declare that I understand and agree to follow the provisions, processes, and procedures set forth herein at all times while working on this site.

Printed Name	Signature	Date

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

ATTACHMENT A
HASP AMENDMENT FORM

Date printed: 2/12/2026 at 2:36 PM

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

HASP AMENDMENT FORM

This form is to be used whenever there is an immediate change in the project scope that will require an amendment to the HASP. For project scope changes associated with "add-on" tasks, the changes must be made in the body of the HASP. Before changes can be made, a review of the potential hazards must be initiated by the Haley & Aldrich Project Manager.

This original form must remain on site with the original HASP. If additional copies of this HASP have been distributed, it is the Project Manager's responsibility to forward a signed copy of this amendment to those who have copies.

Amendment No.	
Site Name	
Work Assignment No.	
Date	
Type of Amendment	
Reason for Amendment	
Alternate Safeguard Procedures	
Required Changes in PPE	

Project Manager Name (Print)	Project Manager Signature	Date

Health & Safety Approver Name (Print)	Health & Safety Approver Signature	Date

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

ATTACHMENT B
TRAINING REQUIREMENTS

Date printed: 2/12/2026 at 2:36 PM

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

TRAINING REQUIREMENTS

Health and Safety Training Requirements

Personnel will not be permitted to supervise or participate in field activities until they have been trained to a level required by their job function and responsibility. Haley & Aldrich staff members, contractors, subcontractors, and consultants who have the potential to be exposed to contaminated materials or physical hazards must complete the training described in the following sections.

The Haley & Aldrich Project Manager/FSM will be responsible for maintaining and providing to the client/site manager documentation of Haley & Aldrich staff members' compliance with required training as requested. Records shall be maintained per OSHA requirements.

40-Hour Health and Safety Training

The 40-Hour Health and Safety Training course provides instruction on the nature of hazardous waste work, protective measures, proper use of personal protective equipment, recognition of signs and symptoms which might indicate exposure to hazardous substances, and decontamination procedures. It is required for all personnel working on-site, such as equipment operators, general laborers, and supervisors, who may be potentially exposed to hazardous substances, health hazards, or safety hazards consistent with 29 CFR 1910.120.

8-hour Annual Refresher Training

Personnel who complete the 40-hour health and safety training are subsequently required to attend an annual 8-hour refresher course to remain current in their training. When required, site personnel must be able to show proof of completion (i.e., certification) at an 8-hour refresher training course within the past 12 months.

8-Hour Supervisor Training

On-site managers and supervisors directly responsible for, or who supervise staff members engaged in hazardous waste operations, should have eight additional hours of Supervisor training in accordance with 29 CFR 1910.120. Supervisor Training includes, but is not limited to, accident reporting/investigation, regulatory compliance, work practice observations, auditing, and emergency response procedures.

Additional Training for Specific Projects

Haley & Aldrich personnel will ensure their personnel have received additional training on specific instrumentation, equipment, confined space entry, construction hazards, etc., as necessary to perform their duties. This specialized training will be provided to personnel before engaging in the specific work activities including:

- Client specific training or orientation
- Competent person excavations
- Confined space entry (entrant, supervisor, and attendant)
- Heavy equipment including aerial lifts and forklifts
- First aid/ CPR
- Use of fall protection
- Use of nuclear density gauges
- Asbestos awareness

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

ATTACHMENT C
ROLES AND RESPONSIBILITIES

Date printed: 2/12/2026 at 2:36 PM

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

SITE ROLES AND RESPONSIBILITIES

Haley & Aldrich Personnel

Field Safety Manager (FSM)

The Haley & Aldrich FSM is a full-time Haley & Aldrich staff member, trained as a safety and health professional, who is responsible for the interpretation and approval of this Safety Plan. Modifications to this Safety Plan cannot be undertaken by the PM or the SSO without the approval of the FSM.

Specific duties of the FSM include:

- Approving and amending the Safety Plan for this project
- Advising the PM and SHSOs on matter relating to health and safety
- Recommending appropriate personal protective equipment (PPE) and air monitoring instrumentation
- Maintaining regular contact with the PM and SSO to evaluate the conditions at the property and new information which might require modifications to the HASP and
- Reviewing and approving JSAs developed for the site-specific hazards.

Project Manager (PM)

The Haley & Aldrich PM is responsible for ensuring that the requirements of this HASP are implemented at that project location. Some of the PM´s specific responsibilities include:

- Assuring that all personnel to whom this HASP applies have received a copy of it;
- Providing the FSM with updated information regarding environmental conditions at the site and the scope of site work;
- Providing adequate authority and resources to the on-site SHSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SHSO;
- Maintaining regular communications with the SHSO and, if necessary, the FSM;
- Coordinating the activities of all subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project;
- Providing project scheduling and planning activities; and
- Providing guidance to field personnel in the development of appropriate Job Safety Analysis (JSA) relative to the site conditions and hazard assessment.

Site Health & Safety Officer (SHSO)

The SHSO is responsible for field implementation of this HASP and enforcement of safety rules and regulations. SHSO functions may include some or all of the following:

- Act as Haley & Aldrich´s liaison for health and safety issues with client, staff, subcontractors, and agencies.
- Verify that utility clearance has been performed by Haley & Aldrich subcontractors.
- Oversee day-to-day implementation of the Safety Plan by Haley & Aldrich personnel on site.

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

- Interact with subcontractor project personnel on health and safety matters.
- Verify use of required PPE as outlined in the safety plan.
- Inspect and maintain Haley & Aldrich safety equipment, including calibration of air monitoring instrumentation used by Haley & Aldrich.
- Perform changes to HASP and document in Appendix A of the HASP as needed and notify appropriate persons of changes.
- Investigate and report on-site accidents and incidents involving Haley & Aldrich and its subcontractors.
- Verify that site personnel are familiar with site safety requirements (e.g., the hospital route and emergency contact numbers).
- Report accidents, injuries, and near misses to the Haley & Aldrich PM and FSM as needed.

The SHSO will conduct initial site safety orientations with site personnel (including subcontractors) and conduct toolbox and safety meetings thereafter with Haley & Aldrich employees and Haley & Aldrich subcontractors at regular intervals and in accordance with Haley & Aldrich policy and contractual obligations. The SHSO will track the attendance of site personnel at Haley & Aldrich orientations, toolbox talks, and safety meetings.

Field Personnel

Haley & Aldrich personnel are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading the HASP in its entirety prior to the start of on-site work;
- Submitting a completed Safety Plan Acceptance Form and documentation of medical surveillance and training to the SHSO prior to the start of work;
- Attending the pre-entry briefing prior to beginning on-site work;
- Bringing forth any questions or concerns regarding the content of the Safety Plan to the PM or the SHSO prior to the start of work;
- Stopping work when it is not believed it can be performed safely;
- Reporting all accidents, injuries and illnesses, regardless of their severity, to the SHSO;
- Complying with the requirements of this safety plan and the requests of the SHSO; and
- Reviewing the established JSAs for the site-specific hazards on a daily basis and prior to each shift change, if applicable.

Visitors

Authorized visitors (e.g., Client Representatives, Regulators, Haley & Aldrich management staff, etc.) requiring entry to any work location on the site will be briefed by the Site Supervisor on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer´s health and safety policies. In addition, this safety plan specifies the minimum acceptable qualifications, training and personal protective equipment which are required for entry to any controlled work area; visitors must comply with these

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

requirements at all times. Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

SUBCONTRACTOR PERSONNEL

Subcontractor Site Representative

Each contractor and subcontractor shall designate a Contractor Site Representative. The Contractor Site Representative will interface directly with Insert Staff Name Here, the Subcontractor Site Safety Manager, with regards to all areas that relate to this safety plan and safety performance of work conducted by the contractor and/or subcontractor workforce. Contractor Site Representatives for this site are listed in the Contact Summary Table at the beginning of the Safety Plan.

Subcontractor Site Safety Manager

Each contractor / subcontractor will provide a qualified representative who will act as their Site Safety Manager (Sub-SSM). This person will be responsible for the planning, coordination, and safe execution of subcontractor tasks, including preparation of job hazard analyses (JHA), performing daily safety planning, and coordinating directly with the Haley & Aldrich SHSO for other site safety activities. This person will play a lead role in safety planning for Subcontractor tasks, and in ensuring that all their employees and lower tier subcontractors are in adherence with applicable local, state, and/or federal regulations, and/or industry and project specific safety standards or best management practices.

General contractors / subcontractors are responsible for preparing a site-specific HASP and/or other task specific safety documents (e.g., JHAs), which are, at a minimum, in compliance with local, state, and/or federal other regulations, and/or industry and project specific safety standards or best management practices. The contractor(s)/subcontractor(s) safety documentation will be at least as stringent as the health and safety requirements of the Haley & Aldrich Project specific HASP.

Safety requirements include, but are not limited to: legal requirements, contractual obligations and industry best practices. Contractors/subcontractors will identify a site safety representative during times when contractor/subcontractor personnel are on the Site. All contractor/subcontractor personnel will undergo a field safety orientation conducted by the Haley & Aldrich SHSO and/or PM prior to commencing site work activities.

All contractors / subcontractors will participate in Haley & Aldrich site safety meetings and their personnel will be subject to training and monitoring requirements identified in this Safety Plan. If the contractors / subcontractors means and methods deviate from the scope of work described in Section 1 of this Safety Plan, the alternate means and methods must be submitted, reviewed and approved by the Haley & Aldrich SHSO and/or PM prior to the commencement of the work task. Once approved by the Haley & Aldrich SHSO and/or PM, the alternate means and methods submittal will be attached to this Safety Plan as an Addendum.

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

ATTACHMENT D
Job Safety Analyses

Date printed: 2/12/2026 at 2:36 PM

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

HALEY ALDRICH	JOB HAZARD ANALYSIS		
	Job/Operation Title: Oversight of Drilling and Direct Push Injections	**JHA No.:** JHA-X	**Date:**
Project: 4001 4th Avenue, Brooklyn, NY	**Location(s):**	**Job Start Date:**	**Analysis Developed By:** Elizabeth Bishop
Person(s) Performing This Job: H&A Oversight, Subcontractor	**SSO:**	**Duration:**	**Analysis Reviewed By:** Elizabeth Bishop

Task/Step	Potential Hazards	Consequence	Recommended Safe Job Procedures
1. Tailgate Meeting **2. Verify Boring Locations Have Been Marked and Cleared of Utilities** **Verify One-Call ticket number(s) are valid prior to any ground disturbance and utility/site owners have marked utilities before the start of any ground disturbance task.**	Slips/Trips/Falls	Physical Injury	-Survey area for uneven surfaces and other tripping hazards; Remove all trip hazards by keeping materials/objects organized and out of walkways; - Equipment will be stored unless in use. - Place cuttings in location away from traffic and other site functions
	Struck by vehicle	Physical Injury	- Work zone will be barricaded - Watch for vehicles when out of the exclusion zone - If location in right of way Traffic Control will be setup
	Utility Strikes	Physical Injury, electrical shock	- Follow procedures for utility clearance outlined in OP1020 Working Near Utilities. - Visually check area to validate overhead clearance and utility mark outs
3. Calibrate and Inspect Air Monitoring Equipment	Tool Hazards	Pinch Points Cuts	- Inspect all tools prior to use; tagged or remove tools that are cracked, chipped or dulled; - Use Level 2 abrasion/cut resistant gloves during activities if there is a potential for cuts or broken skin from pinch points, etc;
4. Inspect DPT and Injection rig	Manual Lifting	Muscle strains/sprains	- Keep load in close to the body; Keep hips and shoulders aligned (no twisting); Maintain stability (keep a balanced position); and Use 2 people for lifts >50 lbs;

Voltage (Nominal, kV, alternating current)	Required Minimal Radial Clearance Distance (feet)
Up to 50	10
Over 50 to 175	15
Over 175 to 350	20
Over 350 to 550	27
Over 550 to 1,000	45
Over 1,000	Established by utility owner operator or registered PE qualified with respect to electrical power

5. Position and Setup Drill Rig **6. Advance Boring** **7. Oversee mixing and injection of chemical reagents**			- Reduce travel distance when there is a need to carry/lift materials
	Drilling Equipment	Pinch Points/Crushing Flying Debris/Rotating Parts	- Keep body parts clear of rig when adjusting and raising hammer assembly; - Inspect rods and sampler during operation-remove damaged equipment from use; - Keep clear of drive caps, thread connections, and sampler shoe when assembling/disassembling the tool string, advancing and withdrawing the sampler; Ensure any rotating parts are properly guarded.
	Excessive Noise	Hearing Loss	- Personnel will wear ear plugs or muffs within 25 feet of any operating equipment and implement a system of hand signals understood by all.
	Chemical Exposure	Illness from Inhalation Irritation to Skin and Eyes Illness from Ingestion	- Follow Air Monitoring Plan included in section 6.0 of the HASP; - Calibrate and inspect monitoring equipment before use; -Ensure subcontractors mixing/injecting chemicals wear tight-fitting goggles and a face shield. Don a face shield where splash hazards are likely. Wear chemical protective gloves per SDS recommendations (Neoprene gloves, 0.11 mm nitriles). - Maintain eyewash within work zone in the event that employees eyes come into contact contaminated material. -No eating or drinking in the work area, designated areas will be made available. -Ensure employees wash hands before eating, smoking, taking medication, chewing gum/tobacco, using restrooms, or applying cosmetics and before leaving the work area for the day.
	Energized Equipment	Electrical shock or potential fire	- Ensure type ABC, 20-lb, fully charged fire extinguisher is within 25’ of work area; - All equipment and cords will be inspected prior to being brought on site and they have a proper ground; - Additionally, prior to each use, personnel will perform a pre-use inspection to ensure that it is still safe to operate. - Equipment must be operated and maintained in accordance with manufacturer’s guidelines.

	Spills	Environmental Release	• Prior to mixing or injection activities, ensure spill containment is appropriately set up and spill response materials are readily available in the work area where spills may occur. • Ensure the injection pump is shut off prior to disconnecting/moving any injection lines. • Prior to reenergizing the injection lines ensure the subcontractor verifies all hose fittings are properly connected and locked with a zip-tie, whip check, and the injection ball valve is open.
	Pressurized Lines	Injury, Spills	• Suction and discharge hoses may be under pressure. • Stage hoses so that a clear walking path is available at all times. Do not walk over injection hoses. • Ensure injection hose has a whip check in place (e.g. safety chain, cable, or strap at each end) and/or other secure locking devices at all connection to prevent whipping in the event of failure.

FIELD HAZARDS ANALYSIS			

POTENTIAL SITE HAZARDS OF THIS JOB	
Site Hazards	**Description/Health Hazards**
Biological	- Be aware that small animals, snakes, and insects may be in the area. - Long pants, sleeved shirts and insect repellent will be worn, and caution will be used if walking in tall grass or overgrown areas to minimize potential hazards associated with insects, snakes and vermin. - DEET can be used to control exposure to insects. Personnel shall follow the directions for use of DEET. - Be aware of spiders, do not pick up and debris without carefully checking the area, and wear gloves when moving debris to protect bare hands from exposure to spiders and/or insects. - Employees allergic to insect stings shall be identified and necessary actions taken to treat in the event of a sting will be available on site.
Severe Weather	Field activities will stop during lightning. - Operators, field crew, and other support personnel will move out of the work zone and take shelter within an approved shelter or hard top vehicles with windows up; - Every effort must be taken to remain dry, and a spare change of clothing for each personnel will be available; - The SSO will specify the shelter, work will not resume until lightning and thunder has stopped for a minimum of 30 minutes.

Natural Disasters	- The Site is located within an active geological active zone where earthquakes may happen. The SSO will discuss the danger of earthquakes and what to do in case it happens at the orientation meeting, and every day during daily safety meetings.
Heat Stress	-Employees and subcontractors crew should be aware of potential health effects and/or physical hazards of working during hot weather. Safeguard against the effects and hazards of heat stress by drinking keeping hydrated, and taking sufficient work breaks in a shaded area. If staff member feels the effect of heat stress, seek a cool/shaded location and drink water and contact the SSO/CSM. Symptoms of heat stress, exhaustion include profuse sweating, weakness, nausea, vomiting, headache, lightheadedness, and muscle cramps.
Cold Stress	- Dress appropriately for wet/cold weather. If staff member feels the effect of stress, seek warm location and drink warm non-caffeinated beverages. Provide adequate work rest time frame during both cold and hot weather as necessary. Without proper protection, cold injuries, such as frostbite, can occur even when the temperature is above freezing (32 degrees F, 0 degrees C). This is especially true if there is a high wind or if a glove or sock gets wet.

HAZARD CONTROL MEASURES USED FOR THIS JOB

Administrative Controls: OP1020 – Working Near Utilities OP1024 - PPE OP1026 - Hand and Power Tools	**Required Forms:** Tailgate Form Air Monitoring Recording Form Utility Locator Report	**Required PPE:** Long pants, Hi-Viz vest, Hard Hat (if overhead hazards exist) Safety toed boots, safety glasses with side shields, and Nitrile gloves, cut resistant or leather gloves (as needed)
Required Training: 40 Hour Hazwoper 8 Hour Hazwoper	**Required Safety Equipment:** First Aid Kit Barricades PID 10.6 eV Lamp	**Other Information:**

Employee Signatures:	Date:

Employee Signatures:	Date:

A signed copy of this JHA must be posted while the applicable subcontractor is working on-site and be available to any employee upon request.

ATTACHMENT E
Project Site Forms

Date printed: 2/12/2026 at 2:36 PM

Note: This HASP has been developed for Haley & Aldrich purposes only and is not for use by others.

Subsurface Clearance Field Checklist

PROJECT INFORMATION

Site Name:		Project Manager:	
Location:		Client Leader/LSRP:	
Client Name:		Scope of Work:	
Project Number:		Date of SSC Event:	

PROJECT BASICS (Completed prior to the start of field activities)

Site Contact Person Identified? Circle one: Yes No			
Contact Person/Company Name/Phone Number:			
Subcontractor & On-Site Representatives:			
Have the subsurface activities been explained to the subcontractor? Circle one: Yes No			
Public utility mark-out completed? Circle one: Yes No			
Public Mark-out/called in by Company/Representative:		Date:	
Ticket Number:		Utilities Notified and Response received:	

PRE-CLEARANCE (Completed prior to breaking ground or determining final locations)

Private Utility Mark-out completed? Circle one: Yes No		Date:	
Work area and each intrusive location scanned for all utilities? Circle one: Yes No			
Private Mark-out completed by Subcontractor & Representative:			
Depth of accuracy (feet):		Limitations:	
Type of equipment used:			

Utility Identified & Marked-out	Depth (ft)	Yes	No	Utility Identified & Marked-out	Depth (ft)	Yes	No
Electricity (Red)				Sewer (Green)			
Gas (Yellow)				Telephone Data (Orange)			
Water (Blue)				Fuel/Oil			
Reclaimed H_2O/Irrigation (Purple)				Proposed excavation (white)			

SCOPE OF WORK

Scope of Work provided to subcontractors? Circle one: Yes No					
Number of intrusive locations:		Targeted depth (feet):		Diameter of Borehole (inches):	
Proposed intrusive locations within 10 feet of marked and/or known utility? Circle one: Yes No					
Final locations confirmed at least 10 feet away from all utilities? Circle one: Yes No					

FIELD OBSERVATIONS

Other Utilities & Visual Clues Observed	Yes	No	Other Utilities & Visual Clues Observed	Yes	No
Natural gas meters			Fire suppression		
Water meters			Fire hydrants		
Cable markers			Fire sprinkler lines		
Sewer drains/cleanouts			Sprinkler/irrigation systems		
Overhead lines (give 15' x 15' of clearance)			Utility poles with conduit leading to the ground		
Pipeline and pipeline markers			Utility boxes		
Underground storage tank (UST)			Manholes		
UST fill ports and vent pipes			Pavement scarring		
Lights			Remote buildings with no visible utilities		
Signage			Other (specify):		
Steam lines			Other (specify):		

Any mitigations taken if points cannot be obtained or site type was not listed:_____

_____

Mitigations taken by whom: _____

Subsurface Clearance Field Checklist

Utility Point System: Gain points to protect against utility strike

Site Description	Minimum Points Needed
Combination of 2 or more Site Types	5
Commercial/Office Park	5
Downtown/Urban Development	5
Manufacturing/Active	5
Manufacturing/Non-Active	5
Mine	5
Rail	5
Residential	5
Roadway (right-of-way, highway, and secondary routes)	5
Roadway (right-of-way, rural route)	5
Universities/Government Campus/Airports	5
Abandoned/Non-Active/Vacant	3
Remote (field, woods, undisturbed)	2
Work over water	2
Site Type Not Listed Above	Consult with the PM, Utility Specialist, and Project Team
Cannot Gain Minimum Points	Perform hand clearing/soft dig/vacuum excavation

1 Point Value (2 Maximum from this Category)
Facility/contact supplied information (GIS figure with photo overlay; extensive client records and drawings)
The utilities have been marked using GPS or surveyed (with minimum accuracy of 0.1 foot)
A review of the work scope with a knowledgeable site contact (client contact, site manager, maintenance manager or other site personnel) about the site's history and utility locations/conditions (with a utility site drawing). **A knowledgeable site contact is someone who has regular responsibilities for managing site infrastructure, construction activities, and/or retaining site drawings/figures.**
A visual inspection of the site to verify that the utilities match the drawings and figures (completed after the State One Call Subsurface Clearance Checklist)
Confirmation of the low density of subsurface utilities (based on site maps, previous private utility locates)
Shallow boring advancement (<2 feet below ground surface (bgs) with non-mechanical drilling techniques)

2 Point Values
As-built drawings (plot plans, as-builts, pipeline or facilities maps, and/or lease drawings), reviewed and verified by client for updated changes
Confirmation that utilities cut off at street and align with drawings and figures
Drawing/figure (measured to scale, shows site utilities as visually verified during site walk); includes any new or repaired lines that match site (e.g., pavement scarring); depth and diameter of utilities; and recent (includes any new construction activity)
Survey data and figures produced by Haley & Aldrich and/or Haley & Aldrich site utility experience with additional site inspection
Site drawing and figures from prior private utility locate created by Haley & Aldrich (drawing must include GPS coordinates and utilities are to scale)
GPR/EM Cable location by private utility locate directly above proposed ground disturbance/borehole location

3 Point Values	3 Point Values (Open Excavations Only)
Hand Clearing/Soft Dig/Vacuum Excavation to 5 feet bgs using the following soft dig clearance methods listed from least invasive to most: • Probing • Hand Digging • Hand Auguring • Vacuum Extraction • Air/Water Knife with Vacuum Extraction	Hand Clearing/Soft Dig/Vacuum Excavation using the following soft dig clearance methods to confirm location of known utilities prior to using mechanical excavation: • Probing • Hand Digging • Vacuum Extraction

Health & Safety Tailgate Meeting Form

Project:	Project No.:
Location:	Project Manager:
Subcontractor(s):	Date:
Site Safety & Health Officer (SSHO):	SSHO Contact Info:

Emergency Procedures

If an emergency occurs, follow procedure outlined in the HASP and contact numbers below. If non-life-threatening injury occurs, contact PM to report the incident. Seek first-aid treatment from the Occupational Health Center, as outlined in the HASP.

Emergency Dispatch phone number if other than 911:	
Local Hospital:	Local Hospital Phone #:
Evacuation/Muster Point:	Alt Evacuation/Muster Point:

Simultaneous Operations (SIMOPS)

SIMOPS or Multi-Crew Activity	☐ Yes	☐ No	If yes, describe SIMOPS:	
Has SIMOPS been communicated to all workforce?	☐ Yes	☐ No		
SIMOPS PIC:			**Phone Number:**	

Task Identification

Task	Responsible Company	Task Supervisor

Required Permits/Forms (*check all that apply*)

☐None	☐Lifting Plan	☐Other:
☐Confined Space Entry Permit	☐Hot Work Permit	☐Other:
☐Lock-out / Tag-out (LOTO)	☐Ground Disturbance Permit	☐Other:
☐Excavation Permit	☐Other:	☐Other:

Discussion of Work Hazards *(check all that apply)*

☐Chemical	☐Hazardous materials (lead, asbestos, etc.)	☐Radiological
☐Confined space	☐Hosting and rigging	☐Stored energy LOTO
☐Congested work area	☐Hot work	☐Traffic control
☐Elevated work	☐Material handling	☐Weather and/or temp extremes
☐Ergonomics	☐Noise pollution	☐Waste generation
☐Emergency egress	☐Oxygen deficiency	☐Other:

Required PPE *(check all that apply)*

										
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hearing Protection	Safety Eyewear	Hard Hat	Safety Toed Shoes	Leather or Palm Protective	Safety Vest	Protective Clothing	Respiratory Protection	PFD	Face Shield	Fall Protection

All information and content in this form is for information purposes only and is not medical advice, diagnosis, or treatment. Printed copies are not document controlled.

HALEY ALDRICH

Tailgate Topic / Hazard Discussion

Item	Discussion

Management of Change (MoC)

Does the work activity require a MoC? If yes, has it been authorized by applicable management? ☐No ☐Yes
Has the safety information been updated to incorporate any change in product, equipment, material or process? This information should include how to investigate accidents, audit compliance with safety procedures, and plan for emergency responses. ☐No ☐Yes
Have the procedures for a MoC been reviewed and evaluated? ☐No ☐Yes
Have all affected staff been informed and trained on the new equipment, process, or other changes? Health and safety hazards must be emphasized including processes/procedures in an emergency. The training must occur before any staff is allowed to operate the equipment or perform the job relating to the changes. ☐No ☐Yes
Have written procedures been put into place for the next time there is a change in safety management? ☐No ☐Yes

Best Practice(s) Observed? ☐ Yes ☐ No If yes, describe:	**H&S Observations/ Near Misses/ Incidents Reported?** ☐ Yes ☐ No If yes, describe:
Safe Work Interventions? ☐ Yes ☐ No If yes, describe:	**Have additional hazards and risk controls been identified for future work?** ☐ Yes ☐ No If yes, update appropriate job hazard analysis (JHA).

Site Safety & Health Officer Acknowledgement

At the conclusion of the day, I certify that the work site has been inspected and is being left in a safe and clean condition and any incidents have been properly reported.

Signature Date

All information and content in this form is for information purposes only and is not medical advice, diagnosis, or treatment. Printed copies are not document controlled.

HALEY ALDRICH

Worker Acknowledgement

By signing here, you are stating the following:

1. You understand the hazards and risk control actions associated with each task you are about to perform.
2. You understand the permit to work requirements pertinent to the work you are about to perform (if applicable).
3. You are aware that no tasks or work that is not risk-assessed is to be performed.
4. You also are aware of your obligation to implement 'Safe Work'.
5. You arrived and departed fit for duty.
6. You are physically and mentally fit for duty.
7. You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
8. You are aware of your responsibility to bring any illness, injury (regardless of where or when it occurred), or fatigue issue you may have to the attention of the SSHO.
9. You signed out uninjured unless you have otherwise informed the SSHO.

Name (print)	Company	Initials & Sign In/Out Time		COVID-19 Self-Declaration
		In & Fit	Out & Fit	On File

Visitor Log (*Site Visitors not involved in the work activities*)

Name (print)	Company	Initials & Sign In/Out Time		COVID-19 Self Declaration
		In & Fit	Out & Fit	On File

All information and content in this form is for information purposes only and is not medical advice, diagnosis, or treatment. Printed copies are not document controlled.

APPENDIX D
NYSDEC Request to Import/Reuse Forms

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 80 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised August 2014

APPENDIX E
AP-pH Product Specification Sheets

Product Sheet

KLOZUR® SP

THE FIELD PROVEN AND VERSATILE ISCO SOLUTION TO ADDRESS SOIL & GROUNDWATER CONTAMINATION

KLOZUR® SP is the oxidant of choice for in situ chemical oxidation (ISCO), because of its proven ability to treat a wide range of contaminants including chlorinated solvents, petroleum and PAHs. Based upon an environmental grade of sodium persulfate (SP), KLOZUR® SP is ideal for contaminated source zones and hot spots that require rapid treatment. When properly activated, KLOZUR® SP provides an unmatched combination of oxidative power, versatility, and control that can be delivered both safely and cost effectively. Successful field applications of KLOZUR® activated persulfate have been performed globally. These applications demonstrate the ability of KLOZUR® activated persulfate to treat diverse organic contaminants of concern including: chlorinated ethenes (TCE, PCE, DCE and vinyl chloride), chlorinated ethanes (TCA and DCA), chlorinated methanes (carbon tetrachloride and methylene chloride), BTEX, MTBE, polyaromatic hydrocarbons (PAHs), petroleum hydrocarbons (TPHs, GRO, DRO), 1,4-dioxane and pesticides.

KEY BENEFITS

When used with Evonik's patented activation methods, KLOZUR® SP produces the powerful oxidative ($SO_4^{-}\bullet$, $OH\bullet$) and reductive ($O_2^{-}\bullet$) radicals creating a multi-radical attack for the rapid destruction of recalcitrant compounds.

$S_2O_8^{-2}$ + Activator → $SO_4^{-}\bullet$, $OH\bullet$, $O_2^{-}\bullet$

Multiple activation options and methods of delivery provide for a flexible and custom solution based on site conditions. With a solubility limit of up to 40 wt%, KLOZUR® SP can be applied as a fully soluble solution. KLOZUR® SP is a stable oxidant given its high oxidation potential, with a typical active lifetime in the subsurface of weeks to months, providing an extended radius of influence. KLOZUR® SP is safe to handle with Evonik's recommended use guidelines and does not generate heat or gas.

EXAMPLES OF CONTAMINANTS OF CONCERN
CHLORINATED SOLVENTS PCE, TCE, DCE, VC, TCA, DCA, methylene chloride, carbon tetrachloride, chlorobenzene
PETROLEUM TPH, BTEX, DRO, GRO
PAHs creosote, MGP residuals 1,4-dioxane, MTBE, TBA, energetics, chlorinated pesticides

THE SOUND SCIENCE OF KLOZUR® ACTIVATED PERSULFATE

KLOZUR® activated persulfate has a long history of documented success having been used at thousands of sites to remediate contaminants of concern around the world. The field application of KLOZUR® activated persulfate has been scientifically validated in hundreds of independent peer-reviewed journal articles and conference presentations.

APPLICATION METHODS

- Direct push injection
- Fixed well injection
- Soil blending

For more information and detailed case studies, please visit our website.

Disclaimer This information and any recommendations, technical or otherwise, are presented in good faith and believed to be correct as of the date prepared. Recipients of this information and recommendations must make their own determination as to its suitability for their purposes. In no event shall Evonik assume liability for damages or losses of any kind or nature that result from the use of or reliance upon this information and recommendations. EVONIK EXPRESSLY DISCLAIMS ANY REPRESENTATIONS AND WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, AS TO THE ACCURACY, COMPLETENESS, NON-INFRINGEMENT, MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE (EVEN IF EVONIK IS AWARE OF SUCH PURPOSE) WITH RESPECT TO ANY INFORMATION AND RECOMMENDATIONS PROVIDED. Reference to any trade names used by other companies is neither a recommendation nor an endorsement of the corresponding product, and does not imply that similar products could not be used. Evonik reserves the right to make any changes to the information and/or recommendations at any time, without prior or subsequent notice.

Evonik Operations GmbH
Smart Materials
Active Oxygens Business Line
Soil & Groundwater Remediation

remediation@evonik.com
www.evonik.com/remediation

EVONIK
Leading Beyond Chemistry

CONTAMINANTS TREATED

Use this guide by locating the contaminant of concern sorted by contaminant type. The technologies recommended for treatment of each contaminant are located to the right.

✓ Recommended, lab or field data available demonstrating success
■ Recommended with site specific lab study

	CHEMICAL OXIDATION KLOZUR® PERSULFATE	CHEMICAL REDUCTION EHC® REAGENT, EHC® PLUS, DARAMEND® REAGENT	ENHANCED ANAEROBIC BIOREMEDIATION EHC® LIQUID, ELS® MICROEMULSION	METALS TREATMENT METAFIX® REAGENTS, EHC® METALS, DARAMEND® METALS	AEROBIC BIOREMEDIATION TERRAMEND® REAGENT	 PERMEOX® ULTRA	BIOGEOCHEMICAL GEOFORM® REAGENTS
CHLORINATED SOLVENTS							
Tetrachloroethene (PCE)	✓	✓	✓	✓			✓
Trichloroethene (TCE)	✓	✓	✓	✓			✓
Dichloroethene (cis and trans DCE)	✓	✓	✓	✓			✓
Trichloroethane (TCA)	✓	✓	✓	✓			✓
Dichloroethane (DCA)	✓	✓	✓	✓			✓
Carbon tetrachloride	✓	✓	✓	✓			✓
Chloroethane	✓	✓	✓	✓			✓
Chloroform	✓	✓	✓	✓			✓
Chloromethane	✓	✓	✓	✓			✓
Chlorotoluene	✓	✓	✓	✓			✓
Methylene chloride	✓	✓	✓	✓			✓
Vinyl chloride	✓	✓	✓	✓		✓	✓
Dichloropropane	✓	✓	✓	✓			✓
Dichloropropene	✓	✓	✓	✓			✓
Hexachlorobutadiene	✓	✓	✓	✓			✓
Tetrachloroethane	✓	✓	✓	✓			✓
Trichloropropane	✓	✓	■	✓			✓
BTEX							
Benzene	✓				✓	✓	
Toluene	✓				✓	✓	
Ethylbenzene	✓				✓	✓	
Xylenes	✓				✓	✓	

CONTAMINANTS TREATED

✓ Recommended, lab or field data available demonstrating success
■ Recommended with site specific lab study

	CHEMICAL OXIDATION KLOZUR® PERSULFATE	CHEMICAL REDUCTION EHC® REAGENT, EHC® PLUS, DARAMEND® REAGENT	ENHANCED ANAEROBIC BIOREMEDIATION EHC® LIQUID, ELS® MICROEMULSION	METALS TREATMENT METAFIX® REAGENTS, EHC® METALS, DARAMEND® METALS	AEROBIC BIOREMEDIATION TERRAMEND® REAGENT	AEROBIC BIOREMEDIATION PERMEOX® ULTRA	BIOGEOCHEMICAL GEOFORM® REAGENTS
PAHs							
Acenaphthene	✓				✓		
Acenaphthylene	✓				✓		
Anthracene	✓				✓		
Benzo(a)anthracene	✓				✓		
Benzo(a)pyrene	✓				✓		
Benzo(b)fluoranthene	✓				✓		
Benzo(ghi)perylene	✓				✓		
Chrysene	✓				✓		
Dibenzo(ah)anthracene	✓				✓		
Fluorene	✓				✓		
Naphthalene	✓				✓	✓	
Phenathrene	✓				✓		
Pyrene	✓				✓		
OXYGENATES							
Methyl tert-butyl ether (MTBE)	✓					✓	
Tert-butyl alcohol (TBA)	✓					✓	
PETROLEUM HYDROCARBONS							
GRO (gasoline range organics)	✓				✓	✓	
DRO (diesel range organics)	✓				✓	✓	
ORO (oil range organics > C20 alkanes)	✓				✓		
Creosote (coal tar)	✓				✓		
PHENOLS							
Phenol	✓				✓		
4-chloro-3-methyl phenol	✓				✓		
2-chlorophenol	✓		■		✓		
2,4-dichlorophenol	✓		■		✓		
2,4-dinitrophenol	✓		■		✓		
4-nitrophenol	✓		■		✓		
Pentachlorophenol	✓	✓	■	✓	✓		✓

CONTAMINANTS TREATED

✓ Recommended, lab or field data available demonstrating success
■ Recommended with site specific lab study

	CHEMICAL OXIDATION KLOZUR® PERSULFATE	CHEMICAL REDUCTION EHC® REAGENT, EHC® PLUS, DARAMEND® REAGENT	ENHANCED ANAEROBIC BIOREMEDIATION EHC® LIQUID, ELS® MICROEMULSION	METALS TREATMENT METAFIX® REAGENTS, EHC® METALS, DARAMEND® METALS	AEROBIC BIOREMEDIATION TERRAMEND® REAGENT	 PERMEOX® ULTRA	BIOGEOCHEMICAL GEOFORM® REAGENTS
CHLOROBENZENES							
Chlorobenzene	✓	✓	■	✓	✓	✓	■
Dichlorobenzene	✓	✓	✓	✓			■
Trichlorobenzene	✓	✓	✓	✓			■
FLUORINATED COMPOUNDS							
Dichlorodifluoromethane	✓	✓	✓	✓			■
Trichlorofluouromethane	✓	✓	✓	✓			■
Trichlorotrifluoroethane	✓	✓	✓	✓			■
PFCA/PFOA	✓						
PESTICIDES & HERBICIDES							
Chlordane	✓	✓	✓	✓			■
Heptachlor Epoxide	✓	✓		✓			■
Lindane (hexachlorocyclohexane)	✓	✓	✓	✓	✓		■
DDT, DDD, DDE	✓	✓	✓	✓			■
Toxaphene	✓	✓	✓	✓			■
Dieldrin	✓	✓	✓	✓			■
2,4-D	✓	✓	✓	✓	✓		■
2,4,5-T	✓	✓	✓	✓	✓		■
Endrin	✓	✓	✓	✓			■
Kepone	■	✓		✓			■
ENERGETICS							
TNT	✓	✓	✓	✓			■
DNT	✓	✓	✓	✓			■
Nitroglycerine	✓	✓	✓	✓			■
HMX	✓	✓	✓	✓			■
RDX	✓	✓	✓	✓			■
Perchlorate		✓	✓	✓			■

CONTAMINANTS TREATED

✓ Recommended, lab or field data available demonstrating success
■ Recommended with site specific lab study

	CHEMICAL OXIDATION KLOZUR® PERSULFATE	CHEMICAL REDUCTION EHC® REAGENT, EHC® PLUS, DARAMEND® REAGENT	ENHANCED ANAEROBIC BIOREMEDIATION EHC® LIQUID, ELS® MICROEMULSION	METALS TREATMENT METAFIX® REAGENTS, EHC® METALS, DARAMEND® METALS	AEROBIC BIOREMEDIATION TERRAMEND® REAGENT	 PERMEOX® ULTRA	BIOGEOCHEMICAL GEOFORM® REAGENTS
MISCELLANEOUS							
Acetone	✓				■	■	
4-methyl-2-pentanone	✓						
1,4-dioxane	✓						
Polychlorinated biphenyls (PCBs)	✓	■		■			
Nitrate		✓	✓	✓	✓		✓
Bis(2-ethyhexyl)phthalate	✓				✓		
Nitrobenzene	✓						
Propylbenzene	✓				■	■	
4-iso-propyltoluene	✓						
Styrene	✓						
Trimethylbenzene	✓				■	■	
n-butylbenzene	✓						
Carbon Disulfide (CS_2)	✓						
Dioxins / Furans	■						
HEAVY METALS							
Antimony				✓			
Arsenic	✓			✓			■
Barium				✓			
Cadmium				✓			✓
Chromium		✓	✓	✓			✓
Cobalt				✓			✓
Copper				✓			✓
Lead				✓			✓
Mercury				✓			
Nickel				✓			✓
Selenium				✓			■
Vanadium				✓			
Zinc				✓			✓

EVONIK
Leading Beyond Chemistry

Safe Handling, Use, and Storage of Klozur® Persulfate

BACKGROUND

Klozur® sodium persulfate is a stable, highly soluble, crystalline material, which upon activation is capable of oxidizing a broad range of recalcitrant compounds. When properly handled and stored, Klozur persulfate does not present a serious health hazard. However, as with all oxidizing chemicals, Klozur persulfate requires careful attention to all aspects of handling and use. This bulletin covers the basic safe handling, use and storage practices for Klozur persulfate. For more information, please refer to the Safety Data Sheet (SDS), which is available from PeroxyChem.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye protection – wear chemical goggles or a face shield whenever splashing, spraying or eye contact is possible

Respiratory – use dust respirator approved by NIOSH/MSA whenever exposure may exceed the established standard listed in the MSDS.

Hands – wear chemically compatible (neoprene) gloves

Clothing – wear chemically compatible protective clothing with long sleeves and full-length pants when contact is possible.

Footwear – wear safety shoes with chemical resistant soles (neoprene)

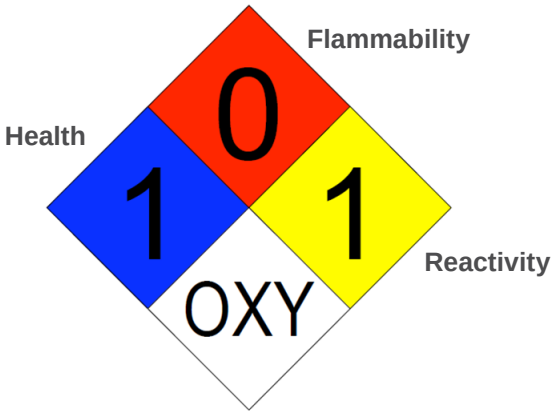
FIRST AID

Section Eye Contact – flush with water for at least 15 minutes. If irritation occurs and persists, obtain medical attention.

Skin Contact – wash with plenty of soap and water. If irritation occurs and persists, obtain medical attention. Wash clothing before reuse.

Inhalation – get fresh air. If breathing difficulty or discomfort occurs, call a physician.

Ingestion – drink one to two glasses of water. Do not induce vomiting. Call a physician immediately.



DISPOSAL

Klozur persulfate crystals should never be discarded in trash bins. Contact with moisture, contaminants, and / or reducing agents can initiate a chemical reaction or persulfate decomposition. Persulfate crystals that become waste material are classified as hazardous waste, because they are oxidizers. Persulfate that is spilled on the floor, or otherwise contaminated, is best dissolved in copious amounts of water. Do not return spilled persulfate back to the original container, as it may contain trace contaminants. Spent packaging materials may be termed a “non-classified” waste, which allows for disposal with regular waste.

An acceptable disposal method for spent Klozur persulfate solutions is to dilute with large quantities of water and dispose via a treatment system. Any disposal method must be in full accordance with all local, state and federal agencies. Neutralization of Klozur persulfate solutions may be performed, but must be done slowly with mild alkali (example: bicarbonate) with ample heat sink or cooling to prevent rapid temperature increases and gas release.

MATERIALS COMPATABILITY

304 And 316 stainless steel are recommended for mixing, conveyance and storage equipment (tanks, pipes, etc.) Other compatible materials include: polyvinyl chloride, polyethylene, Poly(methyl methacrylate), Teflon®, chemical stoneware and glass.

Metals other than 304 and 316 stainless steel may cause persulfate decomposition, and in turn may be corroded by the persulfate. This is particularly true of Monel, copper, brass, aluminum, and iron. The pH of Klozur persulfate solutions will decrease over time, and may drop below a pH of 2.

STORAGE

Klozur persulfate should be kept in a cool, dry storage area. If stored in bulk, NFPA 400 guidelines should be followed.

Do not store or process Klozur persulfate solutions in sealed or closed containers or vessels. Normal solution decomposition will release oxygen gas, which may over pressurize a sealed container and cause rupture.

DECOMPOSITION HAZARD OF KLOZUR PERSULFATE CRYSTALS

Overheating or contamination of persulfate can lead to a self-accelerating decomposition. Persulfate decomposes to form solid sulfate salts and emit noxious fumes of SOx. Oxygen and heat released from persulfate decomposition may induce combustion in flammable materials. The only way to halt a decomposition event is to apply large quantities of water. One gallon of water per pound of decomposing material is recommended. Do not use less than a quart of water per pound of material, as this may intensify the decomposition.

Observe the following precautions to prevent decomposition:

Do not expose Klozur persulfate or their containers to moisture. Moisture reduces the decomposition onset temperature.

Do not store Klozur persulfate near incompatible materials: reducing agents, acids, bases, ammoniacal solutions, or alkaline cleaners.

Do not store near point sources of heat (steam pipes, electrical appliances, heating vents, gas flames radiant heaters, etc). Do no store in ambient temperatures above 113 ºF or 45 ºC.

Do not return spilled or unused portions to the original container.

Do not establish direct contact with hydrocarbons.

Klozur is a Trademark of PeroxyChem. © 2015 PeroxyChem. All rights reserved. Document 05-01-ESD-15. The information contained herein is, to our knowledge, true and accurate. However, we make no warranty or representation, expressed or implied, and nothing contained herein should be construed as permission or recommendation to infringe any patent. All intellectual property rights to this material are retained by PeroxyChem. Teflon is a Trademark of E. I. du Pont de Nemours and Company

Alkaline Activated Klozur® Persulfate

Alkaline activated Klozur® persulfate, U.S Patent No.: 7,576,254 and its foreign counterparts, is a widely used technology capable of remediating most common organic contaminants of concern. Alkaline activated persulfate forms oxidative radical species, reductants, and nucleophiles (Furman et al, 2010). This multi-radical attack allows the treatment of chlorinated ethenes (TCE, PCE, DCE, and vinyl chloride), 1,4-dioxane, MTBE, TBA, petroleum hydrocarbons (BTEX, and PAHs), pesticides, as well as more recalcitrant compounds including chlorinated methanes, such as carbon tetrachloride, and chlorinated ethanes, such as 1,1,1-trichloroethane. For a complete list, please contact your PeroxyChem technical representative or consult www.peroxychem.com/remediation.

ALKALI REAGENT SELECTION

Common reagents used to create alkaline conditions for activation of Klozur persulfate include:

- **25 Percent Sodium Hydroxide, 25% NaOH, *liquid***
  The use of 25 percent sodium hydroxide (NaOH) is recommended for safety and handling considerations as 25 percent NaOH releases less heat upon dilution and remains in solution at lower temperatures than more concentrated forms of NaOH. For more information please consult PeroxyChem's Technical Bulletin on Crystal Formation in Solutions of Klozur Persulfate and Klozur Caustic or contact your local PeroxyChem technical representative.
- **Calcium Hydroxide, $Ca(OH)_2$, *solid***
  Calcium hydroxide [$Ca(OH)_2$] is commonly referred to as slaked lime, hydrated lime, or caustic lime. Calcium hydroxide is recommended over calcium oxide (CaO) in most circumstances as calcium hydroxide releases significantly less heat (less exothermic) than calcium oxide upon hydration. Both lime products can generate the alkaline conditions to activate Klozur persulfate when dosed appropriately.
- **Calcium Oxide, CaO, *solid***
  Calcium oxide (CaO) is also commonly referred to as quicklime. Calcium oxide releases significant heat (exothermic) once hydrated as the calcium oxide consumes water to form calcium hydroxide [$Ca(OH)_2$] in a process referred to as "slaking." Even when mixed directly with hydrated soil, it can release sufficient heat energy to create heat activated conditions for persulfate. Health, safety and handling of the expected evolution of heat should be considered when using calcium oxide to activate persulfate.
- **Portland Cement, *solid***
  Portland cement contains a significant amount of calcium oxide with the other major components including silicon dioxide, aluminum oxides and gypsum. Portland cement has been applied with Klozur persulfate to improve the geotechnical characteristics of the soil post mixing. At higher dosage rates, Portland cement can provide a combined remedy that both reduces contaminant mass (via *In Situ* Chemical Oxidation, ISCO) and contaminant flux (via *In Situ* Stabilization, ISS) from a single application. As with calcium hydroxide above, it is recommended the potential heat evolution of the system be considered prior to field application.

Due to a number of health and safety concerns, the following alkali reagents are **NOT RECOMMENDED** for use with Klozur persulfate:

- High purity Sodium Hydroxide flakes, granules or powder, *solid* **Not Recommended**
  Solid forms of sodium hydroxide release significant heat (highly exothermic) upon hydration. In certain circumstances, sufficient heat may be liberated that it can boil the solution, generate steam eruptions, and damage to equipment.
- Sodium Hydroxide, >25% NaOH, *liquid* **Not Recommended**
  Sodium Hydroxide is sold commercially in a variety of concentrations. To minimize potential risk, PeroxyChem recommends NaOH solutions of no more than 25% by weight be used to activate Klozur persulfate. More concentrated forms of NaOH (50 % or greater solutions and solid form NaOH) may generate increasingly exothermic reactions upon dilution and any NaOH solution greater than 30% can solidify above the freezing point of water.
- Carbonate based lime products, *solid* **Not Recommended**
  Different types of lime exist that are not based on calcium hydroxide or calcium oxide but are instead based on carbonates or contain a significant amount of carbonates. These forms of lime, such as Agricultural lime, should not be used to create alkaline activated conditions as the carbonates can interfere with the oxidative treatment process.

There are several factors to using a lime reagent (calcium hydroxide or calcium oxide) that should be considered including:

Purity	Commercially available lime products typically include impurities. For example, high purity commercial lime products might have greater than 95 percent of the desired lime product (calcium hydroxide or calcium oxide) while other commercially available lime products could have significantly lower percentages of the desired lime product. These impurities have the potential to introduce an unexpected compound into the subsurface, such as carbonates (see below), and necessitate adjusting the total mass of product required to supply the intended amount of calcium hydroxide or calcium oxide.
Carbonates	Carbonates are common impurities in solid lime products, which have the ability to react with, or scavenge, certain oxidative radicals which could negatively impact the efficacy of the persulfate. Trace levels of carbonates are not expected to be a significant issue, however products containing significant carbonates should either be avoided or bench tested to assess their treatment efficacy.
Calcium sulfate	Residual calcium from the lime will react with residual sulfate from persulfate to form gypsum. This reaction can significantly reduce the amount of soluble sulfate in the system and it has been used to increase soil strength.

DETERMINING THE AMOUNT OF ACTIVATOR NEEDED

Alkaline activation typically requires system conditions of at least pH 10.5 be maintained throughout active treatment with the Klozur persulfate. Klozur CR is formulated with PermeOx Ultra in sufficient quantities to create alkaline conditions in typical conditions. Klozur SP (sodium persulfate) and Klozur KP (potassium persulfate) require the addition of an alkaline material.

The demand for alkalinity arises from two sources:

1) Natural demand from soil and groundwater, and
2) The neutralization of acid generated during reactions with persulfate.

Total Alkaline Demand =
(1) natural demand from soil and groundwater + (2) neutralization of generated acid

Natural Demand for Alkalinity

The amount of the 25% NaOH needed to raise soil and groundwater to pH 10.5 is best determined experimentally. PeroxyChem recommends a base buffer capacity (BBC) test be conducted to determine this amount. This test is conducted using aqueous NaOH with the results reported as grams 25 percent NaOH per Kg soil. These values can be converted to calcium hydroxide or calcium oxide instead of 25 percent NaOH using conversion factors, estimated below:

- 0.23 g calcium hydroxide per g of 25 percent NaOH
- 0.175 g calcium oxide per g 25 percent NaOH

Please contact PeroxyChem for further information or to inquire about the BBC test offered by our laboratory.

Alkalinity to Neutralize Generated Acid

PeroxyChem recommends adding sufficient alkalinity to account for the decomposition of all of the Klozur persulfate so that the persulfate system stays sufficiently alkaline until all of the Klozur persulfate is consumed. As persulfate reacts, it typically forms 2 moles of acid for every mole of persulfate that decomposes. The demand for the amount of an alkali reagent required to neutralize the acid generated during persulfate decomposition is presented in Table 1.

Alkali Reagents	Formula	Molecular Weight	Molar Ratio	Alkali Mass per Klozur SP Mass (lb per lb or Kg per Kg)	Alkali Mass per Klozur KP Mass (lb per lb or Kg per Kg)
25% Sodium Hydroxide[1]	NaOH	40	2	1.34	1.18
Calcium Hydroxide[2]	$Ca(OH)_2$	74.1	1	0.31	0.27
Calcium Oxide[2]	CaO	56.1	1	0.24	0.21
Notes: 1 - Assumes mass of 25 percent sodium hydroxide **solution**.					
2 - Assumes 100 percent solid product. Does not include hydration or impurities.					

Table 1. Dosage factors for Alkali Reagents; does not include base buffering capacity

Portland cement, pozzolans, bentonite, or other materials can be used in differing amounts to help control post soil mixing soil characteristics including in sufficient quantities to solidify the soil resulting in a combined ISCO and ISS remedy. The amount of Portland cement needed to solidify the soils may be different than the amount needed to activate the persulfate. The quantities of Portland cement required to activate persulfate and result in the desired soil characteristic should each be assessed and, typically, the greater mass used. It is also recommended that soil stability tests be run on site soils including the Klozur persulfate.

The following examples demonstrate how to estimate the amount of alkali needed at a site to create alkaline activated conditions.

Example 1:

100,000 lbs of Klozur SP is going to be applied to a site with a base buffering capacity of 5 g 25% NaOH/Kg soil. There are 8,000,000 Kg soil within the target interval of 30 ft bgs to 40 ft bgs at the site. The use of liquid activator, 25 percent NaOH, has been selected.

Calculations:

- Part 1 – BBC. The amount due to base buffer capacity of the soil can be determined by multiplying 5 g 25% NaOH per Kg soil by 8,000,000 Kg soil. This is equal to 40 million grams of 25 percent NaOH solution, or 88,105 lbs.
- Part 2 – Persulfate Neutralization. The amount of 25% NaOH needed to offset the acid generated from persulfate decomposition would be 1.34 lbs of 25% NaOH times the 100,000 lbs of Klozur SP which equals 134,000 lbs of 25% NaOH solution.
- The final amount of 25% NaOH required at the site would be the addition of the two, or 88,105 + 134,000 = 222,105 lbs of 25% NaOH.

Example 2:

25,000 Kgs of Klozur KP is going to be applied to a site with a base buffering capacity of 3 g 25% NaOH/Kg soil. There are 3,000,000 Kg soil within the target area at the site. As the target interval is 1 m bgs to 4 m bgs and 98% pure hydrated lime (calcium hydroxide) has been selected as the activator.

Calculations:

- Part 1 – BBC. The amount due to base buffer capacity of the soil can be determined by multiplying 3 g 25% NaOH per Kg soil by 3,000,000 Kg soil times the conversion factor of 0.23. This is equal to 2.07 million grams of hydrated lime, or 2,070 Kgs.
- Part 2 – Persulfate Neutralization. The amount of hydrated lime needed to offset the acid generated from persulfate decomposition would be 25,000 Kgs of Klozur KP times 0.27 Kgs of hydrated lime per Kg Klozur KP divided by 0.98 (purity) which equals 6,887 Kgs of hydrated lime.
- The final amount of calcium hydroxide (hydrated lime) required at the site would be a combination of the two, or 2,070 + 6,887 = 8,957 Kgs of hydrated lime.

Example 3:

It has been decided to apply the combined remedy of activated Klozur SP and ISS to treat a large brownfield site. It has been estimated that the site needs a minimum of 400,000 lbs of Klozur SP and has a base buffering capacity of 2 g 25% NaOH/Kg soil. There are an estimated 26,000,000 lbs of soil within the target area at the site. To stabilize the soils, Portland cement has been selected as the activator. The Portland Cement to be used was identified as being 63 percent

calcium oxide and it was determined that 8 percent Portland Cement (w/w with the soil mass only) sufficiently stabilized the soils.

Calculations:

- Part 1 – BBC. The amount due to base buffer capacity of the soil can be determined by multiplying 2 g 25% NaOH per Kg soil by 26,000,000 lbs soil, dividing by 2.204 lbs/Kg and 0.175 conversion from 25% NaOH to CaO. This is equal to 4.1 million grams of calcium oxide, or 9,100 lbs of calcium oxide.
- Part 2 – Persulfate Neutralization. The amount of hydrated lime needed to offset the acid generated from persulfate decomposition would be 0.24 lbs of hydrated lime times the 400,000 lbs of Klozur SP which equals 96,000 lbs of calcium oxide.
- The final amount of 100% pure calcium oxide (quicklime) required at the site for ISCO would be a combination of the two, or 9,100 + 96,000 = 105,100 lbs of calcium oxide. As the Portland Cement is specified as having 63 percent calcium oxide, this would be equivalent to 105,100/0.63 = 166,825 lbs of Portland Cement required to activate Klozur SP.
- The final step would be to compare the amount of Portland cement needed for alkaline activation against the amount that was determined best to stabilize soils. The amount of Portland cement needed in this example to stabilize the soils was 8 percent of the original soil mass. The total mass at the site would be 8 percent of 26,000,000 lbs of soil or 2,080,000 lbs of Portland cement. In this case the amount of Portland cement needed to stabilize the soils exceeded the amount needed to activate persulfate and should be used in the design.

SAFETY AND HANDLING

As the combination of an alkali reagent with persulfate can initiate a reaction, **PeroxyChem recommends Klozur products and alkaline products be stored separately. Even after being batched, PeroxyChem recommends that the Klozur persulfate and alkaline solutions be stored in separate chemically compatible tanks.** Contact between the alkali material and persulfate prior to injection should be limited to prevent the initiation of the reaction. This is typically accomplished by mixing the reagents inline prior to injection or injecting the reagents separately in a serial manner that creates sufficiently alkaline conditions to activate the persulfate.

Alkaline activated Klozur persulfate has been applied safely and effectively at numerous sites. However, as with any chemical, proper procedures and equipment are recommended in its use. When working with Klozur persulfate, ensure to have adequate ventilation and use the appropriate personal protective equipment, including safety glasses, suitable protective clothing, boots (steel toed), chemical resistant gloves, hard hat, and hearing protection (when direct push is used). For dust, splash, mist, or spray exposures wear a filtering dust mask and chemical protective goggles. A face shield can also be used in addition to goggles.

Please consult the appropriate Safety Data Sheets (SDS) for guidelines regarding proper handling procedures. The SDS's for Klozur persulfate products can be found at: http://www.peroxychem.com/remediation. Additional safety equipment may be required for mechanical and site operations.

Please contact PeroxyChem for additional guidance.

Klozur is a Trademark of PeroxyChem. © 2017 PeroxyChem. All rights reserved. Document 01-04-ESD-17. The information contained herein is presented to the best of our knowledge, PeroxyChem makes no representations or warranties regarding the accuracy, quality, or reliability of this information and shall under no circumstances be liable with respect to such information.

APPENDIX F
Citizen Participation Plan

NEW YORK STATE | Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan

for

4001 4th Avenue Redevelopment Site

July 2026

BCP Site No. 224412
4001-4011 4th Avenue
Brooklyn, New York

Contents

Section **Page Number**

1. What is New York's Brownfield Cleanup Program? 3

2. Citizen Participation Activities 3

3. Major Issues of Public Concern 9

4. Site Information 9

5. Investigation and Cleanup Process 12

Appendix A - Project Contacts and Locations of Reports and Information 16

Appendix B - Site Contact List 17

Appendix C - Site Location Map 23

Appendix D - Brownfield Cleanup Program Process 24

* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **4 Ave Property LLC ("Applicant")**
Site Name: **4001 4th Avenue Redevelopment Site**
Site Address: **4001-4011 4th Avenue, Brooklyn, NY 11232**
Site County: **Kings County**
Site Number: **C224412**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: http://www.dec.ny.gov/chemical/8450.html.

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment.

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process.

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process.

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community.

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods. The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- Residents, owners, and occupants of the site and properties adjacent to the site;
- The public water supplier which services the area in which the site is located;
- Any person who has requested to be placed on the site contact list;
- The administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- Location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

Note: The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html .

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in

Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, the significant threat determination for the site had not yet been made.

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

Citizen Participation Activities	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repository(ies)	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement (BCA):	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation **Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA.
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report • Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)	At the time the cleanup action has been completed. **Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

Previous environmental investigations at the Site were conducted between 2019 and 2024. These environmental investigations included soil and groundwater sampling which have identified the primary contaminants of concern for the Site to be petroleum-related volatile organic compounds (VOCs), which includes benzene, toluene, ethylbenzene, and total xylenes (BTEX). Light non-aqueous phase liquid (LNAPL) was also observed in a monitoring well at the Site, which has been associated with NYSDEC Spill Case No. 1811146. The contaminants of concern identified in previous investigations are believed to have resulted from previous operations, including gasoline station operations and the current and previous leaking USTs.

The Site is located within a potential 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 politics.

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.

Because there is a large Hispanic-American and Chinese-American population near the Site, all future fact
sheets will be translated into Spanish and Chinese.

4. Site Information

Appendix C contains a map identifying the location of the site.

Site Description

The Site's address is 4001-4011 4th Avenue, Brooklyn, NY and is identified as Block 714, Lot 6 on the New York City tax map. The Site is approximately 10,017 square feet (sq ft) (0.23 acres) and is currently improved with a BP Gasoline Service Station with a 1,860 square foot one-story convenience store, a canopy for three pump islands and parking for the convenience store.

The Site is bound by 40th Street followed by mixed-use commercial and residential buildings to

the north, a commercial car wash and auto repair shop to the south, residential apartment buildings to the east, and 4th Avenue followed by Intermediate School (I.S.) 136 to the west.

History of Site Use, Investigation, and Cleanup

Historical records indicated that circa 1926 the Site was comprised of one tax lot developed with a one-story concrete structure and a gasoline filling/auto service station with one UST and a second lot which was vacant. By the 1940s, the Site merged as one lot. The Site was operated as an automotive service station, including lubrication and minor repair services, with office use and a parking area, from approximately 1940 until at least the mid-1960s. The configuration of the Site changed and was identified with a cement brick one-story structure with a gasoline filling station circa 1970. The Site has then operated as a gasoline filling station to the present.

A subsurface investigation was first conducted in 2019 to evaluate the impact of historical and current use of the Site as a gasoline filling station on subsurface conditions. Nine suspected former USTs, in addition to the four 4,000-gallon active USTs, were identified at the Site. Analytical results of soil samples reported petroleum-related VOCs in soil above applicable standards. Based on these findings, a spill was reported and Spill No. 1811146 was assigned to the Site.

Supplemental investigation work was performed in 2020 and 2021 which included the installation of a monitoring well at the Site. Groundwater samples collected from the monitoring well reported petroleum-related VOCs in groundwater above applicable standards.

Monitoring activities since 2021 at the Site have included gauging of the monitoring well for depth to groundwater and presence of LNAPL. When LNAPL was observed in the monitoring well, LNAPL was removed via vacuum-enhanced fluid recovery.

A Phase I Environmental Site Assessment conducted in 2024 identified four Recognized Environmental Conditions (RECs) to the Site including 1) historical use of the Site and adjacent areas as gasoline filling stations, an auto repair shop, and a car wash, indicated by impacted subsurface conditions; 2) suspected presence of nine out-of-service USTs in the western section of the lot, with subsurface impact; 3) a metallic anomaly was detected during the geophysical investigation, possibly a buried hydraulic lift due to historic use as an auto service station; and 4) A spill was recorded on the adjacent property along 4th Avenue with no remediation conducted, and the case was closed due to lack of response from the owner.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a Volunteer. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposes that the site will be used for unrestricted purposes.

To achieve this goal, the Applicant will conduct investigation and/or cleanup activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

Investigation

The Applicant will conduct an investigation of the site officially called a "remedial investigation" (RI). This investigation will be performed with NYSDEC oversight. The Applicant must develop a remedial investigation workplan, which is subject to public comment.

The site investigation has several goals:

1) define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) identify the source(s) of the contamination;
3) assess the impact of the contamination on public health and the environment; and
4) provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

The Applicant has submitted a draft "Remedial Investigation Work Plan" to NYSDEC for review and approval. NYSDEC made the draft plan available to the public review during a 30-day public comment period.

When the investigation is complete, the Applicant will prepare and submit a report that summarizes the results. This report also will recommend whether cleanup action is needed to address site-related contamination. The investigation report is subject to review and approval

by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a "significant threat," it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis of alternatives.

Interim Remedial Measures

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

Remedy Selection

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must

concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

Site Management

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Appendix A -
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Shawn Roberts
Project Manager
NYSDEC
Division of Environmental Remediation
625 Broadway
Albany, NY 12233-5060
(518) 402-9799
Shawn.Roberts@dec.ny.gov

Thomas V. Panzone
Public Participation Specialist
NYSDEC Region 2
47-40 21st Street,
Long Island City, NY 11101
(718) 482-4953
Thomas.panzone@dec.ny.gov

New York State Department of Health (NYSDOH):

Christopher Budd
NYSDOH, Public Health Specialist
Bureau of Environmental Exposure
Investigation
Empire State Plaza, Corning Tower,
Room 1787
Albany, NY 12203
(518) 402-1769
BEEI@health.ny.gov

NYSDEC InfoTracker
https://www.dec.ny.gov/data/DecDocs/C224412/

Click here to enter text.

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents:

Sunset Park Branch – NY Public Library
5108 4th Avenue, Brooklyn, NY 11220
Phone: 718-230-2255
Email: rbenavides@bklynlibrary.org
Attn: Roxana Benevides
Hours: M-Th – 10am-7pm
F-S – 10am-5pm
Su – Closed

Sunset Park Branch – NY Public Library
5108 4th Avenue, Brooklyn, NY 11220
Phone: 718-230-2255
Email: rbenavides@bklynlibrary.org
Attn: Roxana Benevides
Hours: M-Th – 10am-7pm
F-S – 10am-5pm
Su – Closed

Brooklyn Community Board 7
4201 4th Avenue Brooklyn, NY 11232
Phone: 718-854-0003
Email: Bk07@cb.nyc.gov
Attn: Jeremy Laufer
Hours: M-F– 10am-6pm
S – 10am-5pm
Su – Closed

Brooklyn Community Board 7
4201 4th Avenue Brooklyn, NY 11232
Phone: 718-854-0003
Email: Bk07@cb.nyc.gov
Attn: Jeremy Laufer
Hours: M-F– 10am-6pm
S – 10am-5pm
Su – Closed

Appendix B - Site Contact List

Owners, Residents, Occupants:

Owner	Contact Name	Phone	Mailing Address	Email
4001 4TH LLC	George Macchia	718-395-2096	556 Central Avenue, Bethpage, NY 11714	george@themacchiagroup.net

Operator	Contact Name	Phone	Mailing Address	Email
B&L Gas Station Enterprises, Inc.	Lilia Lomanov	347-410-3977	2951 Ocean Avenue, Apt. 2D Brooklyn, NY 11235	quickstock@hotmail.com

Executive

Role	Name	Phone	Mailing Address	Email / Contact
NYC Mayor	Mayor Eric Adams	212-NEW-YORK	City Hall New York, NY 10007	https://www1.nyc.gov/office-of-the-mayor/mayor-contact.page
NYC Department of City Planning Chairperson	Marisa Lago	212-720-3300	120 Broadway 31st Floor New York. NY 10271	https://www1.nyc.gov/site/planning/about/email-the-director.page
Brooklyn Borough President	Antonio Reynoso	718-963-3141	Brooklyn Borough Hall 209 Joralemon Street Brooklyn, NY 11201	areynoso@council.nyc.gov
Brooklyn Community Board 7 District Manager	Jeremy Laufer	718-854-0003	4201 4th Avenue, Brooklyn, NY 11232	Bk07@cb.nyc.gov
New York City Council District 38	Alexa Aviles	718-439-9012	4417 4th Avenue, Ground Floor Brooklyn, NY 11220	District38@council.ny.gov
NY Senate District 17 Senator	Iwen Chu	718-333-0311	6605 Fort Hamilton Parkway Brooklyn, NY 11219	iwenchu@nysenate.gov
NY State Assembly District 051 Member	Marcela Mitaynes	718-492-6334	4907 4th Avenue Suite, 1A Brooklyn, NY 11220	mityanes@nyassembly.gov
NYC Department of Health and Mental Hygiene (DOHMH)	Ashwin Vasan, M.D., PhD Commissioner	212-639-9675	42-09 28th Street, Queens, NY 11101	opmc@health.ny.gov
NYC Office of Environmental Remediation	Mark McIntyre, Director	212-788-8841	100 Gold Street – 2nd Floor New York, NY 10038	foil-oer@cityhall.nyc.gov
NYC Department of Environmental Protection	Rohit Aggarwala, Commissioner	311	59-17 Junction Boulevard Flushing, NY 11373	https://www.nyc.gov/nyc-resources/mail/dep-email-the-commissioner.page
US Senator	Charles Schumer	212-486-4430	780 Third Avenue, Suite 2301 New York, NY 11373	-
US Senator	Kirsten Gillibrand	212-688-6262	780 Third Avenue, Suite 2301 New York, NY 11373	-
Brooklyn County Clerk	Hon. Nancy T. Sunshine	347-404-9760	360 Adams Street Brooklyn, NY 11201	KCCOInfo@nycourts.gov

NYC Department Of Education – District 15 Superintendent	Rafael Alvarez	718-935-3424	131 Livingston Street, Brooklyn, NY 11201	Ralvare4@schools.nyc.gov

Adjacent Properties

Owner/Entity Name	Contact Name	Site Use	Property Address	Owner Mailing Address
SANCHEZ JUAN	Sanchez, Juan	Three-Family Walk-Up Building	414 40th Street, Brooklyn, NY 11232	4013 4th Avenue, Brooklyn, NY 11232
ELSAUM INC	Seyed Mohsen Ghanefar	Commercial & Office Buildings/ Car Wash or Lubritorium Facility (GW)	4013 4th Avenue, Brooklyn, NY 11232	4013 4th Avenue, Brooklyn, NY 11232
SIEBER, JONATHAN	Sieber, Jonathan	Three-Family Walk-Up Building	413 41st Street Brooklyn, NY 11232	413 41st Street Brooklyn, NY 11232
JUANITA & MECHY PROPERTIES LLC	Not Available	Mixed Residential & Commercial Buildings	3923 4th Avenue, Brooklyn, NY 11232	3923 4th Avenue, Brooklyn, NY 11232
AAY REALTY L.L.C.	Not Available	Multi-Family Walk-Up Buildings	411 40th Street, Brooklyn, NY 11232	411 40th Street, Brooklyn, NY 11232
NYC DEPARTMENT OF EDUCATION	Not Available	Public Middle School	340 40th Street, Brooklyn, NY 11232	340 40th Street, Brooklyn, NY 11232

Local News and Media:

Owner/Entity Name	Type	Address	Phone	Website
The Brooklyn Eagle/ The Daily Eagle	Online & Print Newspaper	16 Court Street Brooklyn, NY 11241	718-422-7413	www.brooklyneagle.com
New York Daily News	Television	75 Ninth Avenue New York, NY 10011	212-691-6397	https://www.ny1.com/nyc/all-boroughs/about-us/contact-us

Public Water Supply:

Public water supply is a shared responsibility between the New York City Department of Environmental Protection (NYCDEP) and the Municipal Water Finance Authority.

Owner/Entity Name	Contact	Address	Phone	Email
NYCDEP	Vincent Sapienza - Chief Operating Officer	59-17 Junction Blvd. Flushing, NY 11373	718-595-6565	ltcp@dep.nyc.gov
NYC Municipal Water Finance Authority	Philip Wasserman - Executive Director	75 Park Pl, New York, NY 10007	212-788-5889	Not Available

School or Day Care Located on or Proximal to the Site

Following schools or day care facilities are located within ½-mile radius to the Site:

School/Day Care Name	Approximate distance from Site in feet and (directional)	Administrator	Phone	Address
I.S. 136 Charles O. Dewey	~122 ft (northwest of site)	Eric Sackler, Principal Rafael Alvarez, Superintendent	(718) 840-1950	4004 4th Ave, Brooklyn, NY 11232
Family Day Care Graciela's Little Angels	~220 ft (south of site)	Graciela Figueroa, CEO	(917) 941-6856	432 41st St, Brooklyn, NY 11232
Sunset Park Prep	~292 ft (west of site)	Jennifer Spalding, Principal Rafael Alvarez, Superintendent	(178) 840-1951	4004 4th Ave, Brooklyn, NY 11232
Tata y Tito Daycare	~480 ft (northeast of site)	Not Available	(718) 788-1681	996 4th Ave, Brooklyn, NY 11232
Sunset Yards Elementary	~600 ft (north of site)	Not Available	Not Available	341 39th St, Brooklyn, NY 11232
Sunset Park Group Family Daycare	~650 ft (west of site)	Not Available	(929) 899-5284	338 42nd St, Brooklyn, NY 11232
Sunset Park Avenues Elementary School	~730 ft (southeast of site)	J. Knudson, Principal	(718) 369-8330	4222 4th Ave, Brooklyn, NY 11232
P.S. 024	~740 ft (northeast of site)	Maria Diaz, Principal Rafael Alvarez, Superintendent	(718) 832-9366	427 38th St, Brooklyn, NY 11232
Multicultural Family Day Care	~885 ft (west of site)	Not Available	(347) 7991216	324 43rd Ave, Brooklyn, NY 11232
Ps 371 Lillian L Rashkis	~879 ft (northeast of site)	Heather Miller, Principal Ketler Louissaint, Superintendent	(718) 788-7608	355 37th St, Brooklyn, NY 11232
P.S. 958	~1260 ft (northeast of site)	Tamara Alvarez, Secretary	(347) 305 6532	840 5th Ave, Brooklyn, NY 11215
P.S. 836	~1450 ft (southeast of site)	Ramona Adorno, Assistant Principal	(718) 330-9298	411 46th St, Brooklyn, NY 11220
P.S. 001 The Bergen	~1750 ft (southeast of site)	Wanda Ramirez, Principal Rafael Alvarez, Superintendent	(718) 567-7661	309 47th st, Brooklyn, NY 11220
The Brooklyn Daycare	~1950 ft (northeast of site)	Not Available	(718) 832-5785	132 33rd Street, Brooklyn, 11232
Knock Knock Daycare	~2450 ft (northeast of site)	Not Available	(718) 809-1534	185A 31st St, Brooklyn, NY 11232
Childtime of Brooklyn	~2600 ft (southeast of site)	Not Available	(877) 220-0584	762 41st St, Brooklyn, NY 11232
P.S. 169 Sunset Park	~2635 ft (southeast of site)	Emily Hurst, Principal Rafael Alvarez, Superintendent	(718) 853-3224	4305 7th Ave, Brooklyn, NY 11232

Document Repositories

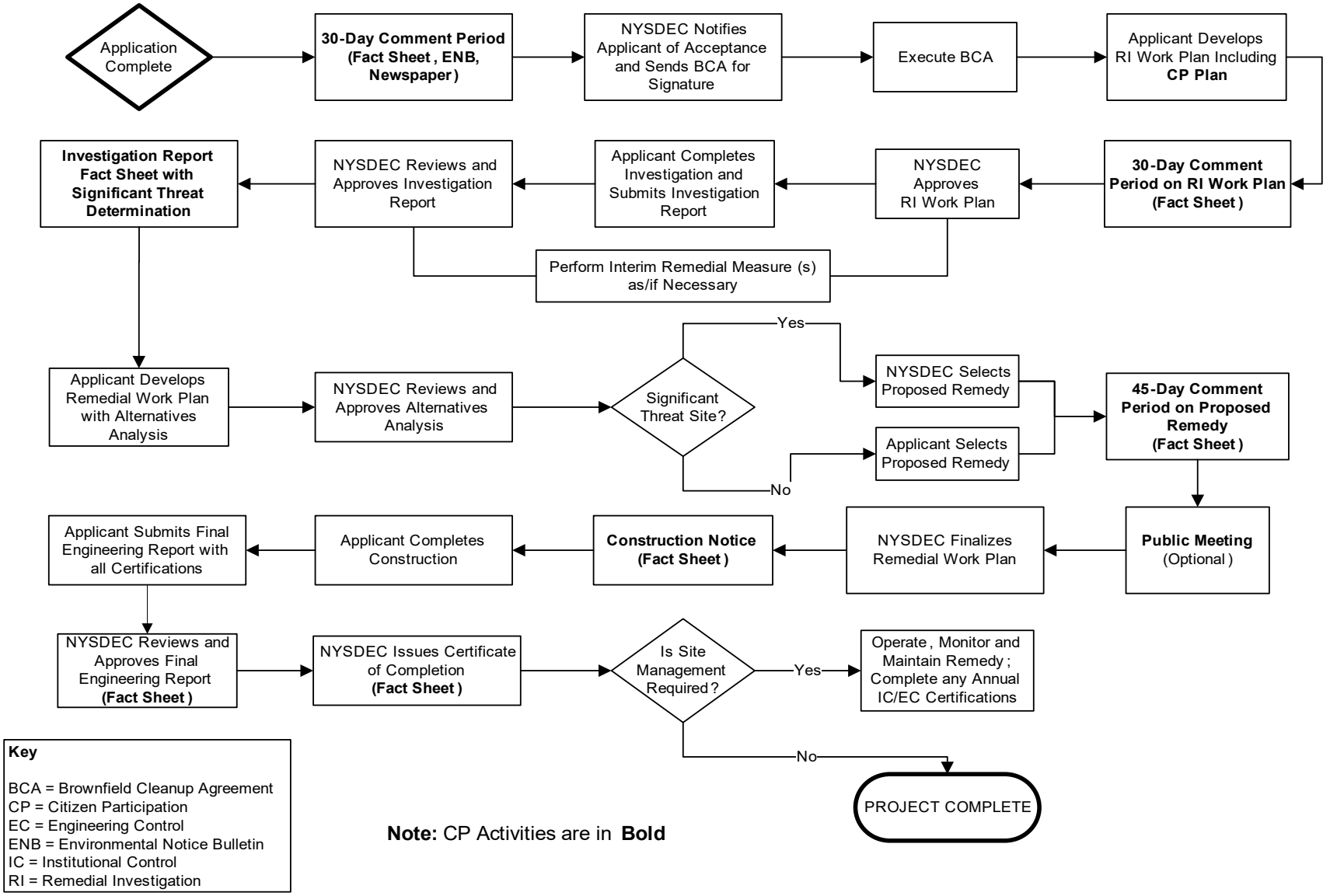
Owner/Entity Name	Contact	Repository Address	Contact Info
Brooklyn Public Library – Sunset Park Branch	Roxana Benevides	5018 4th Avenue, Brooklyn, NY 11220	rbenavides@bklynlibrary.org
Brooklyn Community Board 7	Jeremy Laufer	4201 4th Avenue, Brooklyn, NY 11232	Bk07@cb.nyc.gov

Appendix C - Site Location Map



- Site Boundary

Appendix D– Brownfield Cleanup Program Process



Key

BCA = Brownfield Cleanup Agreement
CP = Citizen Participation
EC = Engineering Control
ENB = Environmental Notice Bulletin
IC = Institutional Control
RI = Remedial Investigation

Note: CP Activities are in **Bold**

NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

Division of Environmental Remediation

Remedial Programs
Scoping Sheet for Major Issues of Public Concern

Instructions

This Scoping Sheet assesses major issues of public concern; impacts of the site and its remedial program on the community; community interest in the site; information the public needs; and information needed from the public.

The information generated helps to plan and conduct required citizen participation (CP) activities, and to choose and conduct additional CP activities, if appropriate. The scoping sheet can be revisited and updated as appropriate during the site's remedial process to more effectively implement the site's CP program.

Note: Use the information as an aid to prepare and update the Major Issues of Public Concern section of the site CP Plan.

General Instructions

- When to prepare: During preparation of the CP Plan for the site. It can be revisited and updated anytime during the site remedial process.
- Fill in site name and other information as appropriate.
- The Scoping Sheet may be prepared by DEC or a remedial party, but must be reviewed and approved by the DER site project manager or his/her designee.

Instructions for Numbered Parts

Consider the bulleted issues and questions below and any others that may be unique or appropriate to the site and the community to help complete the five Parts of this Scoping Sheet. Identify the issue stakeholders in Parts 1 through 3 and adjust the site's contact list accordingly.

Part 1. List Major Issues of Public Concern and Information the Community Wants.

- Is our health being impacted? (e.g. Are there problems with our drinking water or air? Are you going to test our water, yards, sumps, basements? Have health studies been done?)
- There are odors in the neighborhood. Do they come from the site and are they hazardous?
- Are there restrictions on what we may do (e.g. Can our children play outside? Can we garden? Must we avoid certain areas? Can we recreate (fish, hunt, hike, etc. on/around the site?)
- How and when were the site's contamination problems created?
- What contaminants are of concern and why? How will you look for contamination and find out where it is going? What is the schedule for doing that?
- The site is affecting our property values!
- How can we get more information (e.g. who are the project contacts?)
- How will we be kept informed and involved during the site remedial process?
- Who has been contacted in the community about site remedial activities?
- What has been done to this point? What happens next and when?
- The site is going to be cleaned up for restricted use. What does that mean? We don't want redevelopment on a "dirty" site.

Part 2. List Important Information Needed From the Community, if Applicable.

- Can the community supplement knowledge about past/current uses of the site?
- Does the community have knowledge that the site may be significantly impacting nearby people, properties, natural resources, etc.?
- Are activities currently taking place at the site or at nearby properties that may need to be restricted?
- Who may be interested or affected by the site that has not yet been identified?
- Are there unique community characteristics that could affect how information is exchanged?
- Does the community and/or individuals have any concerns they want monitored?
- Does the community have information about other sources in the area for the contamination?

Part 3. List Major Issues and Information That Need to be Communicated to the Community.

- Specific site investigation or remediation activities currently underway, or that will begin in the near future.
- The process and general schedule to investigate, remediate and, if applicable, redevelop the site.
- Current understanding about the site contamination and effects, if any, on public health and the environment.
- Site impacts on the community and any restrictions on the public's use of the site and/or nearby properties.
- Planned CP activities, their schedule, and how they relate to the site's remedial process.
- Ways for the community to obtain/provide information (document repositories, contacts, etc.).

Part 4. Community Characteristics

a. - e. Obtain information from local officials, property owners and residents, site reports, site visits, "windshield surveys," other staff, etc.

f. Has the affected community experienced other **significant** present or past environmental problems unrelated to this site? Such experiences could significantly affect public concerns and perspectives about the site; how the community will relate to project staff; the image and credibility of project staff within the community; and the ways in which project staff communicate with the community.

g. In its remedial programs, DER seeks to integrate, and be consistent with, environmental justice principles set forth in *DEC Commissioner Policy 29 on Environmental Justice* and *DER 23 – Citizen Participation Handbook for Remedial Programs*. Is the site and/or affected community wholly or partly in an Environmental Justice (EJ) Area? Use the Search feature on DEC's public web site for "environmental justice". DEC's EJ pages define an EJ area, and link to county maps to help determine if the site and/or community are in an EJ area.

h. Consider factors such as:

- Is English the primary language of the affected community? If not, provisions should be considered regarding public outreach activities such as fact sheets, meetings, door-to-door visits and other activities to ensure their effectiveness.
- The age demographics of the community. For example, is there a significant number of senior citizens in the community? It may be difficult for some to attend public meetings and use document repositories. This may suggest adopting more direct interaction with the community with activities such as door-to-door visits, additional fact sheets, visits to community and church centers, nursing homes, etc.
- How do people travel about the community? Would most people drive to a public meeting or document repository? Is there adequate public transportation?

Part 5. Affected/Interested Public.

Individuals and organizations who need or want information and input can change during the site's remedial process. This need is influenced by real, potential, or perceived impacts of the site or the remedial process. Some people may want information and input throughout the remedial process. Others may participate only during specific remedial stages, or may only be interested in particular issues.

It is important to revisit this question when reviewing this scoping sheet. Knowing who is interested in the site – and the issues that are important to them – will help to select and conduct appropriate outreach activities, and to identify their timing and the information to be exchanged.

Check all affected/interested parties that apply to the site. **Note: Adjust the site's contact list appropriately.** The following are some ways to identify affected/interested parties:

- Tax maps of adjacent property owners
- Attendees at public meetings
- Telephone discussions
- Letters and e-mails to DER, the remedial party, and other agencies
- Political jurisdictions and boundaries
- Media coverage
- Current/proposed uses of site and/or nearby properties (recreational, commercial, industrial)
- Discussions with community organizations: grass roots organizations, local environmental groups, environmental justice groups, churches, and neighborhood advisory groups

Division of Environmental Remediation

Remedial Programs
Scoping Sheet for Major Issues of Public Concern (see instructions)

Site Name: 4001 4th Ave Redevelopment Site

Site Number: C224412

Site Address and County: 4001-4011 4th Ave, Brooklyn, NY

Remedial Party(ies): 4 Ave Property LLC

Note: For Parts 1. – 3. the individuals, groups, organizations, businesses and units of government identified should be added to the site contact list as appropriate.

Part 1. List major issues of public concern and information the community wants. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and information needs. **Use this information as an aid to prepare or update the Major Issues of Public Concern section of the site Citizen Participation Plan.**

1. The primary contaminants of concern for the Site are petroleum-related VOCs and LNAPL.

2. The Site is located in a potential 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.

How were these issues and/or information needs identified?
These issues were identified through the previous Phase II Investigation results, correspondence with NYSDEC and from resources available through the NYSDEC Office of Environmental Justice.

Part 2. List important information needed **from** the community, if applicable. Identify individuals, groups, organizations, businesses and/or units of government related to the information needed.
The sources of the contaminants of concern detailed in Part 1 was not fully identified during the previous investigations completed at the Site. If the community can provide any knowledge regarding previous site use or previous nearby property use it may assist in determining the onsite or offsite source of impact.

How were these information needs identified?
Previous investigations

Part 3. List major issues and information that need to be communicated **to** the community. Identify individuals, groups, organizations, businesses and/or units of government related to the issue(s) and/or information.
The anticipated schedule for the proposed Remedial Investigation is December 2024. Based on results of this investigation a Remedial Action Work Plan (RAWP) will be drafted and implemented in late 2025

and early 2026. The remedial action will be in accordance with all applicable regulations and upon RAWP approval and implementation additional communications will be made to the public as necessary.

How were these issues and/or information needs identified?
These issues were identified through review of the project schedule, Site background and contaminants of concern.

Part 4. Identify the following characteristics of the affected/interested community. This knowledge will help to identify and understand issues and information important to the community, and ways to effectively develop and implement the site citizen participation plan (mark all that apply):

a. Land use/zoning at and around site:
☒ **Residential** ☐ **Agricultural** ☐ **Recreational** ☒ **Commercial** ☒ **Industrial**

b. Residential type around site:
☒ **Urban** ☐ **Suburban** ☐ **Rural**

c. Population density around site:
☒ **High** ☐ **Medium** ☐ **Low**

d. Water supply of nearby residences:
☒ **Public** ☐ **Private Wells** ☐ **Mixed**

e. Is part or all of the water supply of the affected/interested community currently impacted by the site?
☐ **Yes** ☒ **No**

f. Other environmental issues significantly impacted/impacting the affected community?
☐ **Yes** ☒ **No**

g. Is the site and/or the affected/interested community wholly or partly in an Environmental Justice Area?
☒ **Yes** ☐ **No**

h. Special considerations:
☒ **Language** ☐ **Age** ☐ **Transportation** ☐ **Other**

Explain any marked categories in **h:**
Spanish

Part 5. The site contact list must include, at a minimum, the individuals, groups, and organizations identified in Part 2. of the Citizen Participation Plan under 'Site Contact List'. Are *other* individuals, groups, organizations, and units of government affected by, or interested in, the site, or its remedial program? (Mark and identify all that apply, then adjust the site contact list as appropriate.)

☐ **Non-Adjacent Residents/Property Owners:** Click here to enter text.

☒ **Local Officials: NYC Mayor, NYC Department of City Planning Chairperson, Brooklyn Borough President., Brooklyn Community Board 7 Manager, NY Senator, NY State Assembly District 84, NYC Comptroller, Public Advocate, NY Councilman Hon., US House of Representatives, NYC Office of Environmental Remediation Director, Office of Environmental Assessment & Planning, U.S. Senator Hon. Charles Shumer, U.S. Senator Hon. Kirsten Gillibrand, Brooklyn County Clerk**

☒ **Media:** The Brooklyn Eagle, New York Daily News

☒ **Business/Commercial Interests:** 4 Ave Property LLC

☐ **Labor Group(s)/Employees:** Click here to enter text.

☐ **Indian Nation:** Click here to enter text.

☒ **Citizens/Community Group(s):** Click here to enter text.

☒ **Environmental Justice Group(s):** Click here to enter text.

☒ **Environmental Group(s):** Click here to enter text.

☒ **Civic Group(s):** Sunset Park Library, Community Board 7

☐ **Recreational Group(s):** Click here to enter text.

☐ **Other(s):** Click here to enter text.

Prepared/Updated By: PJ DiNardo **Date:** 9/27/24

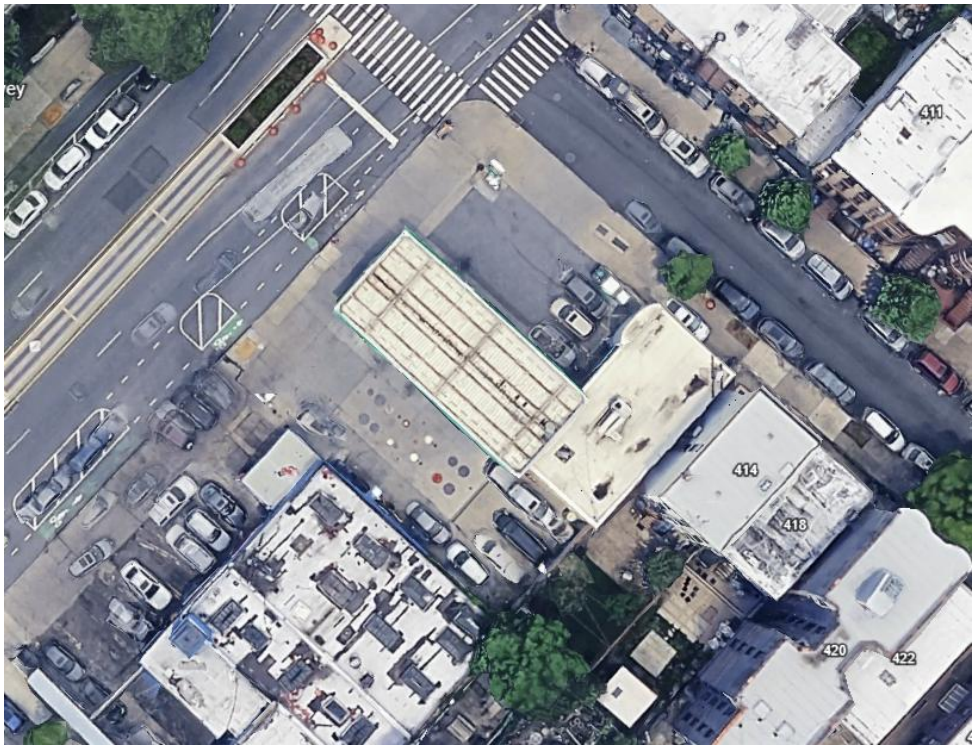
Reviewed/Approved By: James Bellew **Date:** 9/27/24

APPENDIX G
Environmental Footprint Analyses and Climate Screening Checklist

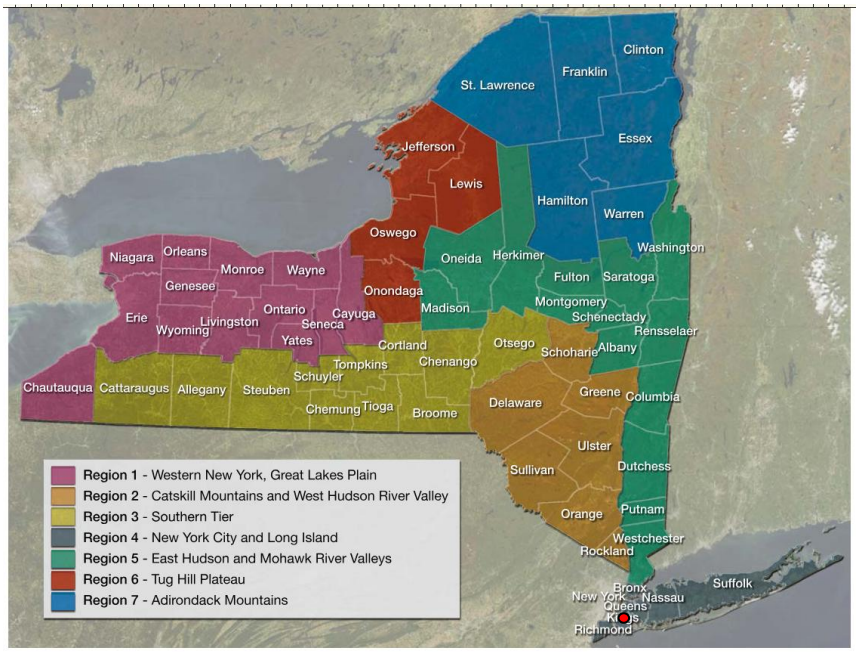
Climate Screening Checklist

Background Information

- Project Manager: Nicole Mooney
- Site Name: 4001 4th Avenue Redevelopment (the "Site")
- Site Number: C224412
- Site Location: 4001 4th Avenue, Brooklyn, New York
- Site Elevation (average above sea level): Approximately 62 feet (ft) above sea level (Google Earth)



- ClimAID Region (Responding Climate Change in New York State (ClimAID) - NYSERDA): Region 4 – New York City and Long Island

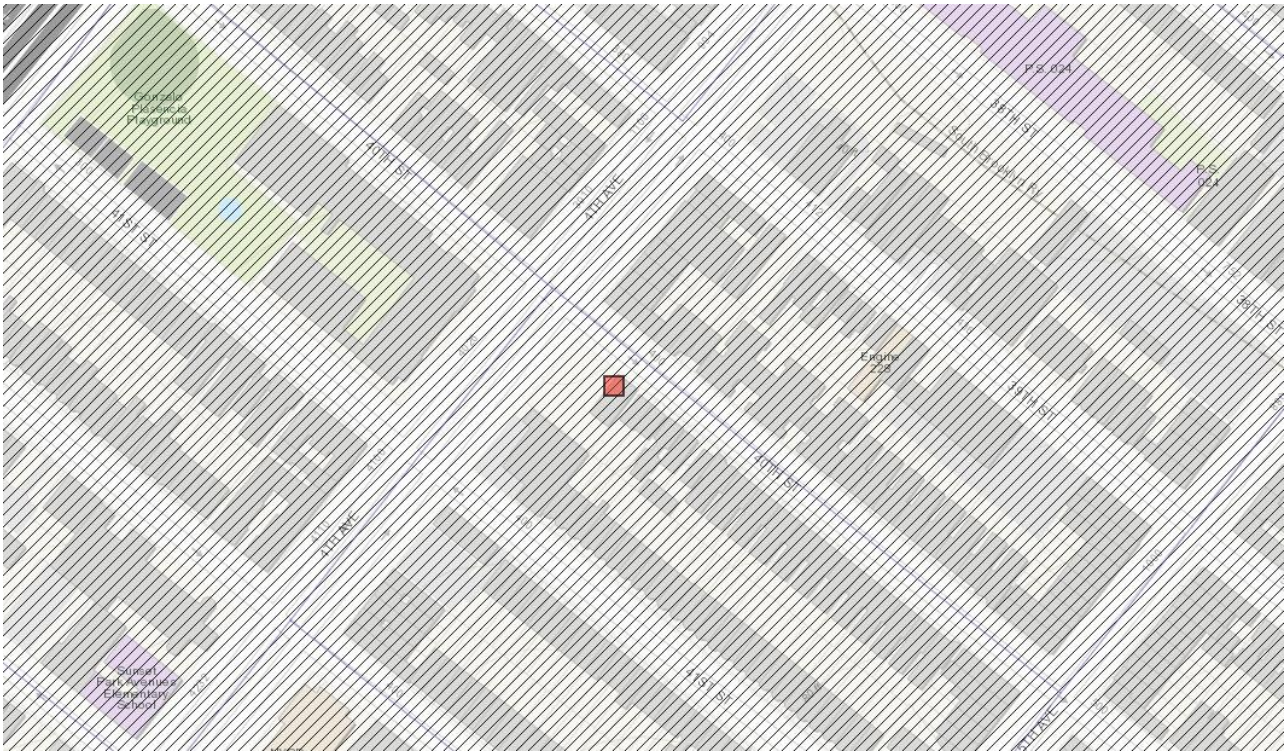


- Remedial Stage/Site Classification: Remediation
- Contamination - Media Impacted/ Contaminants of Concern: Soil - metals, volatile organic compounds (VOCs; specifically petroleum-related VOCs), semi-volatile organic compounds (SVOCs; including polycyclic aromatic hydrocarbons [PAHs]), pesticides, perfluorooctanesulfonic acid (PFOS) and polychlorinated biphenyls (PCBs); groundwater – total/dissolved metals, VOCs (specifically chlorinated volatile organic compounds [CVOCs] and petroleum related VOCs), SVOCs (including PAHs), and PFOS/perfluorooctanoic acid (PFOA); soil vapor – VOCs (including CVOCs and petroleum-related benzene, toluene, ethylbenzene, and xylenes [BTEX]).
- Proposed/Current Remedy: Track 4 remedy – remedy will consist of excavation, stockpiling, off-Site transport, and disposal of contaminated historical fill material and contaminated soil to 15 ft below ground surface (bgs) Sitewide, and removal of underground storage tanks (USTs) and/or associated appurtenances, if encountered, and decommissioning and off-Site disposal. This remedy will also include the installation of a composite cover system, an active sub-slab depressurization system (SSDS) to mitigate the potential for soil vapor intrusion into the proposed building, and the implementation of in-situ chemical oxidation (ISCO) injections to reduce, to the extent practicable, elevated levels of petroleum-based VOC concentrations in the groundwater.
- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years? The predicted timeframe of the active remedy is approximately four to five months. Quarterly groundwater monitoring in accordance with Division of Environmental Remediation (DER)-10 for a minimum of one year following active remediation will take place to evaluate the effectiveness of groundwater ISCO treatment and to determine if additional treatment is required. Engineering controls (ECs) that may be in place for 10+ years under the Track 4 remedy include an active SSDS and Site-wide cover system. As part of this remedy, an Environmental Easement (EE), as defined in Article 71 Title 36 of the Environmental Conservation Law, approved by the New York State Department of Environmental Conservation (NYSDEC), will be filed and recorded with the Kings County Office of the City Register. Adherence to ECs for the Site is mandated by the EE (an Institutional Control [IC]) and will be implemented under a Site Management Plan.

- Is the site in proximity to any sensitive receptors? (e.g., wetlands, waterbodies, residential properties, hospitals, schools, drinking water supplies, etc.) The Site is not located in close proximity to important federal, state, or local natural resources, including waterways, wildlife refuges, wetlands, and critical habitats of endangered or threatened species. Surrounding properties include commercial and residential buildings. There are three sensitive receptors that are within a 500-ft radius of the Site: Intermediate School (I.S.) 136, Family Day Care Graciela's Little Angels (daycare), and Sunset Park Group Family (daycare).

Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))?

X Yes No



If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

☐ **Yes X No**

Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

☐ **Yes X No**

Climate Screening Table*

Potential Climate Hazards	**Relevant to the Site Location** (Y/N/NA)[1]	**Projected Change** (Resilience Analysis and Planning Tool (RAPT)/arcgis.com[3]	**Potential to Impact Remedy** (Y/N)	**Is remedy/site already resilient?** (Y/N)[4]
Precipitation	Y	None	N/A	N/A
Temperature[2] (Extreme Heat or Cold Weather Impacts)	Y	None	N/A	N/A
Sea Level Rise	N	N/A	N/A	N/A
Flooding	N	N/A	N/A	N/A
Storm Surge	N	N/A	N/A	N/A
Wildfire	N	N/A	N/A	N/A
Drought	N	N/A	N/A	N/A
Storm Severity	N	N/A	N/A	N/A
Landslides	N	N/A	N/A	N/A
Other Hazards:	N/A	N/A	N/A	N/A

* Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 0 degrees F (NYSERDA ClimAID report)

[3] List the projected change in specific terms or units e.g. inches of rainfall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

Required Next Steps (If no further action is required, provide justification):

Conduct severe weather storm inspections during the active remedy. Inspect dewatering systems prior to anticipated storm events that could result in a power outage and after storm events.

Potential Data Sources (not an exhaustive list)- from Superfund Climate Resilience: Vulnerability Assessment | US EPA

NYSERDA ClimAID report- Responding Climate Change in New York State (ClimAID) - NYSERDA

FEMA- National Flood Hazard Layer | FEMA.gov

NOAA- National Storm Surge Risk Maps - Version 3 (noaa.gov)

Department of Agriculture Forest Service Wildfire Risk to Communities

EPA Climate Change Indicators in the United States

EPA Climate Resilience Evaluation & Awareness Tool (CREAT) | U.S. Climate Resilience Toolkit

EPA National Stormwater Calculator

National Integrated Drought Information System U.S. Drought Portal

National Interagency Coordination Center National Interagency Fire Center

National Oceanic and Atmospheric Administration Coastal Services Digital Coast

- Resources to help communities assess coastal hazards, such as the Sea Level Rise Viewer for visualizing community-level impacts of flooding or sea level rise and downloadable LIDAR data

National Oceanic and Atmospheric Administration National Centers for Environmental Information website

National Oceanic and Atmospheric Administration Sea Level Trends

National Weather Service Climate Prediction Center

National Weather Service National Hurricane Center

National Weather Service Sea, Lake, and Overland Surges from Hurricanes (SLOSH)

National Weather Service Storm Surge Hazard Maps

U.S. Federal Government Climate Resilience Toolkit: The Climate Explorer

U.S. Army Corps of Engineers Climate Preparedness and Resilience

U.S. Geological Survey Coastal Change Hazards Portal

U.S. Geological Survey Landslide Hazards Program

U.S. Geological Survey National Ground-water Monitoring Network Data Portal

U.S. Geological Survey National Climate Change Viewer

U.S. Geological Survey National Water Dashboard

U.S. Geological Survey StreamStats

NYS Department of State- Assess | Department of State (ny.gov)

NYSERDA NY Costal Floodplain Mapper- Home Page (ny.gov)

NYSDEC Coastal Erosion Hazards- Coastal Areas Regulated By The CEHA Permit Program - NYDEC

NYSDOH Heat Index- health.ny.gov/environmental/weather/vulnerability_index/county_maps.htm

Track 4 Remedy

H & A OF NEW YORK ENGINEERING
AND GEOLOGY, LLP
213 W. 35th Street
7th Floor
New York, NY 10001
646.277.5685

July 27, 2026
File No. 0210815

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

Attention: Shawn Roberts

Subject: Green Site Remediation
4001 4th Avenue Redevelopment
NYSDEC Site C224412
4001 4th Avenue
Brooklyn, New York 11232

H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) presents the following environmental footprint analysis[1] in accordance with EPA 542-R-12-002 for the preferred Track 4 Remedy of the above-referenced site at 4001 4th Avenue, Brooklyn, New York 11232 (Site).

4001 4TH AVENUE REDEVELOPMENT REMEDY – TRACK 4 CLEANUP

The primary remedial tasks consist of the following:

- Excavation
- SVI Evaluation
- Groundwater Treatment
- SSDS Installation
- SVE System Installation

The preferred remedy will result in estimated totals of:

- 4990.61 Metric Million British Thermal Unit (MMBtus) of energy used;
- 354.02 tons of total greenhouse gas emissions (CO2e [includes consideration of carbon dioxide, methane, and nitrous oxide emissions]);
- 8943.38 pounds (lbs) of nitrogen oxides (NOx) + sulfur oxides (SOx) + particulate matter (PM) emissions; and
- 59.64 lbs of hazardous air pollutant (HAP) emissions.

[1] *Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019.*

Energy

- 1,918.68 MMBtus used for on-site activities, such as excavation,
- 337.20 MMBtus used for grid electricity generation,
- 552.91 MMBtus used for transportation of personnel, remedy materials, and waste disposal, and
- 2,196.82 MMBtus used for off-site activities.

Greenhouse Gas Emissions (CO2e)

- 280,381.98 tons of CO2e are estimated to be produced from on-site activities, such as excavation,
- 17,150.37 tons of CO2e are estimated to be produced from grid electricity generation,
- 89,456.80 tons of CO2e are estimated to be produced from transportation of personnel, remedy materials, and waste disposal, and
- 320,995.90 tons are estimated to be produced from off-site activities.

Water Usage

- 9600 gallons of water are estimated to be used to wash down trucks and tires on an imported gravel truck wash pad, for grout production for monitoring well installation, and for groundwater remediation injections.

Roughly a third of the energy use and of CO2e generation will originate from onsite activities for the Track 4 Remedy. Overall, the footprint of the Site Remedy is dominated by off-Site activities, which include landfill use and diesel fuel production. Off-site energy use comprises 43.89 percent of all energy use and off-site greenhouse gas emissions comprises 45.34 percent of all emissions for the Track 4 Remedy.

Sincerely yours,
H & A OF NEW YORK ENGINEERING AND GEOLOGY, LLP

Suzanne M. Bell, P.E.
Senior Associate

James M. Bellew
Principal

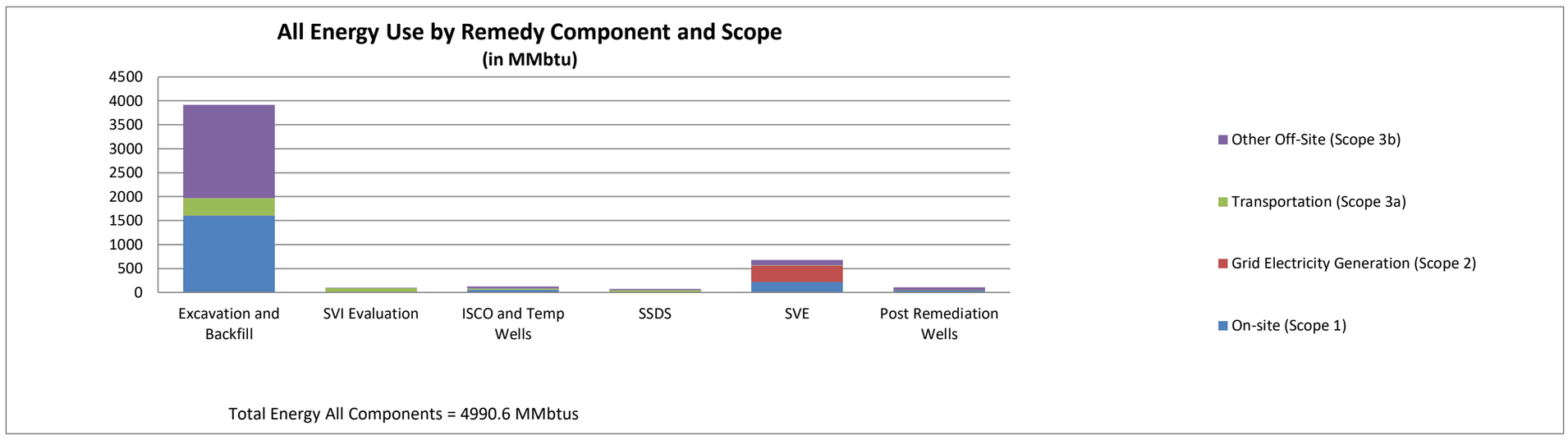
Environmental Footprint Summary

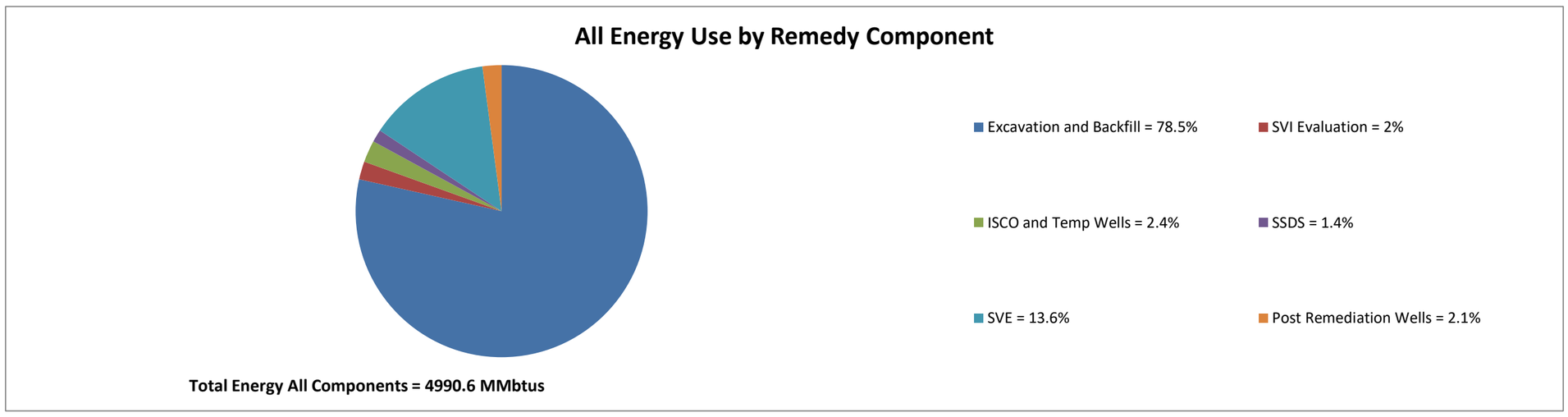
Core Element	Metric		Unit of Measure	Footprint						
				Excavation and Backfill	SVI Evaluation	ISCO and Temp Wells	SSDS	SVE	Post Remediation Wells	Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	6,085.0	0.0	1.0	0.3	0.5	0.5	6,087.3
	M&W-2	% of refined materials from recycled or reused material	%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%
	M&W-3	Unrefined materials used on-site	Tons	0.000	0.000	0.000	0.000	0.000	0.000	0.0
	M&W-4	% of unrefined materials from recycled or reused material	%							
	M&W-5	On-site hazardous waste disposed of off-site	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	9,580.0	0.0	0.0	0.0	0.0	0.0	9,580.0
	M&W-7	Recycled or reused waste	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-8	% of total potential waste recycled or reused	%	0.0%						0.0%
Water (used on-site)	W-1	Public water use	MG	0.0096	0.0000	0.0	0.0	0.0	0.0	0.0111
	W-2	Groundwater use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-3	Surface water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-4	Reclaimed water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-5	Storm water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-6	User-defined water resource #1	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-7	User-defined water resource #2	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-8	Wastewater generated	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy	E-1	Total energy used (on-site and off-site)	MMBtu	3,917.9	99.9	120.8	69.5	677.4	105.1	4,990.6
	E-2	Energy voluntarily derived from renewable resources								
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-2B	Voluntary purchase of renewable electricity	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-3	Voluntary purchase of RECs	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-4	On-site grid electricity use	MWh	0.026	0.000	0.000	0.438	48.180	0.021	48.7
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	1,272.2	0.0	67.8	0.0	67.8	45.2	1,453.1
	A-2	On-site HAP emissions	Pounds	0.5	0.0	0.0	0.0	0.0	0.0	0.5
	A-3	Total NOx, SOx, and PM emissions	Pounds	8,043.8	125.8	110.7	64.9	323.3	274.8	8,943.4
	A-3A	Total NOx emissions	Pounds	3,151.2	111.4	95.3	56.6	163.7	111.9	3,690.0
	A-3B	Total SOx emissions	Pounds	899.2	10.7	7.3	6.5	147.7	137.8	1,209.1
	A-3C	Total PM emissions	Pounds	3,993.5	3.7	8.1	1.8	11.9	25.2	4,044.3
	A-4	Total HAP emissions	Pounds	37.4	1.1	1.3	0.6	3.7	15.4	59.6
	A-5	Total greenhouse gas emissions	Tons CO2e*	307.5	8.1	8.7	4.7	18.1	6.9	354.0
Land & Ecosystems	Qualitative Description									

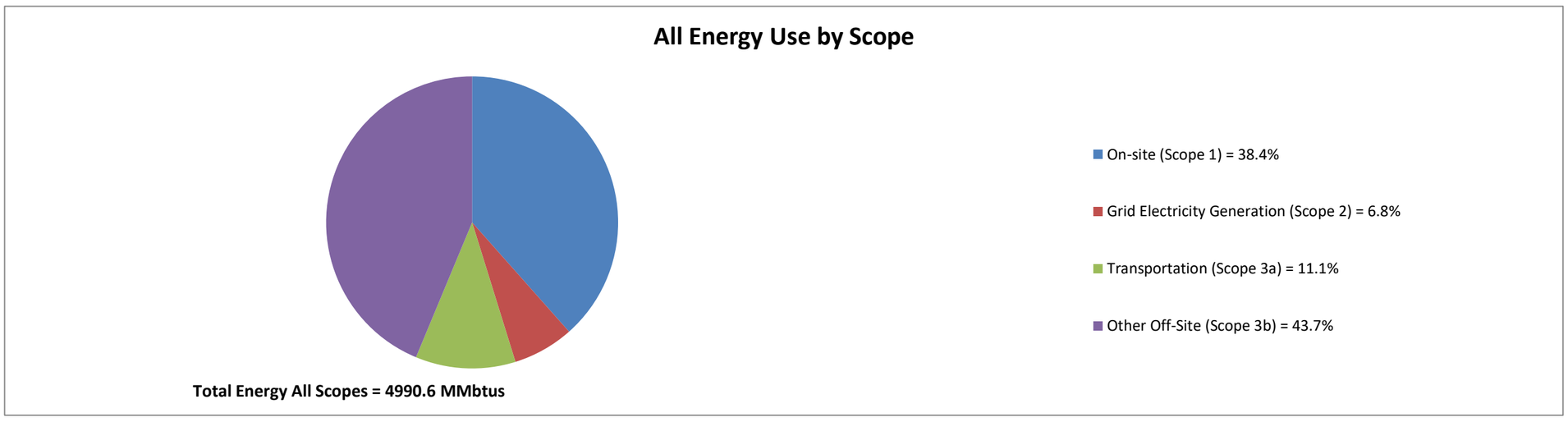
** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*
"MMBtu" = millions of Btus
"MG" = millions of gallons
"CO2e" = carbon dioxide equivalents of global warming potential
"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)
"Tons" = short tons (2,000 pounds)

The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012

Notes:


All Energy Use by Remedy Component and Scope
(in MMbtu)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Excavation and Backfill
SVI Evaluation
ISCO and Temp Wells
SSDS
SVE
Post Remediation Wells
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
Total Energy All Components = 4990.6 MMbtus


All Energy Use by Remedy Component
Excavation and Backfill = 78.5%
SVI Evaluation = 2%
ISCO and Temp Wells = 2.4%
SSDS = 1.4%
SVE = 13.6%
Post Remediation Wells = 2.1%
Total Energy All Components = 4990.6 MMbtus

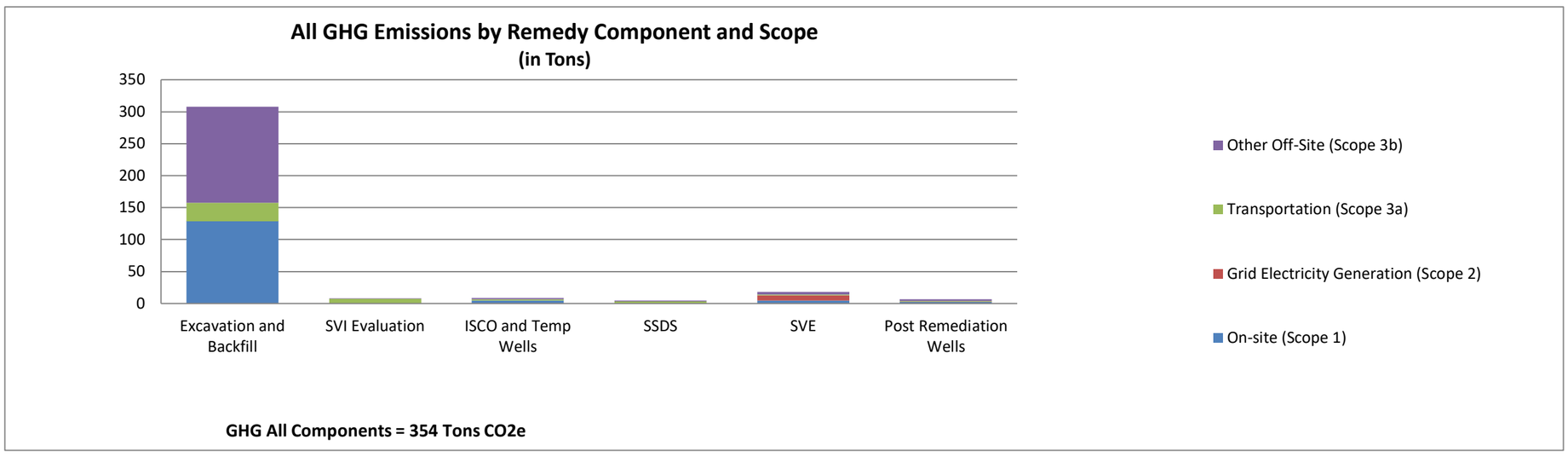

All Energy Use by Scope
On-site (Scope 1) = 38.4%
Grid Electricity Generation (Scope 2) = 6.8%
Transportation (Scope 3a) = 11.1%
Other Off-Site (Scope 3b) = 43.7%
Total Energy All Scopes = 4990.6 MMbtus

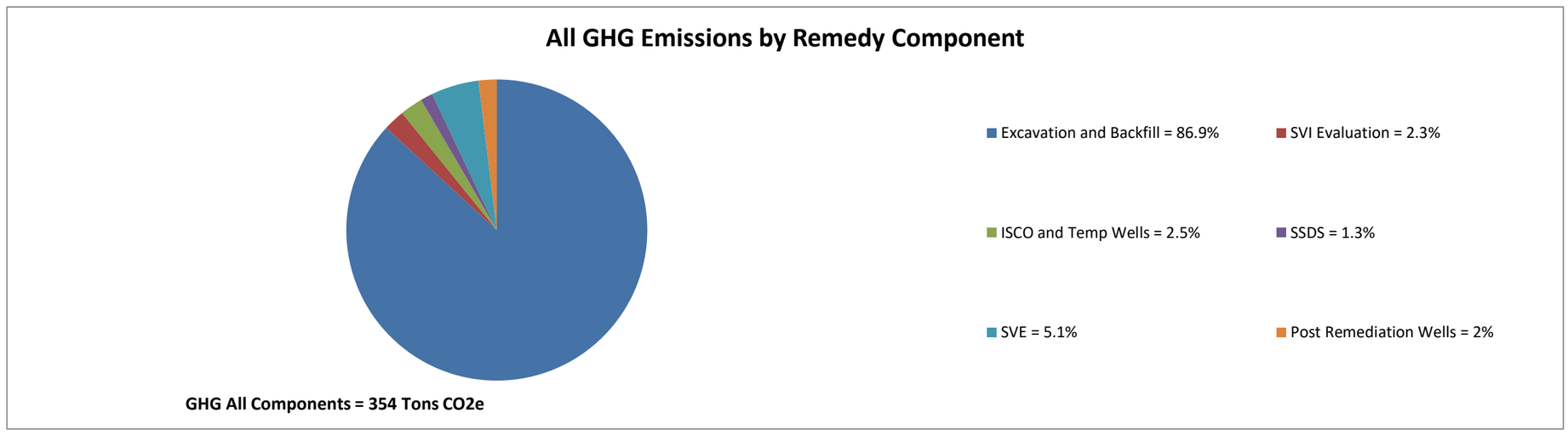
Total Energy MMbtus	Excavation and Backfill	SVI Evaluation	ISCO and Temp Wells	SSDS	SVE	Post Reme	Total
On-site (Scope 1)	1,605.8	0.0	55.1	1.5	219.5	36.8	1,918.7
Grid Electricity Generation (Scope 2)	0.2	0.0	0.0	3.0	333.8	0.1	337.2
Transportation (Scope 3a)	363.8	87.9	29.0	43.2	16.6	12.5	552.9
Other Off-Site (Scope 3b)	1,948.2	12.0	36.7	21.8	107.5	55.6	2,181.8
Total	3,917.9	99.9	120.8	69.5	677.4	105.1	4,990.6

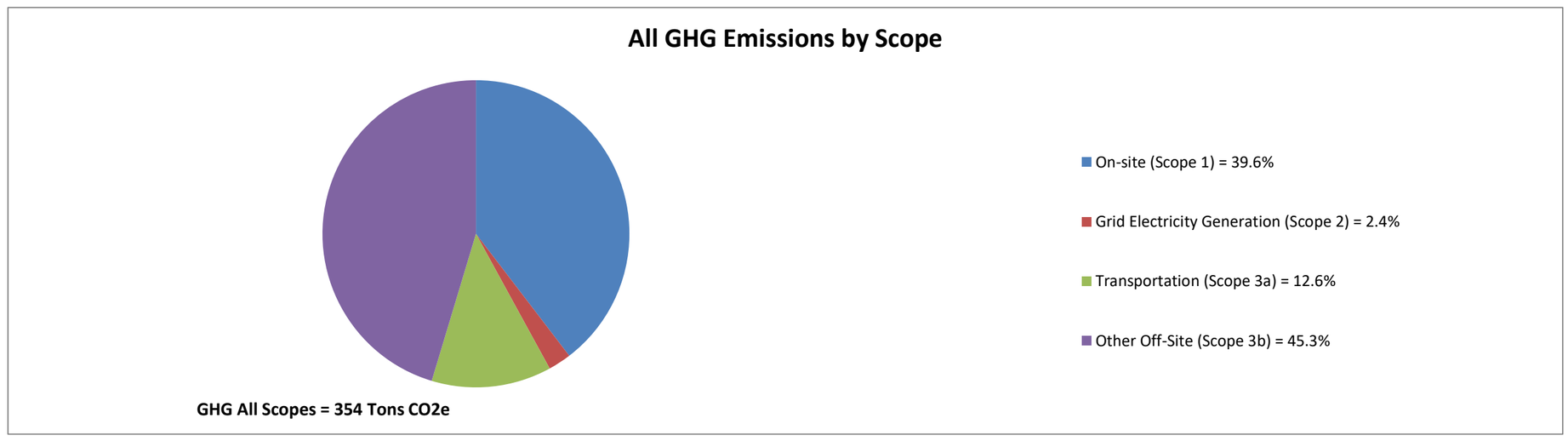
Excavation and Backfill = 78.5%
SVI Evaluation = 2%
ISCO and Temp Wells = 2.4%
SSDS = 1.4%
SVE = 13.6%
Post Remediation Wells = 2.1%

Total Energy All Components = 4990.6 MMbtus
Total Energy All Scopes = 4990.6 MMbtus

On-site (Scope 1) = 38.4%
Grid Electricity Generation (Scope 2) = 6.8%
Transportation (Scope 3a) = 11.1%
Other Off-Site (Scope 3b) = 43.7%


All GHG Emissions by Remedy Component and Scope
(in Tons)
350
300
250
200
150
100
50
0
Excavation and Backfill
SVI Evaluation
ISCO and Temp Wells
SSDS
SVE
Post Remediation Wells
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
GHG All Components = 354 Tons CO2e


All GHG Emissions by Remedy Component
Excavation and Backfill = 86.9%
SVI Evaluation = 2.3%
ISCO and Temp Wells = 2.5%
SSDS = 1.3%
SVE = 5.1%
Post Remediation Wells = 2%
GHG All Components = 354 Tons CO2e

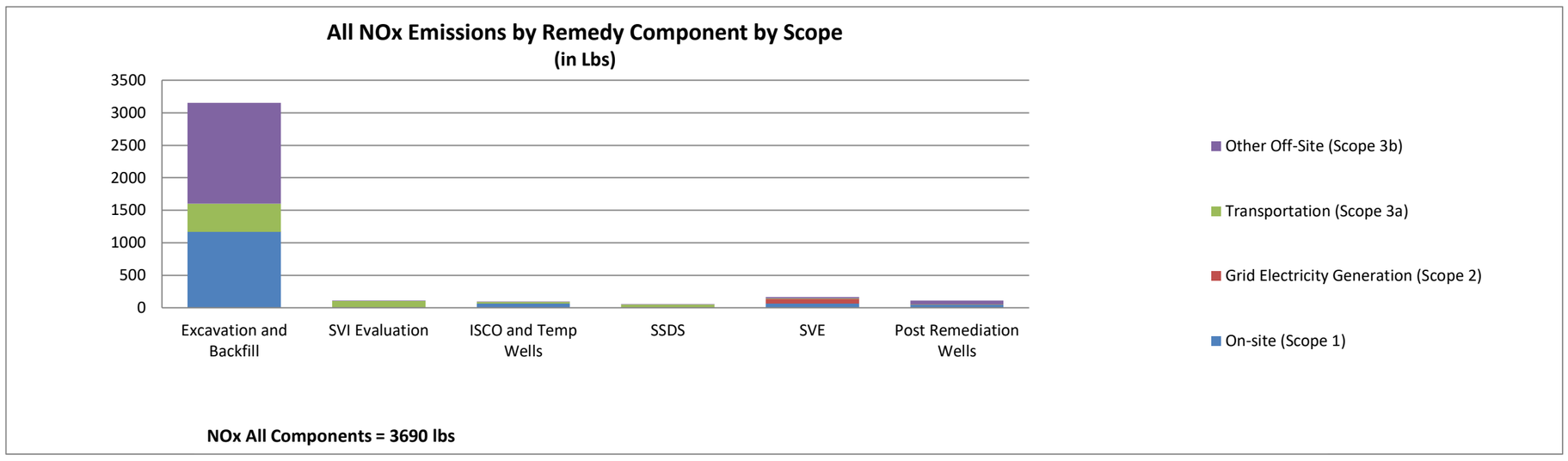

All GHG Emissions by Scope
On-site (Scope 1) = 39.6%
Grid Electricity Generation (Scope 2) = 2.4%
Transportation (Scope 3a) = 12.6%
Other Off-Site (Scope 3b) = 45.3%
GHG All Scopes = 354 Tons CO2e

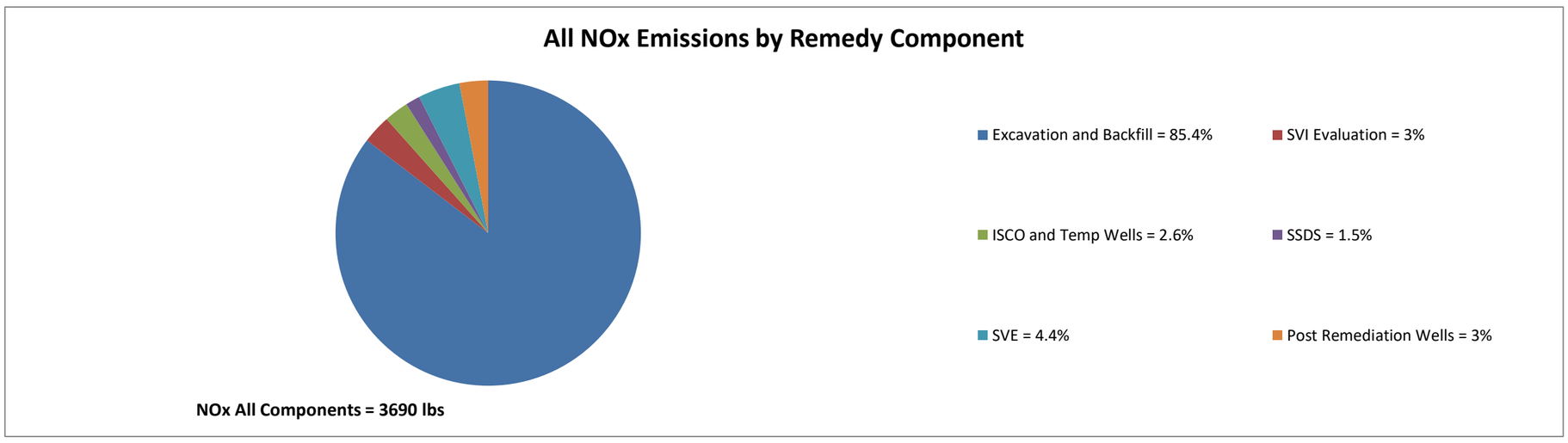
GHG Tons CO2e	Excavation and Backfill	SVI Evaluation	ISCO and Temp Wells	SSDS	SVE	Post Reme	Total
On-site (Scope 1)	128.5	0.0	4.4	0.0	4.4	2.9	140.2
Grid Electricity Generation (Scope 2)	0.0	0.0	0.0	0.1	8.5	0.0	8.6
Transportation (Scope 3a)	29.4	7.1	2.3	3.5	1.3	1.0	44.7
Other Off-Site (Scope 3b)	149.6	1.0	1.9	1.1	3.9	3.0	160.5
Total	307.5	8.1	8.7	4.7	18.1	6.9	354.0

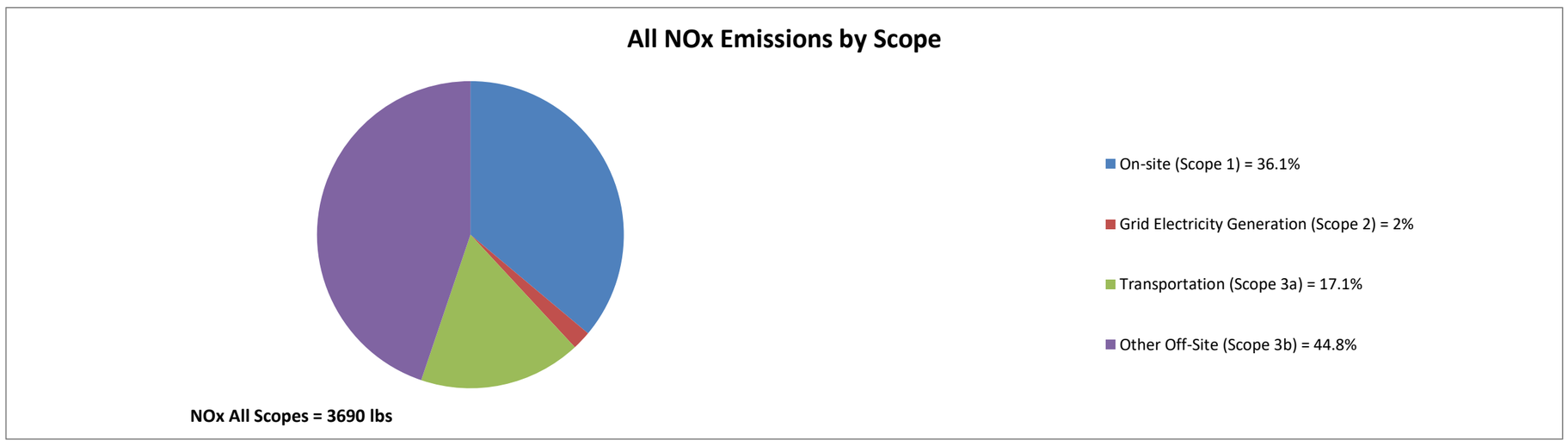
Excavation and Backfill = 86.9%
SVI Evaluation = 2.3%
ISCO and Temp Wells = 2.5%
SSDS = 1.3%
SVE = 5.1%
Post Remediation Wells = 2%

GHG All Components = 354 Tons CO2e
GHG All Scopes = 354 Tons CO2e

On-site (Scope 1) = 39.6%
Grid Electricity Generation (Scope 2) = 2.4%
Transportation (Scope 3a) = 12.6%
Other Off-Site (Scope 3b) = 45.3%


All NOx Emissions by Remedy Component by Scope
(in Lbs)
3500
3000
2500
2000
1500
1000
500
0
Excavation and Backfill
SVI Evaluation
ISCO and Temp Wells
SSDS
SVE
Post Remediation Wells
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
NOx All Components = 3690 lbs


All NOx Emissions by Remedy Component
Excavation and Backfill = 85.4%
SVI Evaluation = 3%
ISCO and Temp Wells = 2.6%
SSDS = 1.5%
SVE = 4.4%
Post Remediation Wells = 3%
NOx All Components = 3690 lbs

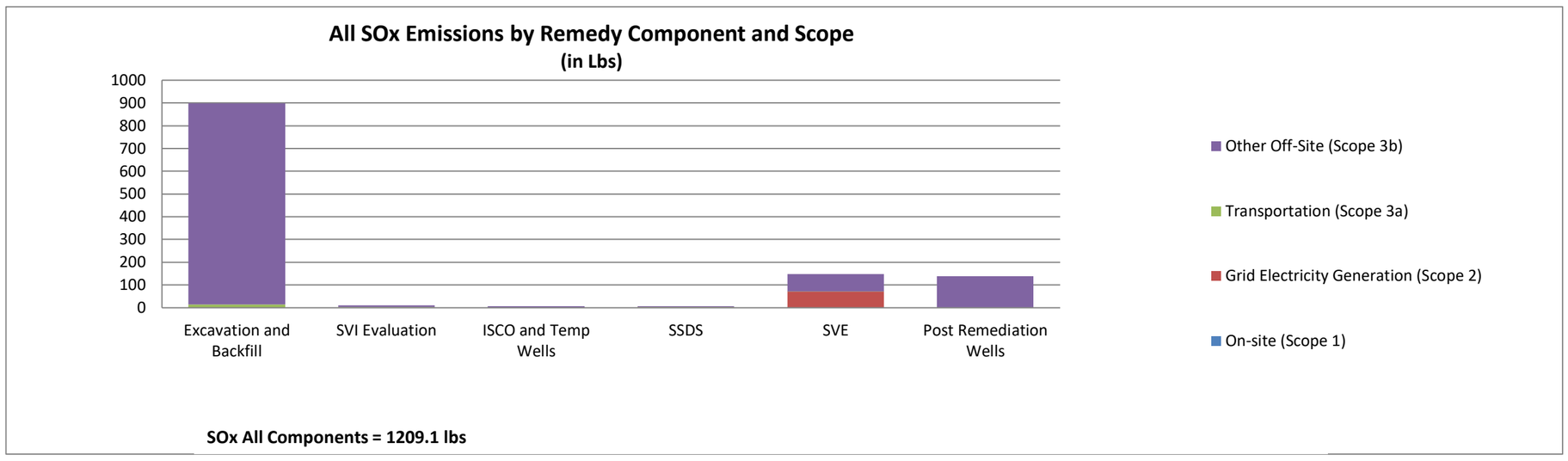

All NOx Emissions by Scope
On-site (Scope 1) = 36.1%
Grid Electricity Generation (Scope 2) = 2%
Transportation (Scope 3a) = 17.1%
Other Off-Site (Scope 3b) = 44.8%
NOx All Scopes = 3690 lbs

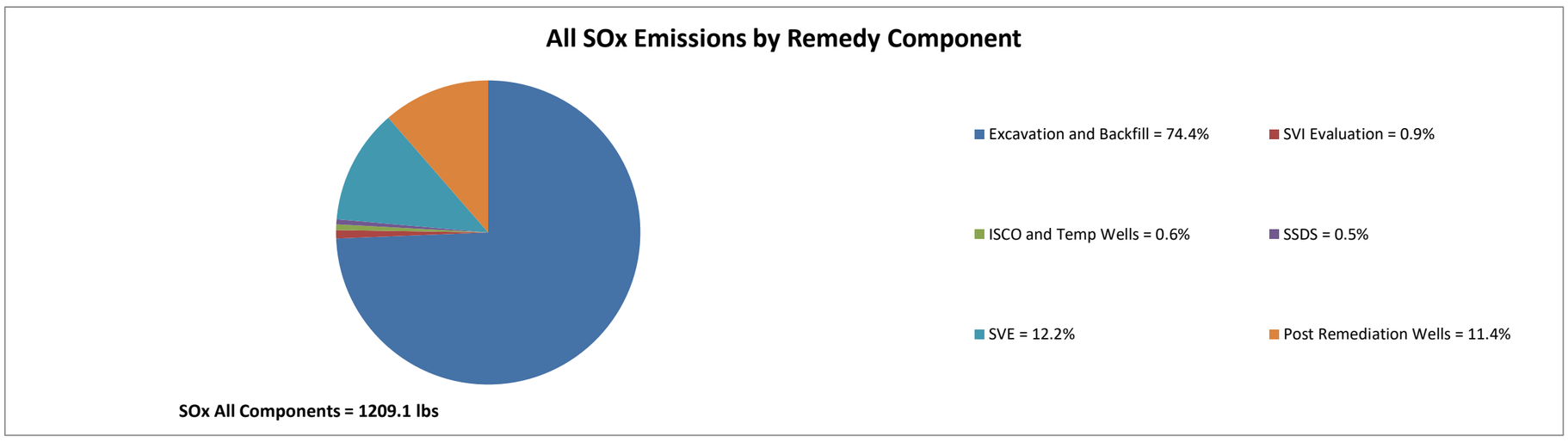
NOx lbs	Excavation and Backfill	SVI Evaluation	ISCO and Temp Wells	SSDS	SVE	Post Reme	Total	
On-site (Scope 1)	1,166.7	0.0	62.0	0.0	62.0	41.4	1,332.1	
Grid Electricity Generation (Scope 2)	0.1	0.0	0.0	0.7	72.5	0.0	73.2	
Transportation (Scope 3a)	431.5	106.6	26.2	51.8	8.0	7.5	631.6	
Other Off-Site (Scope 3b)	1,552.9	4.8	7.1	4.1	21.2	62.9	1,653.1	
Total	3,151.2	111.4	95.3	56.6	163.7	111.9	3,690.0	

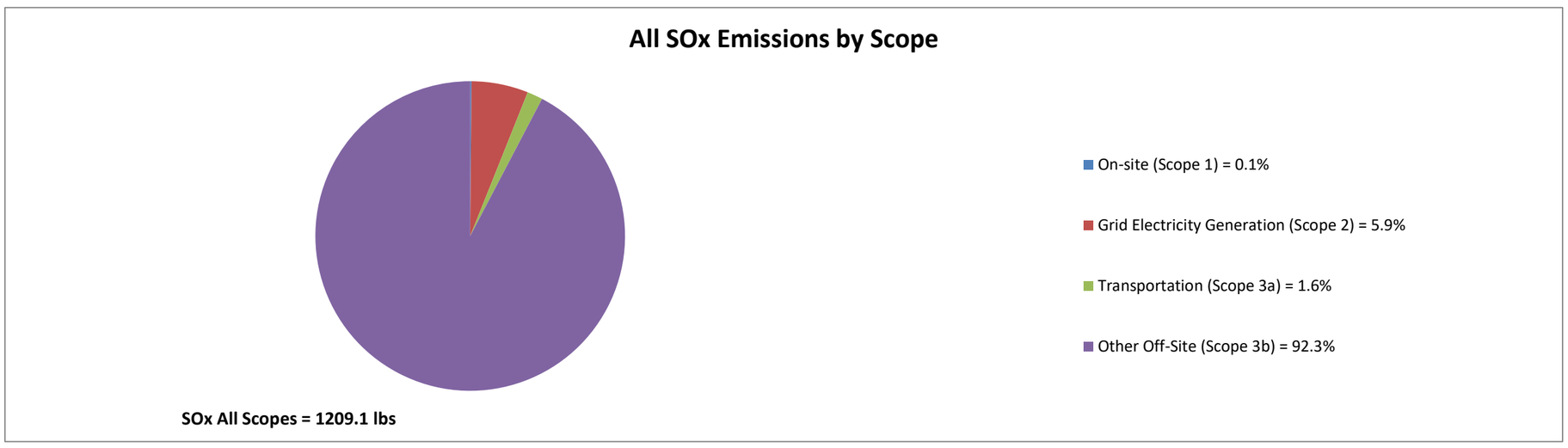
Excavation and Backfill = 85.4%
SVI Evaluation = 3%
ISCO and Temp Wells = 2.6%
SSDS = 1.5%
SVE = 4.4%
Post Remediation Wells = 3%

NOx All Components = 3690 lbs
NOx All Scopes = 3690 lbs

On-site (Scope 1) = 36.1%
Grid Electricity Generation (Scope 2) = 2%
Transportation (Scope 3a) = 17.1%
Other Off-Site (Scope 3b) = 44.8%


All SOx Emissions by Remedy Component and Scope
(in Lbs)
1000
900
800
700
600
500
400
300
200
100
0
Excavation and Backfill
SVI Evaluation
ISCO and Temp Wells
SSDS
SVE
Post Remediation Wells
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
SOx All Components = 1209.1 lbs


All SOx Emissions by Remedy Component
Excavation and Backfill = 74.4%
SVI Evaluation = 0.9%
ISCO and Temp Wells = 0.6%
SSDS = 0.5%
SVE = 12.2%
Post Remediation Wells = 11.4%
SOx All Components = 1209.1 lbs

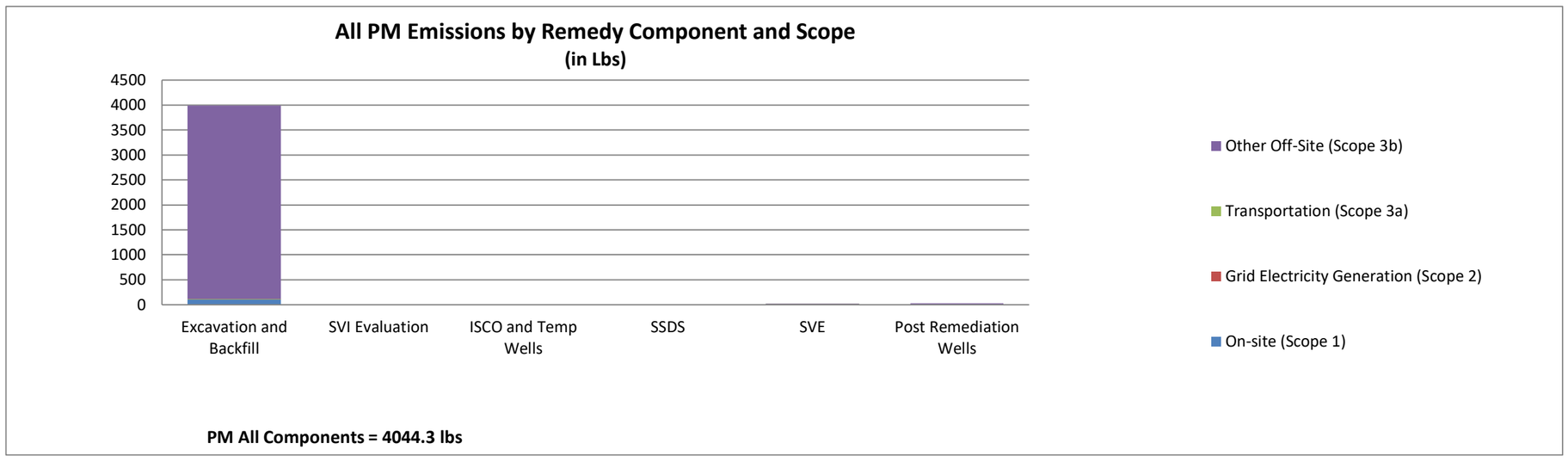

All SOx Emissions by Scope
On-site (Scope 1) = 0.1%
Grid Electricity Generation (Scope 2) = 5.9%
Transportation (Scope 3a) = 1.6%
Other Off-Site (Scope 3b) = 92.3%
SOx All Scopes = 1209.1 lbs

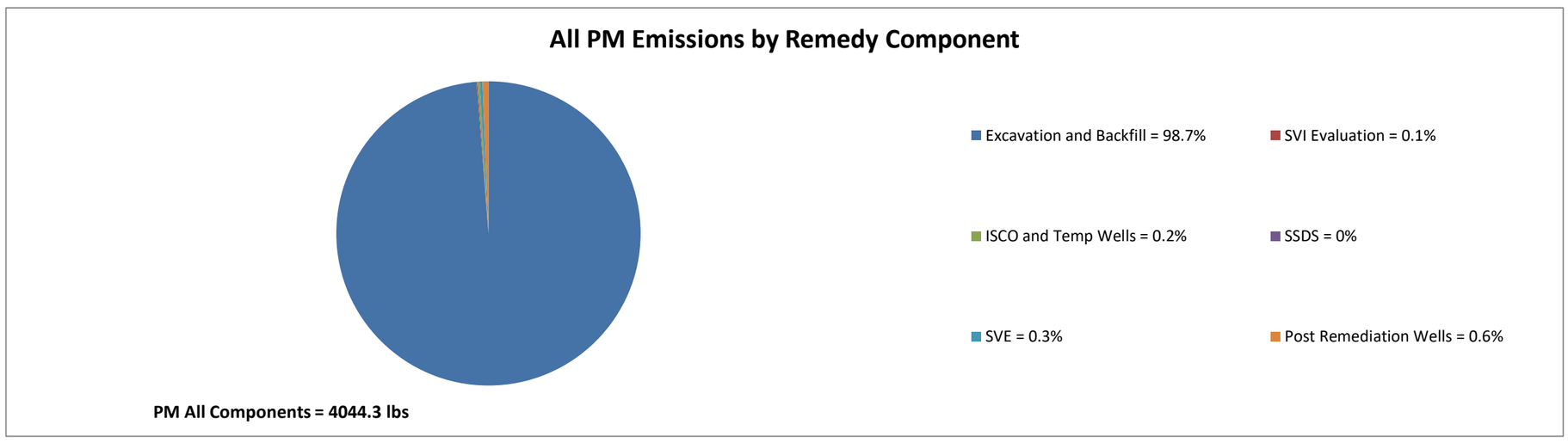
SOx lbs	Excavation and Backfill	SVI Evaluation	ISCO and Temp Wells	SSDS	SVE	Post Reme	Total
On-site (Scope 1)	1.5	0.0	0.1	0.0	0.1	0.0	1.7
Grid Electricity Generation (Scope 2)	0.1	0.0	0.0	0.6	70.8	0.0	71.6
Transportation (Scope 3a)	13.7	3.4	0.7	1.6	0.1	0.2	19.6
Other Off-Site (Scope 3b)	883.9	7.3	6.5	4.2	76.7	137.5	1,116.2
Total	899.2	10.7	7.3	6.5	147.7	137.8	1,209.1

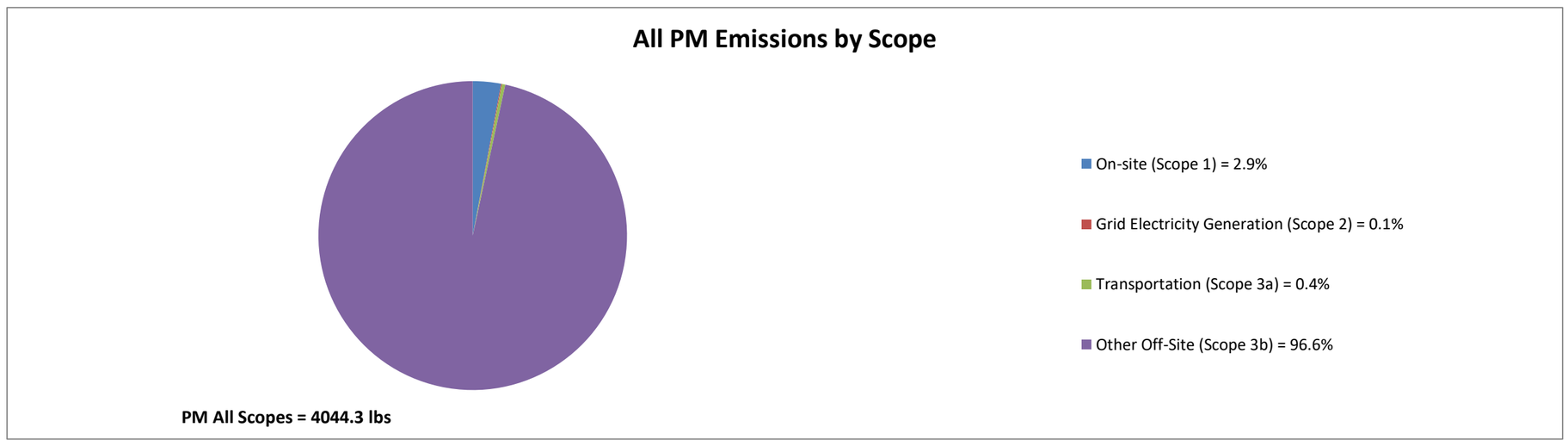
Excavation and Backfill = 74.4%
SVI Evaluation = 0.9%
ISCO and Temp Wells = 0.6%
SSDS = 0.5%
SVE = 12.2%
Post Remediation Wells = 11.4%

SOx All Components = 1209.1 lbs
SOx All Scopes = 1209.1 lbs

On-site (Scope 1) = 0.1%
Grid Electricity Generation (Scope 2) = 5.9%
Transportation (Scope 3a) = 1.6%
Other Off-Site (Scope 3b) = 92.3%


All PM Emissions by Remedy Component and Scope
(in Lbs)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Excavation and Backfill
SVI Evaluation
ISCO and Temp Wells
SSDS
SVE
Post Remediation Wells
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
PM All Components = 4044.3 lbs


All PM Emissions by Remedy Component
Excavation and Backfill = 98.7%
SVI Evaluation = 0.1%
ISCO and Temp Wells = 0.2%
SSDS = 0%
SVE = 0.3%
Post Remediation Wells = 0.6%
PM All Components = 4044.3 lbs

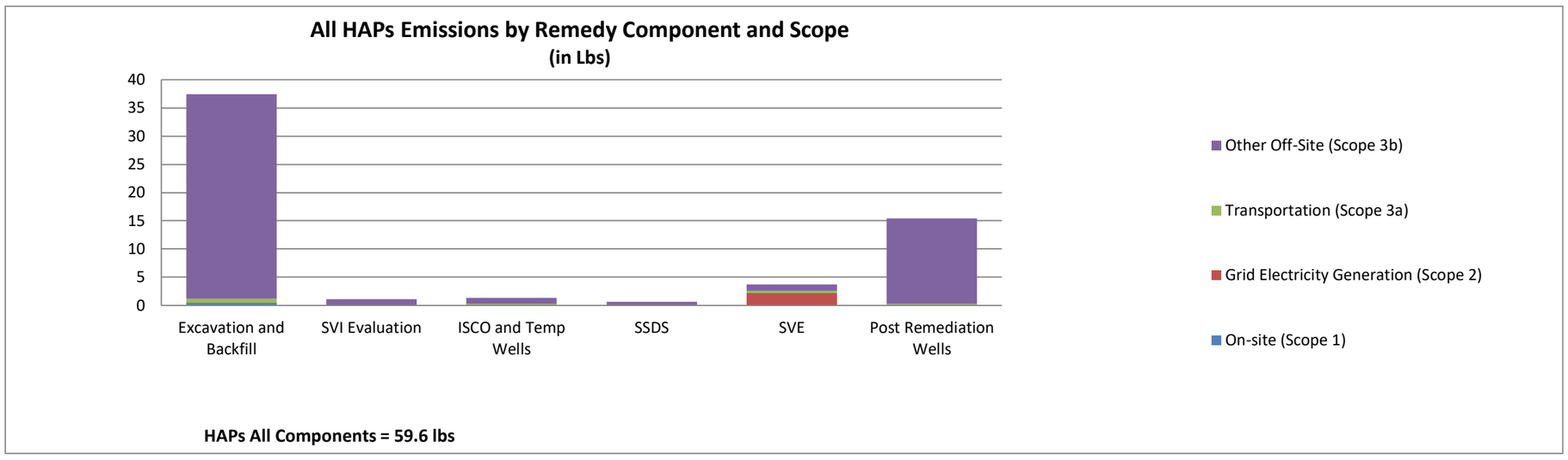

All PM Emissions by Scope
On-site (Scope 1) = 2.9%
Grid Electricity Generation (Scope 2) = 0.1%
Transportation (Scope 3a) = 0.4%
Other Off-Site (Scope 3b) = 96.6%
PM All Scopes = 4044.3 lbs

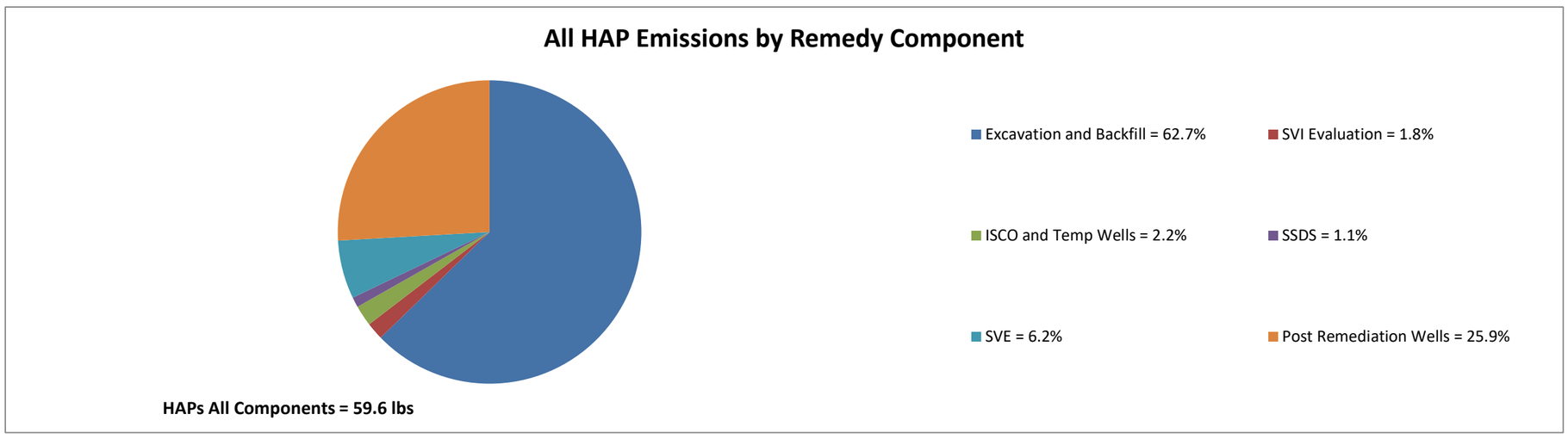
PM lbs	Excavation and Backfill	SVI Evaluation	ISCO and Temp Wells	SSDS	SVE	Post Reme	Total	
On-site (Scope 1)	104.0	0.0	5.7	0.0	5.7	3.8	119.3	
Grid Electricity Generation (Scope 2)	0.0	0.0	0.0	0.0	3.6	0.0	3.7	
Transportation (Scope 3a)	8.9	2.1	1.0	1.1	0.7	0.5	14.3	
Other Off-Site (Scope 3b)	3,880.6	1.6	1.4	0.8	1.8	20.9	3,907.0	
Total	3,993.5	3.7	8.1	1.8	11.9	25.2	4,044.3	

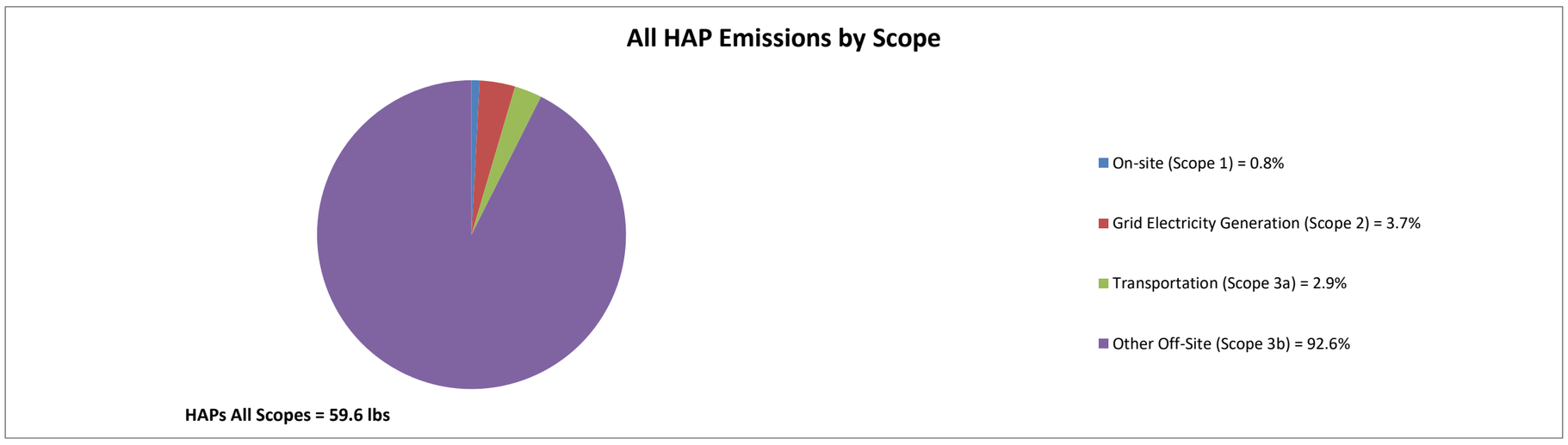
Excavation and Backfill = 98.7%
SVI Evaluation = 0.1%
ISCO and Temp Wells = 0.2%
SSDS = 0%
SVE = 0.3%
Post Remediation Wells = 0.6%

PM All Components = 4044.3 lbs
PM All Scopes = 4044.3 lbs

On-site (Scope 1) = 2.9%
Grid Electricity Generation (Scope 2) = 0.1%
Transportation (Scope 3a) = 0.4%
Other Off-Site (Scope 3b) = 96.6%


All HAPs Emissions by Remedy Component and Scope
(in Lbs)
40
35
30
25
20
15
10
5
0
Excavation and Backfill
SVI Evaluation
ISCO and Temp Wells
SSDS
SVE
Post Remediation Wells
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
HAPs All Components = 59.6 lbs


All HAP Emissions by Remedy Component
Excavation and Backfill = 62.7%
SVI Evaluation = 1.8%
ISCO and Temp Wells = 2.2%
SSDS = 1.1%
SVE = 6.2%
Post Remediation Wells = 25.9%
HAPs All Components = 59.6 lbs


All HAP Emissions by Scope
On-site (Scope 1) = 0.8%
Grid Electricity Generation (Scope 2) = 3.7%
Transportation (Scope 3a) = 2.9%
Other Off-Site (Scope 3b) = 92.6%
HAPs All Scopes = 59.6 lbs

HAPs lbs	Excavation and Backfill	SVI Evaluation	ISCO and Temp Wells	SSDS	SVE	Post Reme	Total
On-site (Scope 1)	0.5	0.0	0.0	0.0	0.0	0.0	0.5
Grid Electricity Generation (Scope 2)	0.0	0.0	0.0	0.0	2.2	0.0	2.2
Transportation (Scope 3a)	0.7	0.0	0.3	0.1	0.3	0.3	1.7
Other Off-Site (Scope 3b)	36.2	1.0	1.0	0.6	1.2	15.2	55.2
Total	37.4	1.1	1.3	0.6	3.7	15.4	59.6

Excavation and Backfill = 62.7%
SVI Evaluation = 1.8%
ISCO and Temp Wells = 2.2%
SSDS = 1.1%
SVE = 6.2%
Post Remediation Wells = 25.9%

HAPs All Components = 59.6 lbs
HAPs All Scopes = 59.6 lbs

On-site (Scope 1) = 0.8%
Grid Electricity Generation (Scope 2) = 3.7%
Transportation (Scope 3a) = 2.9%
Other Off-Site (Scope 3b) = 92.6%

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
4001 4th Avenue Redevelopment Site - RAWP - Track 4 Remedy - 4001 4th Avenue

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	3	4	5	6	6		Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
On-Site																						
On-site Renewable Energy																						
Renewable electricity generated on-site	MWh							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Landfill gas combusted on-site for energy use	ccf CH_4							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site biodiesel use	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site biodiesel use - Other	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined on-site renewable energy use #1	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-Site Conventional Energy																						
Grid electricity	MWh							0.026208	0	0	0.438	48.18	0.010464	0.010464		0.026208	0	0	0.438	48.18	0.020928	48.665136
On-site diesel use - Other	Gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site diesel use <75 hp	Gal							0	0	396.33028	0	396.33028	132.11009	132.11009		0	0	396.33028	0	396.33028	264.22018	1056.8807
On-site diesel use 75<hp<750	Gal							11551.648	0	0	0	0	0	0		11551.648	0	0	0	0	0	11551.648
On-site diesel use >750 hp	Gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site gasoline use - Other	Gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site gasoline use <25 hp	Gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site gasoline use >25 hp	Gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site natural gas use	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site compressed natural gas use - Other	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site compressed natural gas use	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site liquified petroleum gas use - Other	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site liquified petroleum gas use	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other forms of on-site conventional energy use #1	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other On-site Emissions																						
On-site HAP process emissions	Lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site GHG emissions	Lbs CO2e							0	0	0	0	0	0	0		0	0	0	0	0	0	0
On-site carbon storage	Lbs CO2e							0	0	0	0	0	0	0		0	0	0	0	0	0	0
GHG avoided by flaring on-site landfill methane	ccf CH4							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other on-site NOx emissions or reductions	Lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other on-site SOx emissions or reductions	Lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other on-site PM emissions or reductions	Lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Electricity Generation																						
Grid electricity	MWh							0.026208	0	0	0.438	48.18	0.010464	0.010464		0.026208	0	0	0.438	48.18	0.020928	48.665136
Voluntary purchase of renewable electricity	MWh							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Voluntary purchase of RECs	MWh							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Transportation																						
Transportation Fuel Use Breakdown																						
Biodiesel use - Personnel Transport	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Biodiesel use - Personnel Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Biodiesel use - Equipment Transport	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Biodiesel use - Equipment Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Biodiesel use - Material Transport	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Biodiesel use - Material Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Biodiesel use - Waste Transport	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Biodiesel use - Waste Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Diesel use - Personnel Transport - other vehicles	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Diesel use - Personnel Transport - car	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Diesel use - Personnel Transport - passenger truck	gal							0	0	69.5	0	92.7	23.2	23.2		0	0	69.5	0	92.7	46.4	208.6
Diesel use - Personnel Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Diesel use - Equipment Transport	gal							2.6	0	11.7	2.6	11.7	11.7	11.7		2.6	0	11.7	2.6	11.7	23.4	52
Diesel use - Equipment Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Diesel use - Material Transport	gal							1008.334	617.499	116.672	300.833	0.833	0.833	0.833		1008.334	617.499	116.672	300.833	0.833	1.666	2045.837
Diesel use - Material Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Diesel use - Waste Transport	gal							1510	8.4	0	0	0	0	0		1510	8.4	0	0	0	0	1518.4
Diesel use - Waste Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Gasoline use - Personnel Transport - other vehicles	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Gasoline use - Personnel Transport - car	gal							107.7	6.9	12	8	16	10.4	10.4		107.7	6.9	12	8	16	20.8	171.4
Gasoline use - Personnel Transport - passenger truck	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Gasoline use - Personnel Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Gasoline use - Equipment Transport	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Gasoline use - Equipment Transport - User Defined	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Natural Gas use - Personnel Transport	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Natural Gas use - Personnel Transport - User Defined	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Natural Gas use - Equipment Transport	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
4001 4th Avenue Redevelopment Site - RAWP - Track 4 Remedy - 4001 4th Avenue

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	3	4	5	6	6		Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Conventional Energy																						
Transportation diesel use	gal							2520.934	625.899	197.872	303.433	105.233	35.733	35.733		2520.934	625.899	197.872	303.433	105.233	71.466	3824.837
Transportation gasoline use	gal							107.7	6.9	12	8	16	10.4	10.4		107.7	6.9	12	8	16	20.8	171.4
Transportation natural gas use	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined conventional energy transportation #1	TBD							10	10	10	10	10	10	10		10	10	10	10	10	20	70
User-defined conventional energy transportation #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Renewable Energy																						
Transportation biodiesel use	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined renewable energy transportation #1	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined renewable energy transportation #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-Site																						
Construction Materials																						
Aluminum, Rolled Sheet	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Asphalt, mastic	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Asphalt, paving-grade	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Ethanol, Corn, 95%	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Ethanol, Corn, 99.7%	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Ethanol, Petroleum, 99.7%	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Gravel/Sand Mix, 65% Gravel	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Gravel/sand/clay	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
HDPE	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Photovoltaic system (installed)	W							0	0	0	0	0	0	0		0	0	0	0	0	0	0
PVC	lb							0	0	1000	600	1000	500	500		0	0	1000	600	1000	1000	3600
Portland cement, US average	lb							5570000	0	0	0	0	0	0								
Ready-mixed concrete, 20 MPa	ft3							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Round Gravel	lb							6600000	0	0	0	0	0	0		6600000	0	0	0	0	0	6600000
Sand	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Stainless Steel	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Steel	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other refined construction materials	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other unrefined construction materials	lb							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Treatment Materials & Chemicals																						
Cheese Whey	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Emulsified vegetable oil	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Granular activated carbon, primary	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Granular activated carbon, regenerated	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Hydrogen Peroxide, 50% in H2O	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Iron (II) Sulfate	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Lime, Hydrated, Packed	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Molasses	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Phosphoric Acid, 70% in H2O	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Potassium Permanganate	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Sodium Hydroxide, 50% in H2O	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Other Treatment Chemicals & Materials	lbs							0	0	1000	0	0	0	0		0	0	1000	0	0	0	1000
Material Type																						
Total Virgin Refined Materials	tons							6085	0	1	0.3	0.5	0.25	0.25		6085	0	1	0.3	0.5	0.5	6087.3
Total Recycled Refined Materials	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Total Reused Refined Materials	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Total Refined Material	tons							6085	0	1	0.3	0.5	0.25	0.25		6085	0	1	0.3	0.5	0.5	6087.3
Total Virgin Unrefined Materials	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Total Recycled Unrefined Materials	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Total Reused Unrefined Materials	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Total Unrefined Material	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Fuel Processing																						
Biodiesel produced	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Diesel produced	gal							14072.582	625.899	594.20228	303.433	501.56328	167.84309	167.84309		14072.582	625.899	594.20228	303.433	501.56328	335.68618	16433.366
Gasoline produced	gal							107.7	6.9	12	8	16	10.4	10.4		107.7	6.9	12	8	16	20.8	171.4
Compressed natural gas produced	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Liquified petroleum gas produced	gal							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Natural gas produced	ccf							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Water Use																						
Public Water Supply	gal x 1000							9.6	0	1.5	0	0	0	0		9.6	0	1.5	0	0	0	11.1
Extracted Groundwater	gal x 1000							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Surface Water	gal x 1000							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Reclaimed Water	gal x 1000							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Collected/Diverted Storm Water	gal x 1000							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined water resource #1	gal x 1000							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000							0	0	0	0	0	0	0		0	0	0	0	0	0	0

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	3	4	5	6	6		Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Waste/Recycle Handling																						
Hazardous waste incineration	lbs							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site waste water treatment (POTW)	gal x 1000							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site non-hazardous waste landfill	tons							9580	0	0	0	0	0	0		9580	0	0	0	0	0	9580
Off-site hazardous waste landfill	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Recycled/Reused On-Site	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Recycled/Reused Off-Site	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Solid Waste Totals																						
Total Non-Hazardous Waste	tons							9580	0	0	0	0	0	0		9580	0	0	0	0	0	9580
Total Hazardous Waste	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Total Recycled/Reused	tons							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Total Waste (all types)	tons							9580	0	0	0	0	0	0		9580	0	0	0	0	0	9580
Lab Services																						
Off-site Laboratory Analysis - Other	sample							45	0	0	0	0	0	0		45	0	0	0	0	0	45
Off-site Laboratory Analysis - Metals	sample							15	0	0	0	0	32	32		15	0	0	0	0	64	79
Off-site Laboratory Analysis - Mercury	sample							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site Laboratory Analysis - Inorganic Anions	sample							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site Laboratory Analysis - Alkalinity	sample							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site Laboratory Analysis - Perchlorate	sample							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site Laboratory Analysis - Sulfate	sample							0	0	0	0	0	0	0		0	0	0	0	0	0	0
Off-site Laboratory Analysis - PCBs	sample							15	0	0	0	0	0	0		15	0	0	0	0	0	15
Off-site Laboratory Analysis - VOCs	sample							15	15	0	0	0	32	32		15	15	0	0	0	64	94
Off-site Laboratory Analysis - SVOCs	sample							15	0	0	0	0	32	32		15	0	0	0	0	64	79
Resource Extraction for Electricity																						
Coal extraction and processing	MWh							0.0079934	0	0	0.02628	2.8908	0.0006278	0.0006278		0.0079934	0	0	0.02628	2.8908	0.0012557	2.9263291
Natural gas extraction and processing	MWh							0.0088845	0	0	0.0438	4.818	0.0010464	0.0010464		0.0088845	0	0	0.0438	4.818	0.0020928	4.8727773
Nuclear fuel extraction and processing	MWh							0.0051892	0	0	0.00876	0.9636	0.0002093	0.0002093		0.0051892	0	0	0.00876	0.9636	0.0004186	0.9779677
Oil extraction and processing	MWh							0.0001835	0	0	0.0219	2.409	0.0005232	0.0005232		0.0001835	0	0	0.0219	2.409	0.0010464	2.4321299
Other fuel extraction and processing	MWh							2.621E-05	0	0	0	0	0	0		2.621E-05	0	0	0	0	0	2.621E-05
Electricity Transmission																						
Transmission and distribution losses	MWh							0.026208	0	0	0.438	48.18	0.010464	0.010464		0.026208	0	0	0.438	48.18	0.020928	48.665136

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	3	4	5	6	6		Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Other																						
User-defined material #1	ton							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #3	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #4	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #5	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #6	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #7	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #8	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #9	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #10	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #11	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #12	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #13	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #14	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #15	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #16	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #17	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #18	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #19	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined material #20	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined Waste Destinations																						
User-defined recycled/reused on-site #1	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined recycled/reused on-site #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined non-hazardous waste destination #1	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD							0	0	0	0	0	0	0		0	0	0	0	0	0	0

All - Energy & Air Compiled Results

Category	Total Energy	GHG	NOx	SOx	PM	NOx + SOx + PM	HAPs
	MMbtus	lbs CO2e	lbs	lbs	lbs	lbs	lbs
On-site (Scope 1)	**1,919**	**280,382**	**1,332**	**2**	**119**	**1,453**	**1**
Grid Electricity Generation (Scope 2)	**337.201**	**17,150**	**73**	**72**	**4**	**148**	**2**
Transportation (Scope 3a)	**553**	**89,457**	**632**	**20**	**14**	**665**	**2**
Other Off-Site (Scope 3b)	**2,197**	**320,996**	**1,649**	**1,116**	**3,907**	**6,672**	**55**
Remedy Totals	**5,006**	**707,985**	**3,686**	**1,208**	**4,045**	**8,939**	**59**

Values that are forwarded to the "Summary" tab are indicated in orange.

Voluntary Renewable Energy Use	Unit	Quantity
On-site renewable energy generation or use	MMBtu	**0**
On-site biodiesel use	MMBtu	**0**
Biodiesel and other renewable resource use for transportation	MMBtu	**0**
On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	**0**
Voluntary purchase of renewable electricity	MWh	**0**
Voluntary purchase of RECs	MWh	**0**

(This value is the sum of the three rows above)

This worksheet is not intended for user input. Values on this worksheet are obtained from the following file: SEFA_calculations_(121718).xlsx

Track 1 Remedy

H & A OF NEW YORK ENGINEERING
AND GEOLOGY, LLP
213 W. 35th Street
7th Floor
New York, NY 10001
646.277.5685

July 27, 2026
File No. 0210815

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

Attention: Shawn Roberts

Subject: Green Site Remediation
4001 4th Avenue Redevelopment
NYSDEC Site C224412
4001 4th Avenue Redevelopment
Brooklyn, New York

H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) presents the following environmental footprint analysis[1] in accordance with EPA 542-R-12-002 for the Track 1 Remedy of the above-referenced site at 4001 4th Avenue Redevelopment, Brooklyn, New York (Site).

4001 4TH AVENUE REDEVELOPMENT REMEDY – TRACK 1 CLEANUP

The primary remedial tasks consist of the following:

- Excavation and support-of-excavation installation
- SVI Evaluation

The Track 1 remedy will result in estimated totals of:

- 12977.84 Metric Million British Thermal Unit (MMBtus) of energy used;
- 1021.55 tons of total greenhouse gas emissions (CO2e [includes consideration of carbon dioxide, methane, and nitrous oxide emissions]);
- 29635.54 pounds (lbs) of nitrogen oxides (NOx) + sulfur oxides (SOx) + particulate matter (PM) emissions; and
- 124.08 lbs of hazardous air pollutant (HAP) emissions.

Energy

- 3,776.89 MMBtus used for on-site activities, such as excavation,
- 237.16 MMBtus used for grid electricity generation,

[1] *Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019.*

- 2,143.82 MMBtus used for transportation of personnel, remedy materials, and waste disposal, and
- 6,819.97 MMBtus used for off-site activities.

Greenhouse Gas Emissions (CO2e)

- 585,610.97 tons of CO2e are estimated to be produced from on-site activities, such as excavation,
- 38,481.82 tons of CO2e are estimated to be produced from grid electricity generation,
- 346,748.59 tons of CO2e are estimated to be produced from transportation of personnel, remedy materials, and waste disposal, and
- 1,068,411.79 tons are estimated to be produced from off-site activities.

Water Usage

- 36900 gallons of water are estimated to be used to wash down trucks and tires on an imported gravel truck wash pad, for grout production for monitoring well installation, and for groundwater remediation injections.

Roughly a quarter of the energy use and of CO2e generation will originate from onsite activities for the Track 1 Remedy. Overall, the footprint of the Site Remedy is dominated by off-Site activities, which include landfill use and diesel fuel production. Off-site energy use comprises 52.55 percent of all energy use and off-site greenhouse gas emissions comprises 52.39 percent of all emissions for the Track 1 Remedy.

Sincerely yours,
H & A OF NEW YORK ENGINEERING AND GEOLOGY, LLP

Suzanne M. Bell, P.E.
Senior Associate

James M. Bellew
Principal

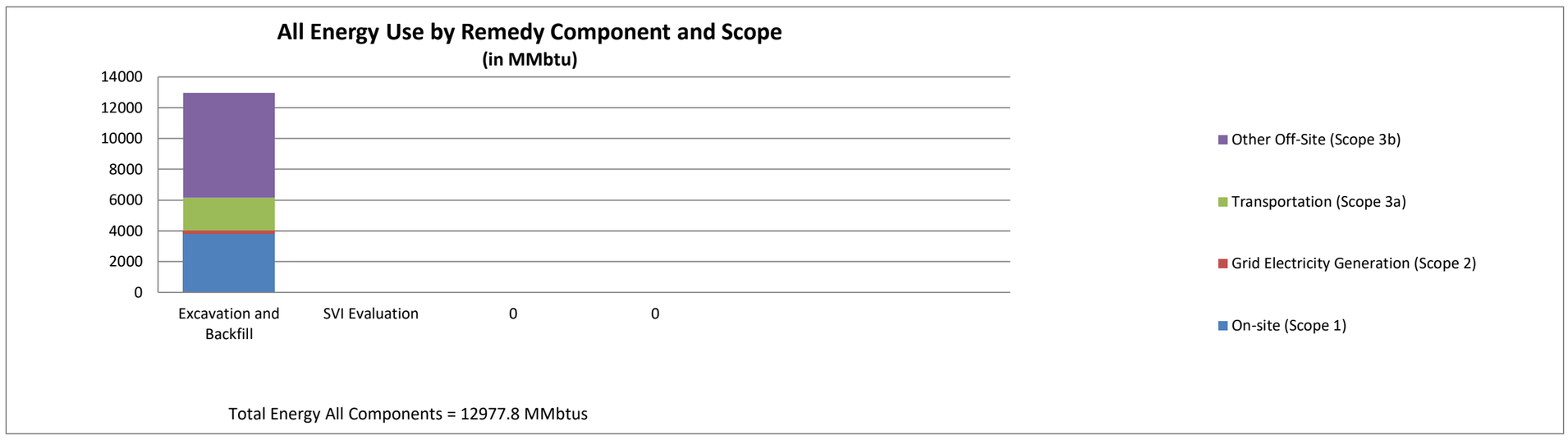
Environmental Footprint Summary

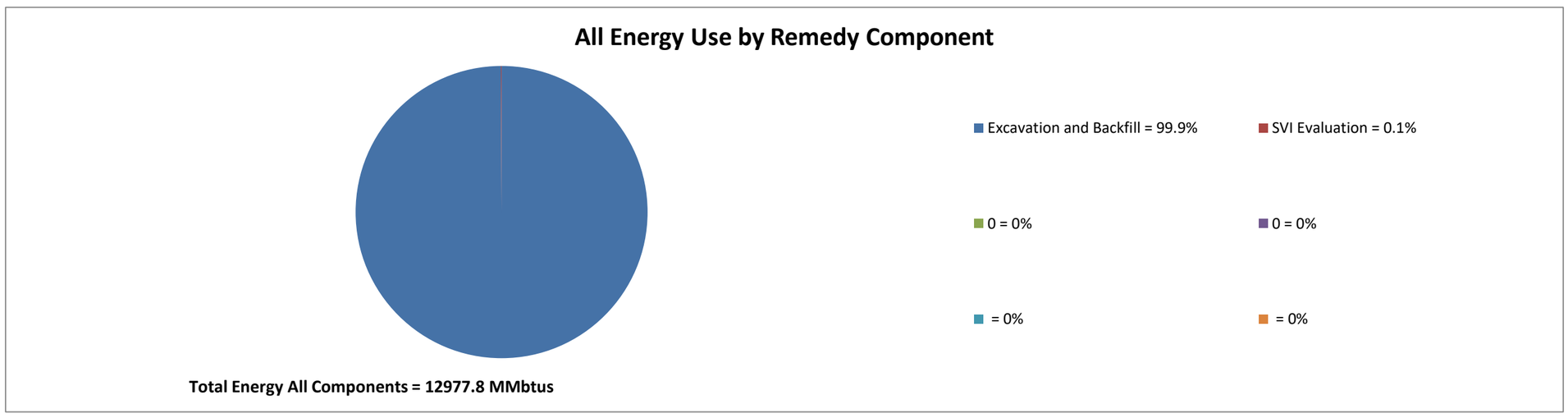
Core Element	Metric		Unit of Measure	Footprint						
				Excavation and Backfill	SVI Evaluation					Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	6,072.5	0.0	0.0	0.0	0.0	0.0	6,072.5
	M&W-2	% of refined materials from recycled or reused material	%	0.0%						0.0%
	M&W-3	Unrefined materials used on-site	Tons	0.000	0.000	0.000	0.000	0.000	0.000	0.0
	M&W-4	% of unrefined materials from recycled or reused material	%							
	M&W-5	On-site hazardous waste disposed of off-site	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	37,330.0	0.0	0.0	0.0	0.0	0.0	37,330.0
	M&W-7	Recycled or reused waste	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-8	% of total potential waste recycled or reused	%	0.0%						0.0%
Water (used on-site)	W-1	Public water use	MG	0.0369	0.0000	0.0	0.0	0.0	0.0	0.0369
	W-2	Groundwater use	MG	0.5	0.0	0.0	0.0	0.0	0.0	0.5
	W-3	Surface water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-4	Reclaimed water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-5	Storm water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-6	User-defined water resource #1	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-7	User-defined water resource #2	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-8	Wastewater generated	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy	E-1	Total energy used (on-site and off-site)	MMBtu	12,968.0	9.9	0.0	0.0	0.0	0.0	12,977.8
	E-2	Energy voluntarily derived from renewable resources								
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-2B	Voluntary purchase of renewable electricity	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-3	Voluntary purchase of RECs	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-4	On-site grid electricity use	MWh	34.227	0.000	0.000	0.000	0.000	0.000	34.2
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	2,899.9	0.0	0.0	0.0	0.0	0.0	2,899.9
	A-2	On-site HAP emissions	Pounds	1.1	0.0	0.0	0.0	0.0	0.0	1.1
	A-3	Total NOx, SOx, and PM emissions	Pounds	29,560.0	75.6	0.0	0.0	0.0	0.0	29,635.5
	A-3A	Total NOx emissions	Pounds	10,735.5	20.8	0.0	0.0	0.0	0.0	10,756.3
	A-3B	Total SOx emissions	Pounds	3,520.4	47.6	0.0	0.0	0.0	0.0	3,568.0
	A-3C	Total PM emissions	Pounds	15,304.1	7.2	0.0	0.0	0.0	0.0	15,311.2
	A-4	Total HAP emissions	Pounds	118.8	5.2	0.0	0.0	0.0	0.0	124.1
	A-5	Total greenhouse gas emissions	Tons CO2e*	1,020.9	0.6	0.0	0.0	0.0	0.0	1,021.6
Land & Ecosystems	Qualitative Description									

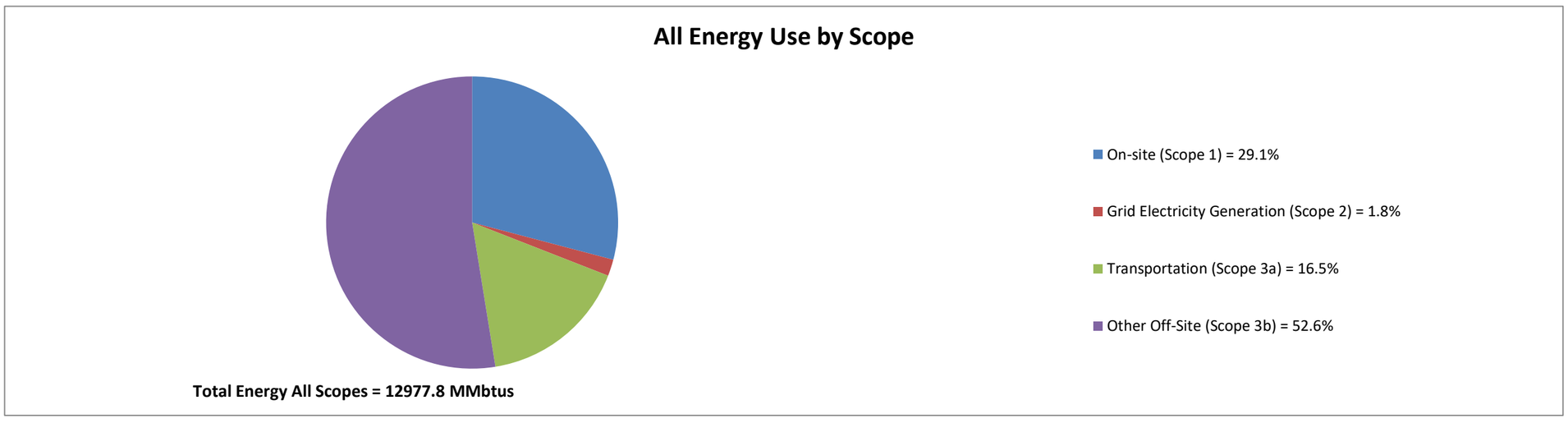
** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*
"MMBtu" = millions of Btus
"MG" = millions of gallons
"CO2e" = carbon dioxide equivalents of global warming potential
"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)
"Tons" = short tons (2,000 pounds)

The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012

Notes:


All Energy Use by Remedy Component and Scope
(in MMbtu)
14000
12000
10000
8000
6000
4000
2000
0
Excavation and Backfill
SVI Evaluation
0
0
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
Total Energy All Components = 12977.8 MMbtus


All Energy Use by Remedy Component
Excavation and Backfill = 99.9%
SVI Evaluation = 0.1%
0 = 0%
0 = 0%
= 0%
= 0%
Total Energy All Components = 12977.8 MMbtus

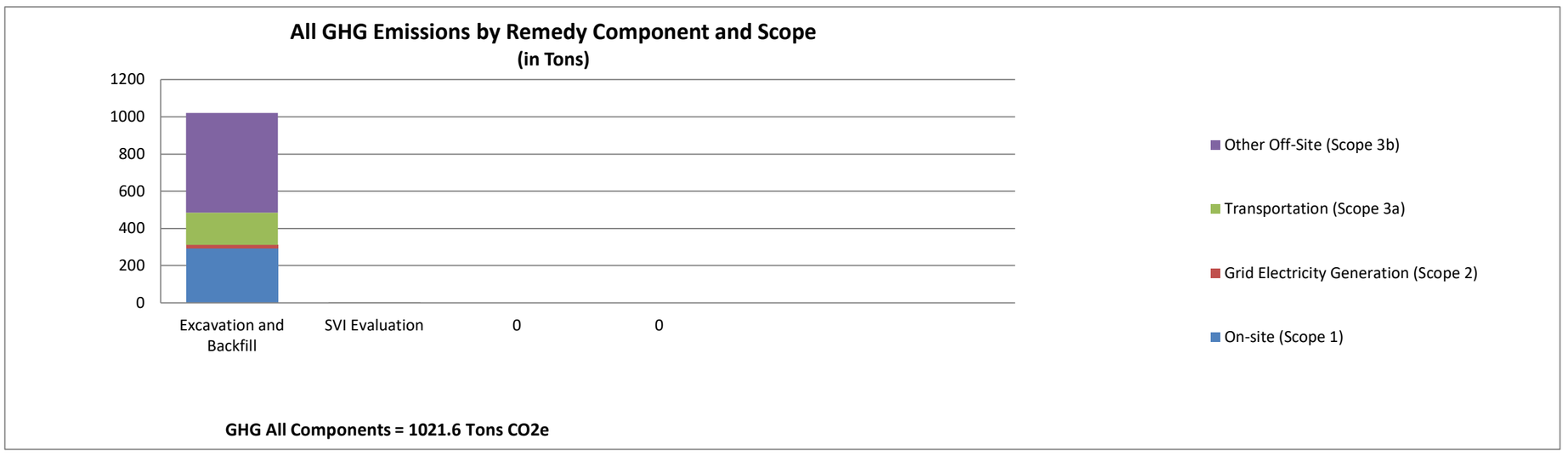

All Energy Use by Scope
On-site (Scope 1) = 29.1%
Grid Electricity Generation (Scope 2) = 1.8%
Transportation (Scope 3a) = 16.5%
Other Off-Site (Scope 3b) = 52.6%
Total Energy All Scopes = 12977.8 MMbtus

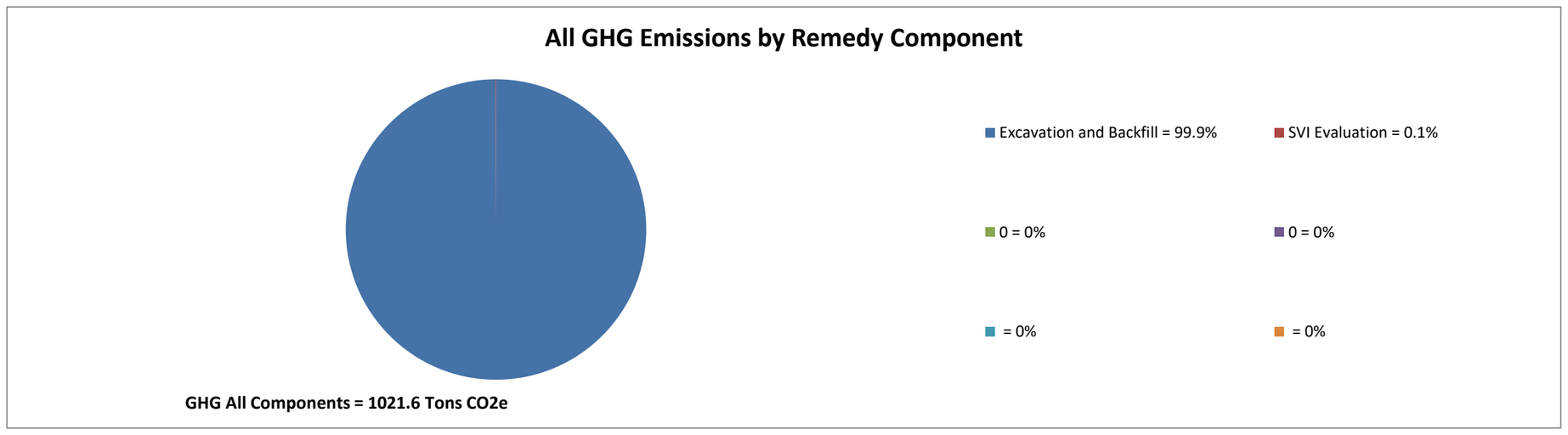
Total Energy MMbtus							
	Excavation and Backfill	SVI Evaluation		0	0		Total
On-site (Scope 1)	3,776.9	0.0	0.0	0.0	0.0	0.0	3,776.9
Grid Electricity Generation (Scope 2)	237.2	0.0	0.0	0.0	0.0	0.0	237.2
Transportation (Scope 3a)	2,143.0	0.9	0.0	0.0	0.0	0.0	2,143.8
Other Off-Site (Scope 3b)	6,811.0	9.0	0.0	0.0	0.0	0.0	6,820.0
Total	12,968.0	9.9	0.0	0.0	0.0	0.0	12,977.8

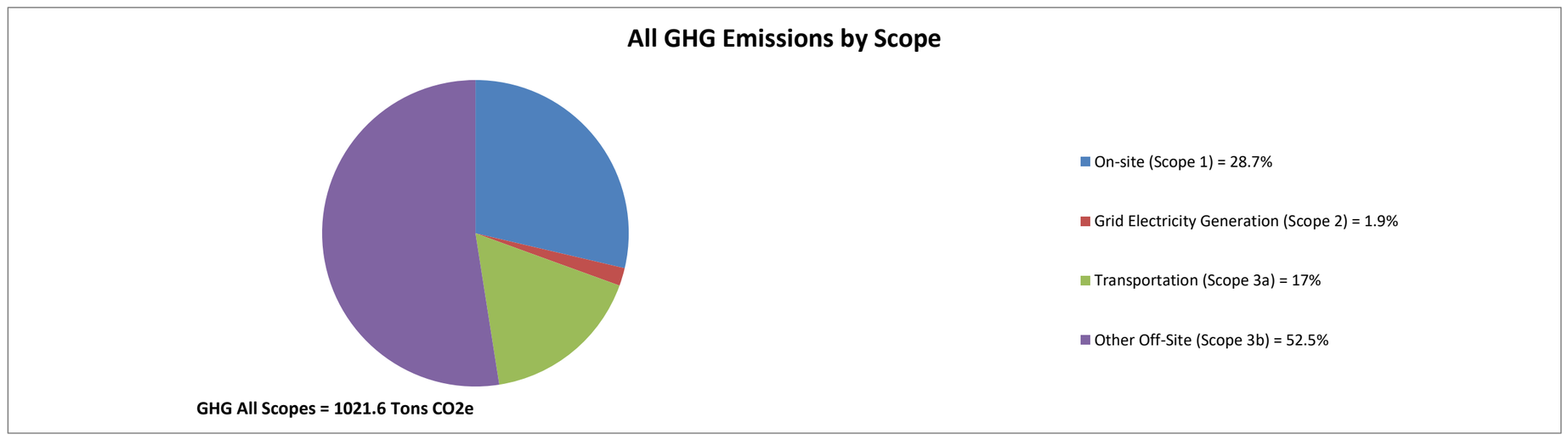
Excavation and Backfill = 99.9%
SVI Evaluation = 0.1%
0 = 0%
0 = 0%
= 0%
= 0%

On-site (Scope 1) = 29.1%
Grid Electricity Generation (Scope 2) = 1.8%
Transportation (Scope 3a) = 16.5%
Other Off-Site (Scope 3b) = 52.6%

Total Energy All Components = 12977.8 MMbtus
Total Energy All Scopes = 12977.8 MMbtus


All GHG Emissions by Remedy Component and Scope
(in Tons)
1200
1000
800
600
400
200
0
Excavation and Backfill
SVI Evaluation
0
0
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
GHG All Components = 1021.6 Tons CO2e


All GHG Emissions by Remedy Component
Excavation and Backfill = 99.9%
SVI Evaluation = 0.1%
0 = 0%
0 = 0%
= 0%
= 0%
GHG All Components = 1021.6 Tons CO2e

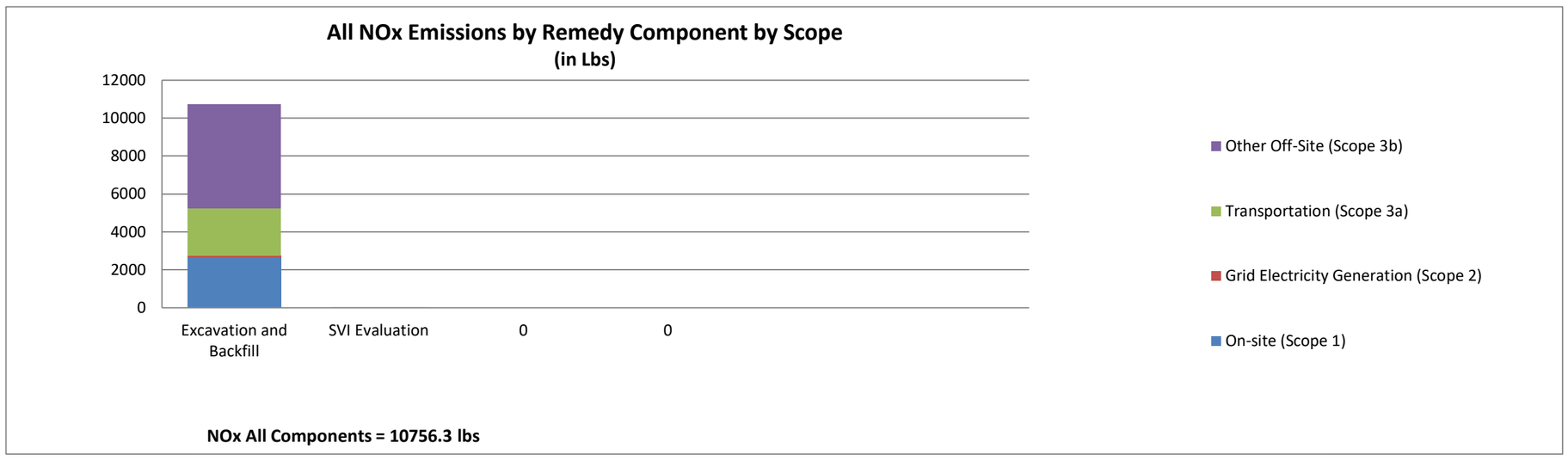

All GHG Emissions by Scope
On-site (Scope 1) = 28.7%
Grid Electricity Generation (Scope 2) = 1.9%
Transportation (Scope 3a) = 17%
Other Off-Site (Scope 3b) = 52.5%
GHG All Scopes = 1021.6 Tons CO2e

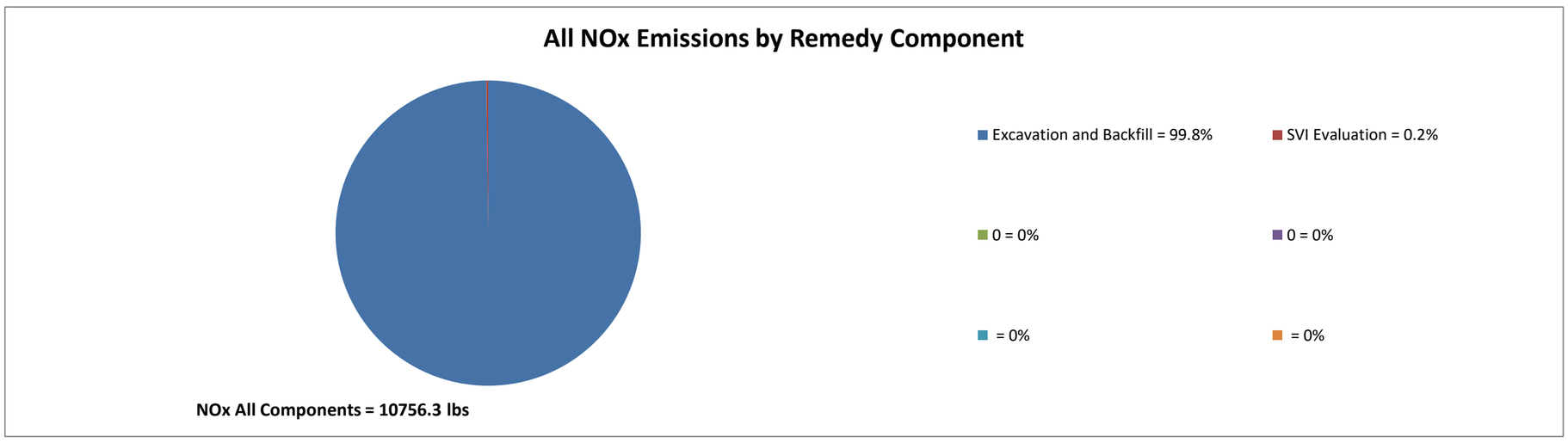
GHG Tons CO2e	Excavation and Backfill	SVI Evaluation		0	0		Total
On-site (Scope 1)	292.8	0.0	0.0	0.0	0.0	0.0	292.8
Grid Electricity Generation (Scope 2)	19.2	0.0	0.0	0.0	0.0	0.0	19.2
Transportation (Scope 3a)	173.3	0.1	0.0	0.0	0.0	0.0	173.4
Other Off-Site (Scope 3b)	535.6	0.5	0.0	0.0	0.0	0.0	536.1
Total	1,020.9	0.6	0.0	0.0	0.0	0.0	1,021.6

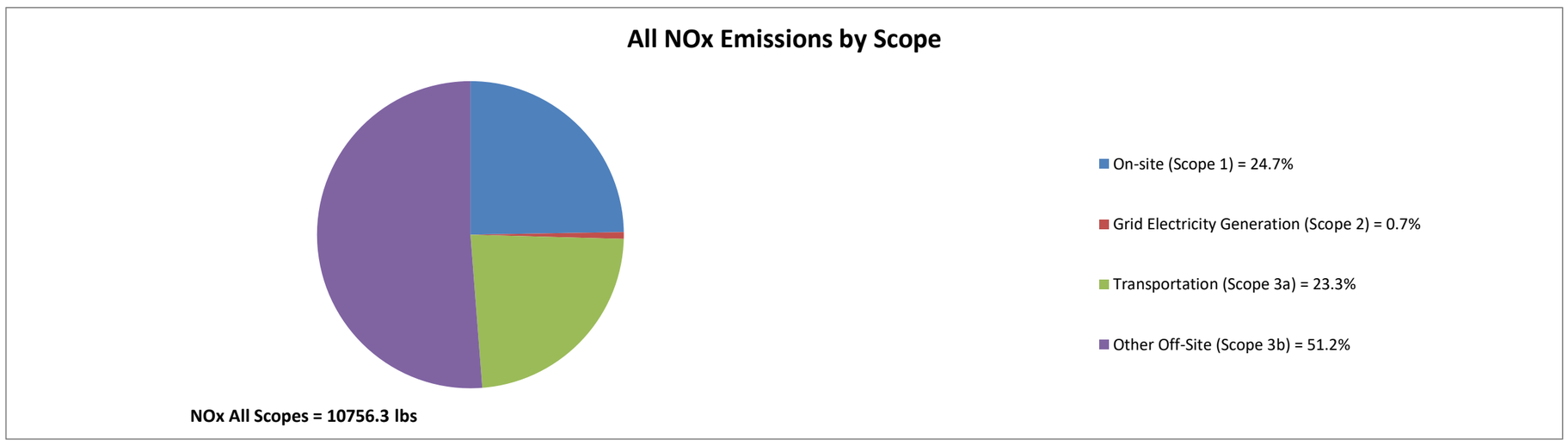
Excavation and Backfill = 99.9%
SVI Evaluation = 0.1%
0 = 0%
0 = 0%
= 0%
= 0%

GHG All Components = 1021.6 Tons CO2e
GHG All Scopes = 1021.6 Tons CO2e

On-site (Scope 1) = 28.7%
Grid Electricity Generation (Scope 2) = 1.9%
Transportation (Scope 3a) = 17%
Other Off-Site (Scope 3b) = 52.5%


All NOx Emissions by Remedy Component by Scope
(in Lbs)
12000
10000
8000
6000
4000
2000
0
Excavation and Backfill
SVI Evaluation
0
0
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
NOx All Components = 10756.3 lbs


All NOx Emissions by Remedy Component
Excavation and Backfill = 99.8%
SVI Evaluation = 0.2%
0 = 0%
0 = 0%
= 0%
= 0%
NOx All Components = 10756.3 lbs

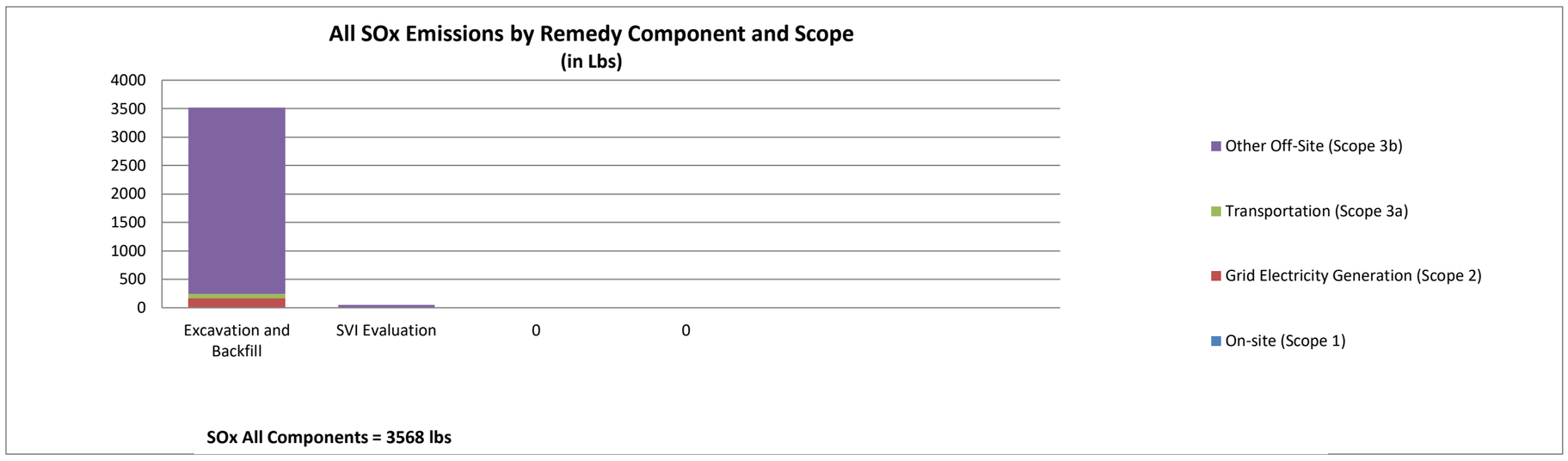

All NOx Emissions by Scope
On-site (Scope 1) = 24.7%
Grid Electricity Generation (Scope 2) = 0.7%
Transportation (Scope 3a) = 23.3%
Other Off-Site (Scope 3b) = 51.2%
NOx All Scopes = 10756.3 lbs

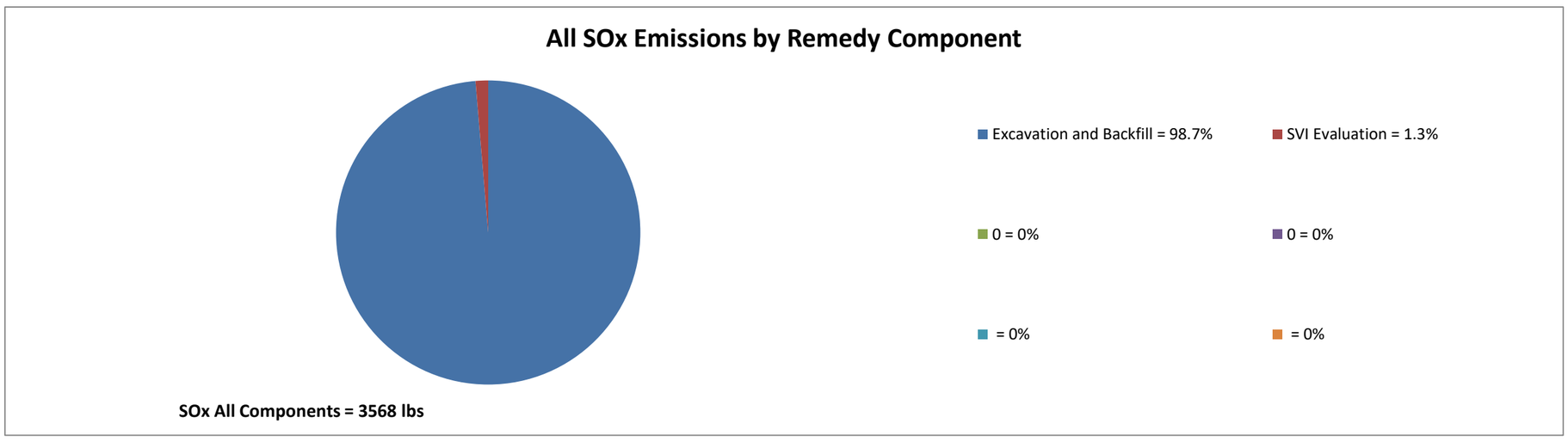
NOx lbs							
	Excavation and Backfill	SVI Evaluation		0	0		Total
On-site (Scope 1)	2,659.5	0.0	0.0	0.0	0.0	0.0	2,659.5
Grid Electricity Generation (Scope 2)	76.7	0.0	0.0	0.0	0.0	0.0	76.7
Transportation (Scope 3a)	2,509.3	0.2	0.0	0.0	0.0	0.0	2,509.5
Other Off-Site (Scope 3b)	5,490.0	20.6	0.0	0.0	0.0	0.0	5,510.6
Total	10,735.5	20.8	0.0	0.0	0.0	0.0	10,756.3

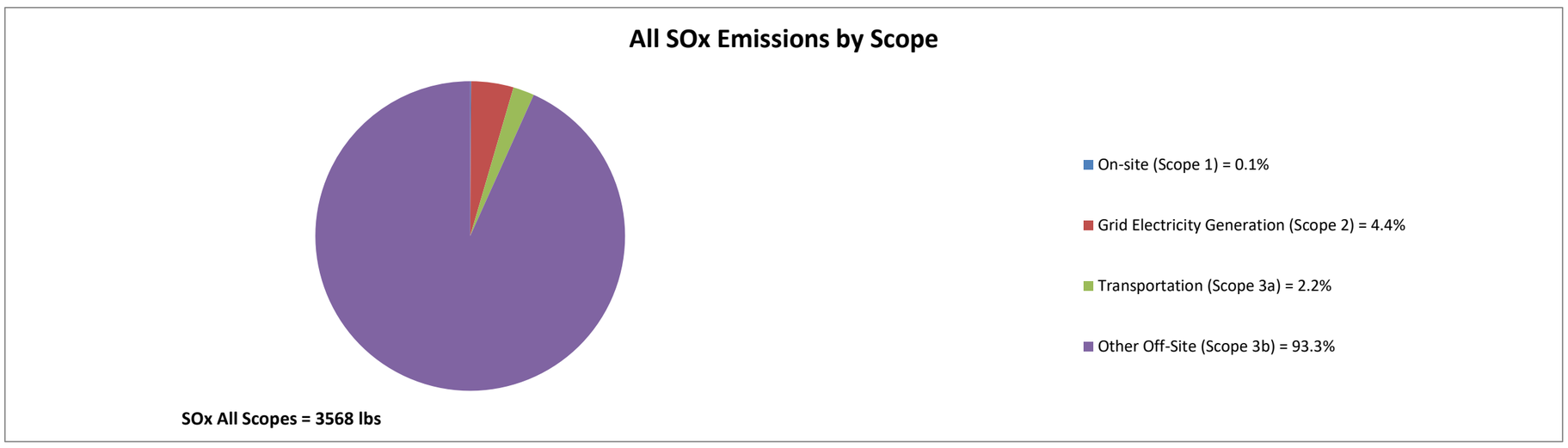
Excavation and Backfill = 99.8%
SVI Evaluation = 0.2%
0 = 0%
0 = 0%
= 0%
= 0%

NOx All Components = 10756.3 lbs
NOx All Scopes = 10756.3 lbs

On-site (Scope 1) = 24.7%
Grid Electricity Generation (Scope 2) = 0.7%
Transportation (Scope 3a) = 23.3%
Other Off-Site (Scope 3b) = 51.2%


All SOx Emissions by Remedy Component and Scope
(in Lbs)
4000
3500
3000
2500
2000
1500
1000
500
0
Excavation and Backfill
SVI Evaluation
0
0
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
SOx All Components = 3568 lbs


All SOx Emissions by Remedy Component
Excavation and Backfill = 98.7%
SVI Evaluation = 1.3%
0 = 0%
0 = 0%
= 0%
= 0%
SOx All Components = 3568 lbs

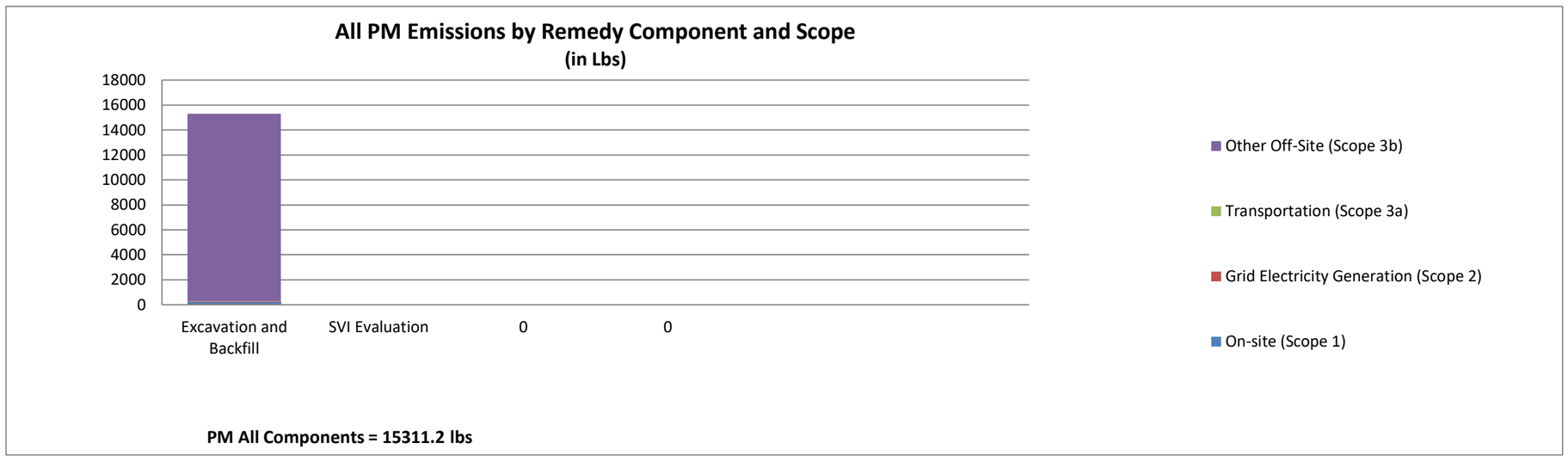

All SOx Emissions by Scope
On-site (Scope 1) = 0.1%
Grid Electricity Generation (Scope 2) = 4.4%
Transportation (Scope 3a) = 2.2%
Other Off-Site (Scope 3b) = 93.3%
SOx All Scopes = 3568 lbs

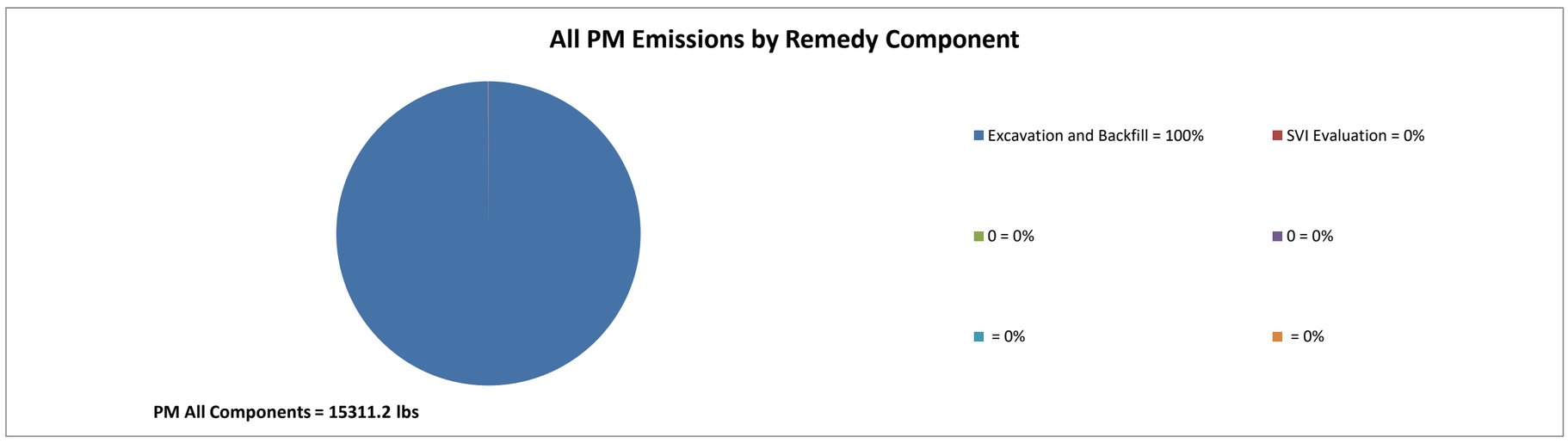
	SOx lbs							
	Excavation and Backfill	SVI Evaluation		0	0		Total	
On-site (Scope 1)	3.4	0.0	0.0	0.0	0.0	0.0	0.0	3.4
Grid Electricity Generation (Scope 2)	157.7	0.0	0.0	0.0	0.0	0.0	0.0	157.7
Transportation (Scope 3a)	79.1	0.0	0.0	0.0	0.0	0.0	0.0	79.1
Other Off-Site (Scope 3b)	3,280.2	47.6	0.0	0.0	0.0	0.0	0.0	3,327.8
Total	3,520.4	47.6	0.0	0.0	0.0	0.0	0.0	3,568.0

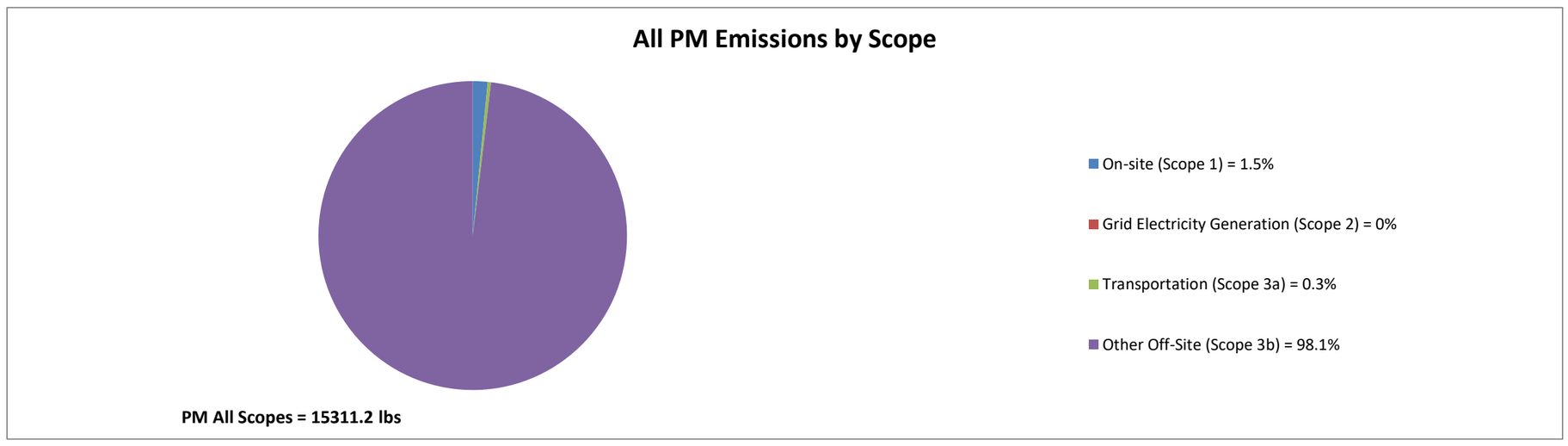
Excavation and Backfill = 98.7%
SVI Evaluation = 1.3%
0 = 0%
0 = 0%
 = 0%
 = 0%

SOx All Components = 3568 lbs
SOx All Scopes = 3568 lbs

On-site (Scope 1) = 0.1%
Grid Electricity Generation (Scope 2) = 4.4%
Transportation (Scope 3a) = 2.2%
Other Off-Site (Scope 3b) = 93.3%


All PM Emissions by Remedy Component and Scope
(in Lbs)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Excavation and Backfill
SVI Evaluation
0
0
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
PM All Components = 15311.2 lbs


All PM Emissions by Remedy Component
Excavation and Backfill = 100%
SVI Evaluation = 0%
0 = 0%
0 = 0%
= 0%
= 0%
PM All Components = 15311.2 lbs

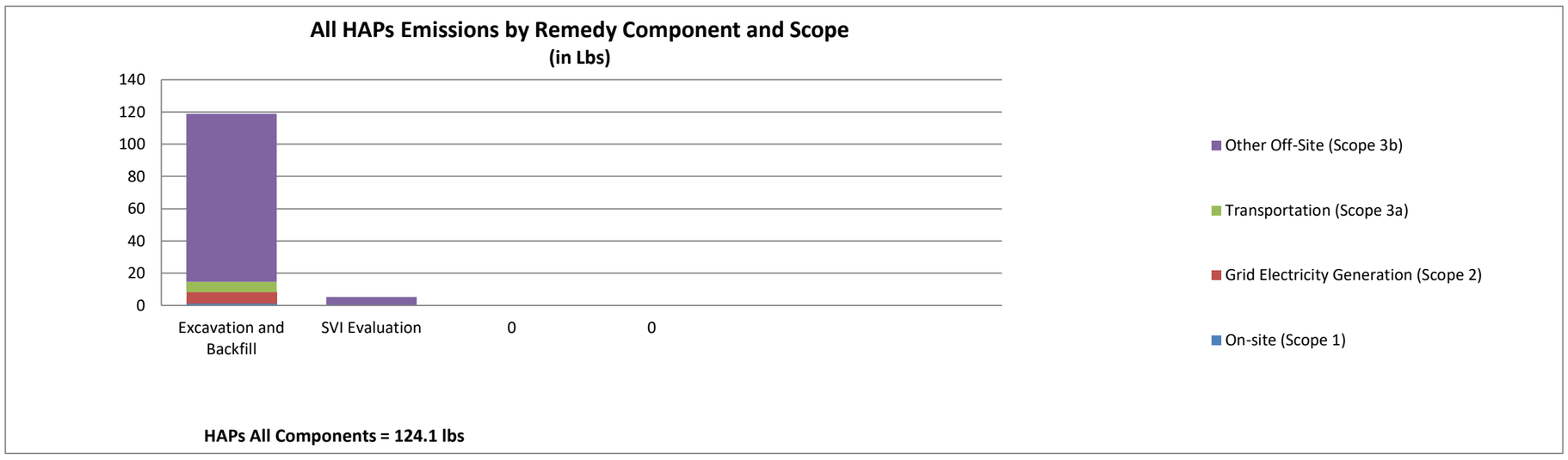

All PM Emissions by Scope
On-site (Scope 1) = 1.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.3%
Other Off-Site (Scope 3b) = 98.1%
PM All Scopes = 15311.2 lbs

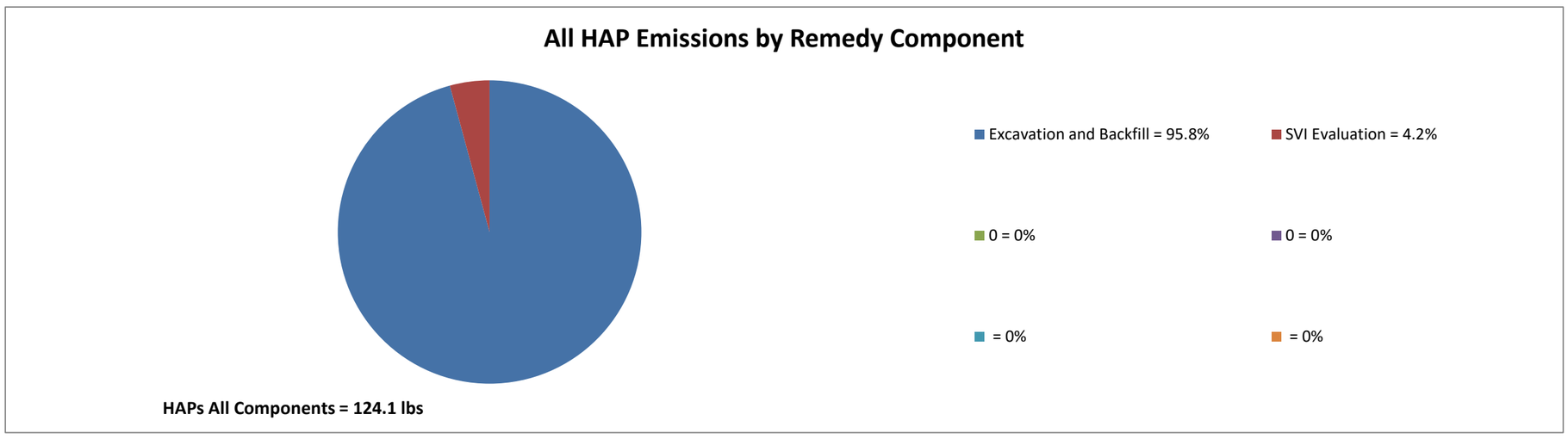
	PM lbs						
	Excavation and Backfill	SVI Evaluation		0	0		Total
On-site (Scope 1)	237.0	0.0	0.0	0.0	0.0	0.0	237.0
Grid Electricity Generation (Scope 2)	2.0	0.0	0.0	0.0	0.0	0.0	2.0
Transportation (Scope 3a)	52.4	0.0	0.0	0.0	0.0	0.0	52.4
Other Off-Site (Scope 3b)	15,012.7	7.2	0.0	0.0	0.0	0.0	15,019.9
Total	15,304.1	7.2	0.0	0.0	0.0	0.0	15,311.2

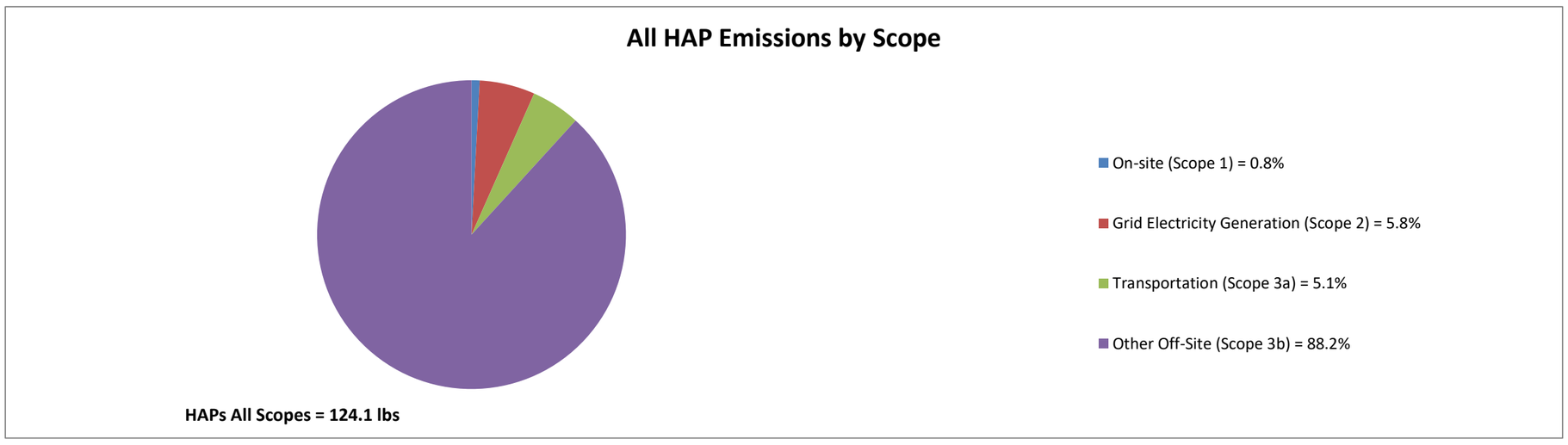
Excavation and Backfill = 100%
SVI Evaluation = 0%
0 = 0%
0 = 0%
= 0%
= 0%

PM All Components = 15311.2 lbs
PM All Scopes = 15311.2 lbs

On-site (Scope 1) = 1.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.3%
Other Off-Site (Scope 3b) = 98.1%


All HAPs Emissions by Remedy Component and Scope
(in Lbs)
140
120
100
80
60
40
20
0
Excavation and Backfill
SVI Evaluation
0
0
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
HAPs All Components = 124.1 lbs


All HAP Emissions by Remedy Component
Excavation and Backfill = 95.8%
SVI Evaluation = 4.2%
0 = 0%
0 = 0%
= 0%
= 0%
HAPs All Components = 124.1 lbs


All HAP Emissions by Scope
On-site (Scope 1) = 0.8%
Grid Electricity Generation (Scope 2) = 5.8%
Transportation (Scope 3a) = 5.1%
Other Off-Site (Scope 3b) = 88.2%
HAPs All Scopes = 124.1 lbs

HAPs lbs							
	Excavation and Backfill	SVI Evaluation		0	0		Total
On-site (Scope 1)	1.1	0.0	0.0	0.0	0.0	0.0	1.1
Grid Electricity Generation (Scope 2)	7.2	0.0	0.0	0.0	0.0	0.0	7.2
Transportation (Scope 3a)	6.3	0.0	0.0	0.0	0.0	0.0	6.4
Other Off-Site (Scope 3b)	104.3	5.2	0.0	0.0	0.0	0.0	109.5
Total	118.8	5.2	0.0	0.0	0.0	0.0	124.1

Excavation and Backfill = 95.8%
SVI Evaluation = 4.2%
0 = 0%
0 = 0%
 = 0%
 = 0%

HAPs All Components = 124.1 lbs
HAPs All Scopes = 124.1 lbs

On-site (Scope 1) = 0.8%
Grid Electricity Generation (Scope 2) = 5.8%
Transportation (Scope 3a) = 5.1%
Other Off-Site (Scope 3b) = 88.2%

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
4001 4th Avenue Redevelopment - Track 1 Remedy - 4001 4th Avenue

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	0	0					Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																			
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
On-Site																						
On-site Renewable Energy																						
Renewable electricity generated on-site	MWh							0	0	0	0					0	0	0	0	0	0	0
Landfill gas combusted on-site for energy use	ccf CH_4							0	0	0	0					0	0	0	0	0	0	0
On-site biodiesel use	gal							0	0	0	0					0	0	0	0	0	0	0
On-site biodiesel use - Other	gal							0	0	0	0					0	0	0	0	0	0	0
User-defined on-site renewable energy use #1	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD							0	0	0	0					0	0	0	0	0	0	0
On-Site Conventional Energy																						
Grid electricity	MWh							34.22736	0	0	0					34.22736	0	0	0	0	0	34.22736
On-site diesel use - Other	Gal							0	0	0	0					0	0	0	0	0	0	0
On-site diesel use <75 hp	Gal							0	0	0	0					0	0	0	0	0	0	0
On-site diesel use 75<hp<750	Gal							26331.429	0	0	0					26331.429	0	0	0	0	0	26331.429
On-site diesel use >750 hp	Gal							0	0	0	0					0	0	0	0	0	0	0
On-site gasoline use - Other	Gal							0	0	0	0					0	0	0	0	0	0	0
On-site gasoline use <25 hp	Gal							0	0	0	0					0	0	0	0	0	0	0
On-site gasoline use >25 hp	Gal							0	0	0	0					0	0	0	0	0	0	0
On-site natural gas use	ccf							0	0	0	0					0	0	0	0	0	0	0
On-site compressed natural gas use - Other	ccf							0	0	0	0					0	0	0	0	0	0	0
On-site compressed natural gas use	ccf							0	0	0	0					0	0	0	0	0	0	0
On-site liquified petroleum gas use - Other	gal							0	0	0	0					0	0	0	0	0	0	0
On-site liquified petroleum gas use	gal							0	0	0	0					0	0	0	0	0	0	0
Other forms of on-site conventional energy use #1	TBD							0	0	0	0					0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD							0	0	0	0					0	0	0	0	0	0	0
Other On-site Emissions																						
On-site HAP process emissions	Lbs							0	0	0	0					0	0	0	0	0	0	0
On-site GHG emissions	Lbs CO2e							0	0	0	0					0	0	0	0	0	0	0
On-site carbon storage	Lbs CO2e							0	0	0	0					0	0	0	0	0	0	0
GHG avoided by flaring on-site landfill methane	ccf CH4							0	0	0	0					0	0	0	0	0	0	0
Other on-site NOx emissions or reductions	Lbs							0	0	0	0					0	0	0	0	0	0	0
Other on-site SOx emissions or reductions	Lbs							0	0	0	0					0	0	0	0	0	0	0
Other on-site PM emissions or reductions	Lbs							0	0	0	0					0	0	0	0	0	0	0
Electricity Generation																						
Grid electricity	MWh							34.22736	0	0	0					34.22736	0	0	0	0	0	34.22736
Voluntary purchase of renewable electricity	MWh							0	0	0	0					0	0	0	0	0	0	0
Voluntary purchase of RECs	MWh							0	0	0	0					0	0	0	0	0	0	0
Transportation																						
Transportation Fuel Use Breakdown																						
Biodiesel use - Personnel Transport	gal							0	0	0	0					0	0	0	0	0	0	0
Biodiesel use - Personnel Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Biodiesel use - Equipment Transport	gal							0	0	0	0					0	0	0	0	0	0	0
Biodiesel use - Equipment Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Biodiesel use - Material Transport	gal							0	0	0	0					0	0	0	0	0	0	0
Biodiesel use - Material Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Biodiesel use - Waste Transport	gal							0	0	0	0					0	0	0	0	0	0	0
Biodiesel use - Waste Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel use - Personnel Transport - other vehicles	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel use - Personnel Transport - car	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel use - Personnel Transport - passenger truck	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel use - Personnel Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel use - Equipment Transport	gal							3.9	0	0	0					3.9	0	0	0	0	0	3.9
Diesel use - Equipment Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel use - Material Transport	gal							7576.667	0	0	0					7576.667	0	0	0	0	0	7576.667
Diesel use - Material Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel use - Waste Transport	gal							6998.3	0	0	0					6998.3	0	0	0	0	0	6998.3
Diesel use - Waste Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Gasoline use - Personnel Transport - other vehicles	gal							0	0	0	0					0	0	0	0	0	0	0
Gasoline use - Personnel Transport - car	gal							251.7	6.9	0	0					251.7	6.9	0	0	0	0	258.6
Gasoline use - Personnel Transport - passenger truck	gal							687.8	0	0	0					687.8	0	0	0	0	0	687.8
Gasoline use - Personnel Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Gasoline use - Equipment Transport	gal							0	0	0	0					0	0	0	0	0	0	0
Gasoline use - Equipment Transport - User Defined	gal							0	0	0	0					0	0	0	0	0	0	0
Natural Gas use - Personnel Transport	ccf							0	0	0	0					0	0	0	0	0	0	0
Natural Gas use - Personnel Transport - User Defined	ccf							0	0	0	0					0	0	0	0	0	0	0
Natural Gas use - Equipment Transport	ccf							0	0	0	0					0	0	0	0	0	0	0

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
4001 4th Avenue Redevelopment - Track 1 Remedy - 4001 4th Avenue

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	0	0					Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																			
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Conventional Energy																						
Transportation diesel use	gal							14578.867	0	0	0					14578.867	0	0	0	0	0	14578.867
Transportation gasoline use	gal							939.5	6.9	0	0					939.5	6.9	0	0	0	0	946.4
Transportation natural gas use	ccf							0	0	0	0					0	0	0	0	0	0	0
User-defined conventional energy transportation #1	TBD							10	10	10	10					10	10	0	0	0	0	20
User-defined conventional energy transportation #2	TBD							0	0	0	0					0	0	0	0	0	0	0
Renewable Energy																						
Transportation biodiesel use	gal							0	0	0	0					0	0	0	0	0	0	0
User-defined renewable energy transportation #1	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined renewable energy transportation #2	TBD							0	0	0	0					0	0	0	0	0	0	0
Off-Site																						
Construction Materials																						
Aluminum, Rolled Sheet	lb							0	0	0	0					0	0	0	0	0	0	0
Asphalt, mastic	lb							0	0	0	0					0	0	0	0	0	0	0
Asphalt, paving-grade	lb							0	0	0	0					0	0	0	0	0	0	0
Ethanol, Corn, 95%	lb							0	0	0	0					0	0	0	0	0	0	0
Ethanol, Corn, 99.7%	lb							0	0	0	0					0	0	0	0	0	0	0
Ethanol, Petroleum, 99.7%	lb							0	0	0	0					0	0	0	0	0	0	0
Gravel/Sand Mix, 65% Gravel	lb							0	0	0	0					0	0	0	0	0	0	0
Gravel/sand/clay	lb							0	0	0	0					0	0	0	0	0	0	0
HDPE	lb							0	0	0	0					0	0	0	0	0	0	0
Photovoltaic system (installed)	W							0	0	0	0					0	0	0	0	0	0	0
PVC	lb							0	0	0	0					0	0	0	0	0	0	0
Portland cement, US average	lb							11550000	0	0	0											
Ready-mixed concrete, 20 MPa	ft3							0	0	0	0					0	0	0	0	0	0	0
Round Gravel	lb							595000	0	0	0					595000	0	0	0	0	0	595000
Sand	lb							0	0	0	0					0	0	0	0	0	0	0
Stainless Steel	lb							0	0	0	0					0	0	0	0	0	0	0
Steel	lb							0	0	0	0					0	0	0	0	0	0	0
Other refined construction materials	lb							0	0	0	0					0	0	0	0	0	0	0
Other unrefined construction materials	lb							0	0	0	0					0	0	0	0	0	0	0
Treatment Materials & Chemicals																						
Cheese Whey	lbs							0	0	0	0					0	0	0	0	0	0	0
Emulsified vegetable oil	lbs							0	0	0	0					0	0	0	0	0	0	0
Granular activated carbon, primary	lbs							0	0	0	0					0	0	0	0	0	0	0
Granular activated carbon, regenerated	lbs							0	0	0	0					0	0	0	0	0	0	0
Hydrogen Peroxide, 50% in H2O	lbs							0	0	0	0					0	0	0	0	0	0	0
Iron (II) Sulfate	lbs							0	0	0	0					0	0	0	0	0	0	0
Lime, Hydrated, Packed	lbs							0	0	0	0					0	0	0	0	0	0	0
Molasses	lbs							0	0	0	0					0	0	0	0	0	0	0
Phosphoric Acid, 70% in H2O	lbs							0	0	0	0					0	0	0	0	0	0	0
Potassium Permanganate	lbs							0	0	0	0					0	0	0	0	0	0	0
Sodium Hydroxide, 50% in H2O	lbs							0	0	0	0					0	0	0	0	0	0	0
Other Treatment Chemicals & Materials	lbs							0	0	0	0					0	0	0	0	0	0	0
Material Type																						
Total Virgin Refined Materials	tons							6072.5	0	0	0					6072.5	0	0	0	0	0	6072.5
Total Recycled Refined Materials	tons							0	0	0	0					0	0	0	0	0	0	0
Total Reused Refined Materials	tons							0	0	0	0					0	0	0	0	0	0	0
Total Refined Material	tons							6072.5	0	0	0					6072.5	0	0	0	0	0	6072.5
Total Virgin Unrefined Materials	tons							0	0	0	0					0	0	0	0	0	0	0
Total Recycled Unrefined Materials	tons							0	0	0	0					0	0	0	0	0	0	0
Total Reused Unrefined Materials	tons							0	0	0	0					0	0	0	0	0	0	0
Total Unrefined Material	tons							0	0	0	0					0	0	0	0	0	0	0
Fuel Processing																						
Biodiesel produced	gal							0	0	0	0					0	0	0	0	0	0	0
Diesel produced	gal							40910.296	0	0	0					40910.296	0	0	0	0	0	40910.296
Gasoline produced	gal							939.5	6.9	0	0					939.5	6.9	0	0	0	0	946.4
Compressed natural gas produced	ccf							0	0	0	0					0	0	0	0	0	0	0
Liquified petroleum gas produced	gal							0	0	0	0					0	0	0	0	0	0	0
Natural gas produced	ccf							0	0	0	0					0	0	0	0	0	0	0
Water Use																						
Public Water Supply	gal x 1000							36.9	0	0	0					36.9	0	0	0	0	0	36.9
Extracted Groundwater	gal x 1000							500	0	0	0					500	0	0	0	0	0	500
Surface Water	gal x 1000							0	0	0	0					0	0	0	0	0	0	0
Reclaimed Water	gal x 1000							0	0	0	0					0	0	0	0	0	0	0
Collected/Diverted Storm Water	gal x 1000							0	0	0	0					0	0	0	0	0	0	0
User-defined water resource #1	gal x 1000							0	0	0	0					0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000							0	0	0	0					0	0	0	0	0	0	0

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
4001 4th Avenue Redevelopment - Track 1 Remedy - 4001 4th Avenue

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	0	0					Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																			
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Waste/Recycle Handling																						
Hazardous waste incineration	lbs							0	0	0	0					0	0	0	0	0	0	0
Off-site waste water treatment (POTW)	gal x 1000							0	0	0	0					0	0	0	0	0	0	0
Off-site non-hazardous waste landfill	tons							37330	0	0	0					37330	0	0	0	0	0	37330
Off-site hazardous waste landfill	tons							0	0	0	0					0	0	0	0	0	0	0
Recycled/Reused On-Site	tons							0	0	0	0					0	0	0	0	0	0	0
Recycled/Reused Off-Site	tons							0	0	0	0					0	0	0	0	0	0	0
Solid Waste Totals																						
Total Non-Hazardous Waste	tons							37330	0	0	0					37330	0	0	0	0	0	37330
Total Hazardous Waste	tons							0	0	0	0					0	0	0	0	0	0	0
Total Recycled/Reused	tons							0	0	0	0					0	0	0	0	0	0	0
Total Waste (all types)	tons							37330	0	0	0					37330	0	0	0	0	0	37330
Lab Services																						
Off-site Laboratory Analysis - Other	sample							45	45	0	0					45	45	0	0	0	0	90
Off-site Laboratory Analysis - Metals	sample							15	15	0	0					15	15	0	0	0	0	30
Off-site Laboratory Analysis - Mercury	sample							0	0	0	0					0	0	0	0	0	0	0
Off-site Laboratory Analysis - Inorganic Anions	sample							0	0	0	0					0	0	0	0	0	0	0
Off-site Laboratory Analysis - Alkalinity	sample							0	0	0	0					0	0	0	0	0	0	0
Off-site Laboratory Analysis - Perchlorate	sample							0	0	0	0					0	0	0	0	0	0	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample							0	0	0	0					0	0	0	0	0	0	0
Off-site Laboratory Analysis - Sulfate	sample							0	0	0	0					0	0	0	0	0	0	0
Off-site Laboratory Analysis - PCBs	sample							15	15	0	0					15	15	0	0	0	0	30
Off-site Laboratory Analysis - VOCs	sample							15	15	0	0					15	15	0	0	0	0	30
Off-site Laboratory Analysis - SVOCs	sample							15	15	0	0					15	15	0	0	0	0	30
Resource Extraction for Electricity																						
Coal extraction and processing	MWh							10.439345	0							10.439345	0	0	0	0	0	10.439345
Natural gas extraction and processing	MWh							11.603075	0							11.603075	0	0	0	0	0	11.603075
Nuclear fuel extraction and processing	MWh							6.7770173	0							6.7770173	0	0	0	0	0	6.7770173
Oil extraction and processing	MWh							0.2395915	0							0.2395915	0	0	0	0	0	0.2395915
Other fuel extraction and processing	MWh							0.0342274	0							0.0342274	0	0	0	0	0	0.0342274
Electricity Transmission																						
Transmission and distribution losses	MWh							34.22736	0	0	0					34.22736	0	0	0	0	0	34.22736

Input Summary

Remedy Component Number →			2	3	4	5	6	1	2	0	0					Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																			
Item		Input Template	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Other																						
User-defined material #1	ton							0	0	0	0					0	0	0	0	0	0	0
User-defined material #2	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #3	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #4	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #5	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #6	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #7	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #8	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #9	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #10	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #11	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #12	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #13	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #14	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #15	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #16	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #17	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #18	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #19	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined material #20	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined Waste Destinations																						
User-defined recycled/reused on-site #1	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined recycled/reused on-site #2	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined non-hazardous waste destination #1	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD							0	0	0	0					0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD							0	0	0	0					0	0	0	0	0	0	0

All - Energy & Air Compiled Results

Category	Total Energy	GHG	NOx	SOx	PM	NOx + SOx + PM	HAPs
	MMbtus	lbs CO2e	lbs	lbs	lbs	lbs	lbs
On-site (Scope 1)	**3,777**	**585,611**	**2,659**	**3**	**237**	**2,900**	**1**
Grid Electricity Generation (Scope 2)	**237.161**	**38,482**	**77**	**158**	**2**	**236**	**7**
Transportation (Scope 3a)	**2,144**	**346,749**	**2,509**	**79**	**52**	**2,641**	**6**
Other Off-Site (Scope 3b)	**6,820**	**1,068,412**	**5,503**	**3,312**	**15,020**	**23,835**	**109**
Remedy Totals	**12,978**	**2,039,253**	**10,749**	**3,552**	**15,311**	**29,612**	**123**

Values that are forwarded to the "Summary" tab are indicated in orange.

Voluntary Renewable Energy Use	Unit	Quantity
On-site renewable energy generation or use	MMBtu	**0**
On-site biodiesel use	MMBtu	**0**
Biodiesel and other renewable resource use for transportation	MMBtu	**0**
On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	**0**
Voluntary purchase of renewable electricity	MWh	**0**
Voluntary purchase of RECs	MWh	**0**

(This value is the sum of the three rows above)

This worksheet is not intended for user input. Values on this worksheet are obtained from the following file: SEFA_calculations_(121718).xlsx

APPENDIX H
Project Personnel Resumes



JAMES BELLEW

Principal

EDUCATION

M.S., Environmental Geology, Queens College
B.S., Geology, Pre-Law, Environmental Science, Binghamton University

PROFESSIONAL SOCIETIES

American Council of Engineering Companies, Member, 2017
Urban Land Institute, Member, 2016
Business Council of New York, Member, 2018

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
30-Hour OSHA Construction Safety and Heath
8-hour OSHA Site Supervisor Certification
OSHA Confined Space Entry Training Certification
Erosion and Sediment Control, New York, No. 006925
USDOT/IATA Training on the Shipping and/or Transportation of Hazardous Materials

James has a hands-on approach to every project. He believes that being present and putting himself into his clients' shoes is the best way to understand their needs. As a Principal, James's expertise includes due diligence, environmental risk development, building surveys, remedial investigations, remedial design, and technical oversight. Mr. Bellew has completed over 50 NYCOER E-Designation Sites and NYSDEC Brownfield Cleanup Program Sites which include preparation of all reports through to the certificate of completion and a certificate of occupancy.

Clients appreciate James' strategies from the inception of a project through closure under various regulatory programs nationwide. That comprehensive approach is what James loves the most about his job. He enjoys taking on complex projects and finding rational, cost-effective, remedial solutions. His biggest reward? When he can bring a client cost relief through value engineering.

RELEVANT PROJECT EXPERIENCE

Development, NYCDDC Shirley Chisholm Recreational Center, Brooklyn, New York. Principal for the project released by the New York City Department of Design and Construction, on behalf of the NYC Parks Department, for the design and construction of a new recreational center located at 3002 Foster Avenue in Brooklyn New York. Scope of services included execution of a Phase II Environmental Site Assessment, soil characterization, remedial oversight, geotechnical percolation testing and closure with the NYC Department of Environmental Protection.

Development's, New York State Superfund Site, Former NuHart Plastics Site, New York State Superfund Site (NuHart West) and Brownfield Cleanup Program Site (NuHart East), Brooklyn, New York. Principal for the preparation of the feasibility study, offsite investigation reports, RCRA (Resource Conservation and Recovery Act) Closure Work Plan, execution of the RCRA Closure, preparation of the Brownfield Cleanup Application (NuHart East), 100% Remedial Design, preparation of all BCP related work plans (NuHart East), coordination to vest the Site for 421-a and all community outreach programs for a former plasticizer facility with on- and off-site pollutant concerns. Responsible for all remedial cost and alternative analysis with the client to bring the Site to a certificate of completion. NuHart is a high-profile Site that requires coordination with the New York State Department of Environmental Conservation (NYSDEC), the New York City Office of Environmental Remediation (NYCOER), local regulatory agencies, community stakeholders and local elected officials. The NuHart East Site has completed the remediation and received the Certificate of Completion with the NYSDEC and the NuHart West Site is close to completion with an anticipated 2024 transition from a Class 2 to a Class 4 Inactive Hazardous waste Site.

Development's, 101 Fleet Place, Brooklyn, New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for a former bus depot Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air/Noise). The Site has a footprint of 20,000 SF with a planned development of a 21-story mixed use building with approximately 292 units which include affordable housing.

Development's, Speedway Portfolio, Multiple Boroughs, New York. Principal responsible for the expedited due diligence during acquisition of 5 former Speedway Sites of Phase I ESA's and Limited Phase II ESI's, preparation of the Brownfield Cleanup Program Applications, Remedial Investigation Work Plans, Interim Remedial Measure Work Plans and Air/Noise Remedial Action Work Plans (NYCOER). Five of the Sites were accepted into the NYSDEC Brownfield Cleanup program. Remedial Investigations for compliance with the Brownfield Cleanup Program have been completed and the remedial design on the Sites include a variety of remedial approaches which include in situ chemical treatment for groundwater, soil vapor extraction, excavation and dewatering removal and treatment.

Development, 138 Bruckner Boulevard, Bronx, New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, coordination to vest the Site for 421-a, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for the former Zaro's Bakery Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air/Noise). The Site has a footprint of 50,000 SF with a planned development of a 12-story mixed use building with approximately 447 units which include affordable housing.

Development, 310 Grand Concourse, Bronx, New York. Principal responsible for environmental and construction management services required to successfully navigate this two-building redevelopment project through the NYSDEC Brownfield Cleanup Program (BCP) and NYCOER E-Designation Program (Air/Noise). Project included site investigation, design, and remediation for development of two buildings within a 30,000 square-foot lot in the Bronx, New York. Remediation included excavation of approximately 20,000 cubic yards of soil, groundwater extraction and treatment, underground storage tank (UST) removal, design, and installation an ex-situ chemical in situ soil stabilization process for elevated levels of metals.

Development, 40 Bruckner Boulevard, Bronx, New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for the former Mill Sanitary Wiping Cloth Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air/Noise). The Site has a footprint of 45,000 SF with a planned development of a 12-story mixed use building with approximately 480 units which include affordable housing.

Development, 297 Wallabout Street, Brooklyn New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for the 297 Wallabout Street Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air). Successfully delineated the onsite tetrachloroethene (PCE) plume in soil and groundwater. The Site is currently in the remedial implementation phase.

Developments, 89-91 Gerry & 93 Gerry Street, Brooklyn New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for two Sites (adjacent to each other) located at 89-91 Gerry Street and 93 Gerry Street under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air). The Sites are currently preparing to execute the remedial action.

Development, Former Techtronics Site (8 Walworth Street), Brooklyn, New York. Principal for the remedial investigation, remedial action design and remedial action implementation for the former Techtronics Site under the New York State Brownfield Cleanup program as a Participant where trichloroethene (TCE) and tetrachloroethene (PCE)

were encountered in soil and groundwater. James successfully delineated the vertical and lateral extents of the plumes which were identified as an upgradient, on-site. For this Site we have designed source removal to 20'bgs, Zero Valent Iron (ZVI) Reactive Barrier Wall, in situ ZVI injections sitewide and a vertical vapor mitigation system. The Site is currently in the remedial implementation phase.

Development, 346 Grand Concourse, Bronx, New York. Principal for the proposed 9-story, 60 key commercial building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise) and the Final Installation Report for the Certificate of Occupancy.

Development, 3294 Atlantic Avenue, Brooklyn, New York. Principal for the proposed 12-story, 80 key commercial building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise) and the Final Installation Report for the Certificate of Occupancy.

590-594 Myrtle Avenue, Brooklyn, New York. Principal for the proposed 6-story, 12-unit residential building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise) and the Final Installation Report for the Certificate of Occupancy.

Development, 3530 Webster Avenue, Bronx, New York. Principal for the proposed 8-story, 75 key commercial building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise). The project is currently in the construction phase of the NYCOER program.

Development, Former BP Station, Elmhurst Queens, New York. Principal for the preparation of a full environmental impact statement with respect to a mixed-use development proposed in Elmhurst Queens for submission to the NYC Department of City Planning to rezone the project. The work included a full impact assessment of the proposed construction with respect to the neighborhood, evaluation of green/open spaces for the community and environmental site investigation and remediation services.

New York State Brownfield Site, Former Delta Metals Site, Brooklyn, New York. Senior Project manager for the remedial investigation and remedial action design for the former Delta Metal Products Company. Project is under the New York State Brownfield Cleanup program as a Participant where TCE and tetrachloroethene (PCE) were encountered in soil and groundwater. James successfully delineated the vertical and lateral extents of the plumes which were identified as an upgradient, on-site and downgradient plume. Investigation results triggered the NYSDEC to utilize its call-out contract to perform a plume track down for the immediate area and identify additional Potentially Responsible Parties. The design for an Air Sparge Soil Vapor Extraction system has been accepted and the project is currently under construction.

Manufacturing-Industrial, Hess Amerada, Bogota and Edgewater, New Jersey. Senior Project Manager and technical Lead for the construction management services for the demolition of two waterfront terminals on the Hackensack and Hudson rivers. Services included demolition design, submittal review, site execution and coordination of activities

related to asbestos abatement, demolition of buildings, thirty holding tanks, piping structures, containment structures and storm water structures.

Manufacturing-Industrial, PQ Corporation, Northeastern United States. Senior Project Manager responsible for the design and implementation of a three phased program for handling polychlorinated biphenyl (PCB) containing materials on approximately 100 tank structures at large, active industrial sites, which included coating removal, encapsulation, demolition, and Toxic Substances Control Act (TSCA) remediation. He was responsible for development of the overall program, specifications, drawings, bid packages, construction oversight and project administration until closure. The program also included design and oversight of a new façade and roof upgrades completed concurrently to client operations.

Development, New York State Brownfield Site, Former Cascade Laundry, Brooklyn, New York. Senior Project Manager responsible for environmental and construction management services required to successfully navigate a seven-building redevelopment project through the NYSDEC Brownfield Cleanup Program (BCP) and NYCOER E-Designation Program (Air/Noise). Project included site investigation, design, and remediation for development of seven buildings within a 2-acre site in Brooklyn, New York. Remediation included excavation of approximately 40,000 cubic yards of soil, groundwater extraction and treatment, underground storage tank (UST) removal, design, and installation of a sub slab depressurization system (SSDS) and ex situ chemical oxidation of groundwater impacted by petroleum.

Development, New York City Brownfield Site - 520-534 West 29th Street, New York, New York. James was responsible for environmental site investigation and remediation activities required to successfully navigate the project through the NYCOER's E-Designation and Voluntary Cleanup Programs. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise). The project is currently in the construction phase of the NYCOER program.

Development, New York State Brownfield Site, BJ's Wholesale, Brooklyn, New York. Senior Project Manager for the remedial execution within the NYSDEC BCP and NYCOER E-Designation programs at an 8-acre peninsula in Gravesend Bay being redeveloped by BJ's Wholesale Club (BJ's) into a "big-box" warehouse and parking garage, and a publicly accessible, waterfront open space. He implemented a comprehensive community air monitoring plan (CAMP), managed the design and installation of a passive sub slab depressurization system, and oversaw handling and off-site disposal of impacted material generated by BJ's (the Lessee for the subject site) during their foundation construction activities.

Development, New York State Brownfield Site, Coney Island, Brooklyn, New York. Senior Project Manager responsible for the environmental design during the rehabilitation and expansion of a 1970s-era mixed-use complex, which covers an area equivalent to three city blocks. He facilitated the BCP applications for two adjacent parcels within the complex impacted by historic dry-cleaning uses. Site investigations performed had documented the presence of PCE in soil gas and was delineated over three separate structural slabs in commercial and residential space utilizing a mobile laboratory. He designed and installed two sub-slab depressurization systems and prepared Remedial Investigation Work Plan which outlined work required to delineate the vertical and horizontal extent of the impacted soils, soil vapor and groundwater at both BCP sites. The system was designed with below slab suction pits, remote sensing vacuum monitoring points, and a variable frequency drive blower tied into the monitoring points for optimization and power savings.

Development, New York City Brownfield Site, Hospitals, Memorial Sloan Kettering Cancer Center (MSKCC), New York, New York. Project Manager for environmental remediation for this MSKCC development project. James was solely responsible for subsurface investigation and remediation activities, large, manufactured gas plant (MGP) gas holder removal (from former Con Edison Operations), UST removal, daily status updates to the NYCOER, implementation of the CAMP and the management, handling, characterization, and off-site disposal of MGP impacted soil and dewatering fluids.

New York State Spill Remediation, Metropolitan Transportation Agency Bridges and Tunnels, New York, New York. Project Manager responsible for execution of a remedial action scope which included UST removal, excavation of 600 cubic yards of petroleum impacted soil, design and installation of a groundwater extraction and treatment system and post remediation samples. He implemented the In Situ Chemical Oxidation program for the injection of 54,000 gallons of 8 percent solution Fenton's Reagent and the O&M (Operation & Maintenance) of the petroleum spill with respect to Fenton's performance and the plume migration.

Various Public Schools, New York City School Construction Authority, New York, New York. Project Manager responsible for environmental remediation proposed several school developments sites, including PS 312, P.S. 281, and PS 27K. Assisted in the design and implementation of the remediation programs for the sites for petroleum spills, PCB TSCA contamination and hazardous lead hot spots.

Development, i.Park Edgewater, Edgewater, New Jersey. Project Manager responsible for the design and environmental remediation on-site. Implemented the construction plan for remediation of arsenic, pitch- and PCB-impacted soil for excavation and off-site disposal of 20,000 tons. He managed the air monitoring system on-site which consisted of four permanent stations set upwind and downwind on-site for volatile organic compounds (VOCs) and particulate migration off-site. Also, James performed redesigns throughout the project to keep within the current schedule and budget.

Development, New York State Brownfield, Queens West, Long Island City, New York. Project Manager responsible for oversight of the Environmental Remediation on-site. James implemented the construction plan for remediation of 20,000 cubic yards of LNAPL on the Site; he assisted in design and oversight of the In Situ Chemical Oxidation mixing on-site. The project was eventually developed into three large towers and a new school.

Manufactured Gas Plant, National Grid, Rockaway, New York. James aided in the design and implementation of the soil characterization plan for MGP impacted sands. After delineation of the contamination plume, drafted work plans and site layout of the negative pressure tent. He performed and trained the on-site staff on the use of personal air monitoring equipment and aided with design considerations on the installation of a waterloo barrier to be advanced to minus 80 feet below grade surface. James also helped with the design and permitting for the groundwater treatment system installed on-site.

Manufactured Gas Plant, Con Edison, New York, New York. Environmental engineer for responsible party for all environmental issues associated with this job, including transportation and disposal of 8,000 tons of MGP contaminated soil from former Con Edison operations. James scheduled weekly work for all civil and environmental tasks on the job. He was responsible for the design and installation of the dewatering treatment system with a daily discharge of 25,000 gallons per day of MGP -impacted water.

New York State Superfund Project, NYSDEC, Hicksville, New York. James performed O&M and reporting on the Site's Potassium Permanganate Injection system, which was on a timed system; maintained the system, troubleshooting problems and ensuring that the proper ratios were being injected. He performed the fieldwork for analysis and drafted interim reports for the project manager.

Retail Petroleum, New York State Spills Program, Hess Amerada, Various Locations, New York. Environmental Engineer responsible for the design and installation of groundwater and soil vapor remedial systems at over 30 retail petroleum stations for Hess. Responsible for ensuring that the remedial systems were operating properly and performing repairs as necessary during operation. He performed groundwater and soil vapor monitoring and drafted O&M reports for the NYSDEC. Plume size ranged from within the retail station property with monitoring off-site impacts in local neighborhoods greater than a 3-mile radius.

Retail Petroleum, New York State Spills Program, British Petroleum (BP), Various Locations, New York. Environmental Engineer responsible for the design and installation of groundwater and soil vapor remedial systems at over 10 retail petroleum stations for BP. He was responsible for ensuring that the remedial systems were operating properly and performing repairs necessary during operation. He performed groundwater and soil vapor monitoring

and drafted O&M reports for the NYSDEC. Plume size ranged from within the retail station property with monitoring off-site impacts in local neighborhoods greater than a 2-mile radius.

Development, 524 West 19th Street, New York, NY (Metal Shutter Homes). Project Engineer responsible party for all environmental and civil issues associated with this job, including transportation and disposal of 5,000 tons of MGP contaminated soil from former Con Edison operations. James scheduled weekly work for all civil and environmental tasks on the job. He successfully redesigned the grout cutoff wall connections to the installed steel sheeting with a secant wall installed off-site. He provided technical guidance for drilling 4-foot diameter exploratory casings for subsurface anomalies. Additionally, James was responsible for the design and installation of the dewatering treatment system with a daily discharge of 25,000 gallons per day of MGP impacted water.

EPA Superfund Site, Newtown Creek Superfund, Brooklyn, New York. Environmental Engineer who aided in the design of the pump and treat system installed at Peerless Importers. He also aided in the design and installation of the harbor boom set up. Operated and Maintained groundwater/LNAPL extraction systems on-site and performed monthly site gauging as part of the O&M plan.

MARI C. CONLON

Project Manager

EDUCATION

M.S., Geology, Boston College
B.S., Geology with a minor in Economics and Business, Lafayette College

PROFESSIONAL REGISTRATIONS

NY: Professional Geologist (License No. 000769)

PROFESSIONAL SOCIETIES

Big Apple Brownfield Awards, Co-Chair, 2018-2019
Big Apple Brownfield Awards Nomination Committee, 2016-2017

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
10-Hour OSHA Construction Safety
8-Hour OSHA Supervisor of Hazardous Waste (29 CFR 1910.120 & 29 CFR 1926.65)

Mari is a project manager with experience in soil, groundwater and soil vapor investigation and a focus on remedial design and implementation, and will focus her time at Haley & Aldrich serving the environmental and real estate markets. She is also experienced in completion of numerous Phase I Environmental Site Assessments and Phase II Environmental Site Investigations, site characterization, hazardous materials analysis, regulatory closure reports as well as remedial design and implementation.

Mari has experience in composing site closure documentation including Remedial Closure Reports and Noise Installation Reports reviewed by the Office of Environmental Remediation as well as Final Engineering Reports reviewed by the New York State Department of Environmental Conservation. Her background includes developing and complying with approved site management plans overseeing the operation and maintenance of on-site engineering controls and ensuring the protection of human health and the environment.

Mari has also worked on city rezoning proposals by performing work associated with and composing the Hazardous Materials Analysis chapter included in Final Environmental Impact Statements published by New York City Department of Planning. Analysis methods were performed in accordance with the City Environmental Quality Review (CEQR) guidelines for neighborhoods including East New York, Brooklyn, Jerome Avenue, Brooklyn, Inwood, and Manhattan.

RELEVANT PROJECT EXPERIENCE

State and City Agencies

School Construction Authority, Waste Characterization and Excavation Materials Disposal Plan, Brooklyn, New York. Project manager for consulting services for New York Public School 127. Services included composition of an Excavated Materials Disposal Plan, collection of waste characterization samples and preparation of and preparation of a findings and recommendations report.

Department of City Planning, Rezoning Environmental Impact Statement, Bronx, New York. Project lead for analysis and composing the Hazardous Materials Chapter as per City Environmental Quality Review (CEQR) Technical Manual guidelines included in the Final Environmental Impact Statement (FEIS) for an approximately 92-block area primarily along Jerome Avenue and its east-west commercial corridors in the Bronx. The review assessed the potential for the presence of hazardous materials in soil and/or groundwater at both the projected and potential development sites identified in the reasonable worst-case development scenario under the proposed East New York Rezoning Proposal. Procedures involved site inspections and review of historic Sanborn fire insurance maps, city directories and city/state regulatory databases. The assessment identified that each of the 146 projected and potential development sites has

some associated concern regarding environmental conditions. As a result, the proposed zoning map actions include (E) designations (E-366) for all privately-held projected and potential development sites.

Department of City Planning, Rezoning Environmental Impact Statement, Brooklyn, New York. Project lead for performance analysis and composing the Hazardous Materials Chapter as per CEQR Technical Manual guidelines included in the FEIS for an approximately 190-block area of East New York, Cypress Hills, and Ocean Hill neighborhoods of Brooklyn, New York. The review assessed the potential for the presence of hazardous materials in soil and/or groundwater at both the projected and potential development sites identified in the reasonable worst-case development scenario under the proposed East New York Rezoning Proposal. Procedures involved site inspections and review of historic Sanborn fire insurance maps, city directories and city/state regulatory databases. The assessment identified that each of the 186 projected and potential development sites has some associated concern regarding environmental conditions. As a result, the proposed zoning map actions include (E) designations (E-366) for all privately-held projected and potential development sites.

Redevelopment and Remediation

Titan Equity Group, Hotel Redevelopment, Bronx, New York. Project manager for a hotel redevelopment in the south Bronx. The site has been assigned New York City Office of Environmental Remediation (NYC OER) E-Designation status for hazardous materials, noise and air quality. Services included completion of a remedial investigation, composition of a Remedial Investigation Report and development of Hazardous Material Remedial Action Work Plan and Air Quality/Noise Remedial Action Plan as per NYC OER requirements.

The Related Companies, Chelsea Mixed-Use Redevelopment, New York, New York. Field geologist for oversight of the remediation of a mixed-use residential and commercial building, the second of a two-building development on 30th Street. Contaminants of concern included volatile and semi-volatile organic compounds associated with historic operations and underground storage tanks (USTs) located on the Site. The Site was given an E-designation (E-142) for hazardous materials and noise as part of the Highline/West Chelsea rezoning proposal. To satisfy the requirements of the E-designation program, soil was excavated to at least 12 feet below grade and bottom endpoint collected showing no contaminants of concern exceeding the New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives (SCO). By achieving Unrestricted Use SCOs, no engineering controls were necessary, although the building slab was included as part of development, and removal of the hazardous materials E-designation was requested.

Tishman Speyer, Long Island City Residential Development, Long Island City, New York. Field geologist for remedial oversight and implementation of a Community Air Monitoring Program during concurrent remediation and development of three Brownfield Cleanup Program (BCP) sites located in Long Island City, New York. The Sites were grossly contaminated with creosote, a carcinogenic chemical formed from the distillation of various tars. Remediation strategies included soil excavation and in-situ soil stabilization. To prevent migration of groundwater off-site, a temporary and later a permanent capture well system was installed on the western boundary of the property. The BCP site located on the western portion of the property left residual contamination in place requiring installation of a sub-slab depressurization system.

Queens West Development Corporation, Queens Waterfront Development, Long Island City, New York. Field geologist for performance of site management post remedial action. Services included annual groundwater monitoring, evaluation of engineering and institutional controls completion and Period Review Reports. In addition to conducting annual site management activities, responsibilities included composing a work plan to evaluate the transition from active sub-slab depressurization systems to passive. Upon NYSDEC approval, active systems were shut down for 30 days prior to a sub-slab vapor sampling event evaluation soil vapor, indoor and outdoor air conditions for potential vapor intrusion risk. As results indicated no evidence of vapor intrusion, continued pressure monitoring was conducted for from the existing monitoring ports for one year assessing whether negative pressure was held by the existing slab by stack-effect or other passive processes.

Jim Beam Brands Co., Brownfield Cleanup Program Remediation Site, Long Island City, New York. Field geologist for oversight of the installation of an Electrical Resistive Heating (ERH) system implemented in order to remediate trichloroethylene groundwater plumes in shallow/intermediate and deep groundwater on- and off-site. The Site, a former stapler manufacturing facility, underwent various remedies, including a Soil Vapor Extraction system, air sparging, ozone injection and chemical oxidation using potassium permanganate injections, which resulted in little reduction to contamination levels and rebounding chlorinated solvents. Components of the ERH system installed included electrodes for delivery of steam, vapor recovery wells, and groundwater monitoring wells. The site is currently under remediation in the state BCP program.

Due Diligence and Site Characterization

Manufacturing Plants, Multiple Investors, Environmental and Compliance Assessment Portfolio United States. Project lead for completion of Phase I Environmental Site Assessments (ESAs) and Limited Compliance Reviews for multiple auto parts manufacturing facilities throughout the United States. Services included completion of Phase I ESAs in accordance with the American Society for Testing and Materials E1527-13 requirements and a limited review of each facility's compliance liabilities including issues pertaining to the Resource Conservation and Recovery Act, Greenhouse Gas Emission Standards and Tier II Emergency and Hazardous Chemical Inventory reporting requirements.

ARM Parking, Environmental Site Assessment and Subsurface Investigation, Brooklyn, New York. Project manager for site assessment and subsurface investigation of parking facility in Sunset Park neighborhood, Brooklyn, New York. Services included ground penetrating radar survey for former and current petroleum USTs, completion of a subsurface investigation of soils and composition of Limited Subsurface Investigation Report.

Spill Consulting

The Trump Organization, Spill Consulting Services, New York, New York. Project manager for consulting services provided after incidental release of calcium carbonate ice rink paint to the Central Park Pond from Wollman Rink. Services included liaising with NYSDEC regarding violations, consent order and required corrective action. Corrective action included designing alterations to the existing on-site drainage plans and routing all meltwater containing paint into the combined sewer system. Coordination was required with property owner, operations personnel, New York City Department of Parks and NYSDEC.

Richmond Gardens Apartments, Spill Management and Closure Services, Staten Island, New York. Project lead responsible for spill closure activities and reporting for Spill 1105661 located at the Richmond Gardens Apartment Complex in the Richmond neighborhood of Staten Island, New York. The spill was opened in 2011 when several underground storage tanks were identified adjacent to the apartments at Jersey Street and Hendricks Avenue. The tanks were cleaned and removed and impacted soils surrounding the tank area excavated to the extent possible. Excavation of all impacted material was not feasible due to the proximity of the tanks to the apartment buildings. Residual contamination in soil and groundwater remained and was monitored through 2016. Upon reviewing the groundwater monitoring data from over 12 consecutive quarters, it was apparent monitored natural attenuation was not a feasible option and an in situ chemical oxidation (ISCO) remedy was approved by NYSDEC. Due to success of the pilot test, the ISCO injection event was implemented utilizing pressure pulse technology to deliver the alkaline activated persulfate solution to the subsurface.

SUZANNE BELL, PE

Senior Project Manager

EDUCATION

B.S., Biosystems Engineering, University of Arizona

PROFESSIONAL REGISTRATIONS

AZ: Environmental Engineer (Reg. No. 61995)
NY: Professional Engineer (Reg No. 106301)

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste and Operations Emergency Response Training (29 CFR 1910.120 and 40 CFR 265.16)
8-Hour HAZWOPER Refresher Course

Suzanne is a senior project manager with over 15 years of experience in the environmental consulting industry. She has worked on soil and groundwater environmental investigations, remediation projects, and prepared reports for private, industrial, and government clients. Her technical experience includes remediation systems; soil and groundwater feasibility studies; Phase I site investigations; environmental file review and historical research; stormwater assessments and SWPPP preparation; reclamation planning for the sand and gravel mining industry; air permitting; and data interpretation.

RELEVANT PROJECT EXPERIENCE

Waterfront Property Management, 89-91 Gerry Street and 93 Gerry Street, Brooklyn, New York. Suzanne served as project manager for execution of Remedial Action Work Plans at the former Just4Wheels Site and Just4Wheels Site 2 under the New York State Brownfield Cleanup Program (NYSBCP). Responsible for remedial oversight of excavation and removal of non-hazardous and hazardous soil, endpoint sample collection, air monitoring, dewatering system installation support, communication with soil brokerage firm and environmental laboratory, preparation of Daily Field Reports (DFRs and the Final Engineering Report (FER).

Multiple Clients, Remedial Investigation Work Plans and BCP Applications, New York City, New York. As project manager and engineer, Suzanne has prepared NYSBCP Applications and Remedial Investigation Work Plans for the New York State Department of Environmental Conservation (NYSDEC) for sites within the New York City boroughs.

Excavation Oversight and CAMP Monitoring, Various Sites, New York City, New York. Suzanne has served as project manager for projects under the New York City Office of Environmental Remediation (NYCOER) program and NYSBCP. Her responsibilities included managing excavation oversight, air monitoring, and logging trucks for off-site disposal.

Aerospace Manufacturing Facility, Feasibility Study and Remedial Action Plan, Chula Vista, CA. Suzanne co-authored feasibility studies for soil and ground water impacted by chlorinated solvents, metals, and PCBs. She screened ex-situ and in-situ remedial alternatives for effectiveness, implementability, and protectiveness of human health. She also assessed alternative cleanup levels for technical and economic feasibility of achieving background concentrations in accordance with State Water Resources Control Board Resolution 92-49. Additionally, she evaluated groundwater remedial alternatives, including bioremediation, monitored natural attenuation (MNA), pump and treat, chemical oxidation, chemical reduction, and engineered and institutional controls. Lastly, she prepared engineering cost estimates and conceptual designs. Assisted with the preparation of remedial action plans: a bioremediation remedy and MNA program for groundwater, and excavation of contaminated soil.

Aerospace Manufacturing Facility, Groundwater Remediation and Bioremediation Pilot Test, Riverside, CA. Suzanne assisted with data analysis and reporting for the bioremediation pilot test study for groundwater impacted by chlorinated solvents, hexavalent chromium, and 1,4-dioxane. She evaluated site data for trends indicative of MNA using statistical analysis.

Goodyear Tire & Rubber Company, Phoenix Goodyear Airport South Superfund Site, Goodyear, Arizona. Suzanne prepared reports and performed data analysis related to the groundwater monitoring program and operation and maintenance of groundwater treatment systems. Currently, two groundwater extraction and remediation systems are capable of treating more than 1MGD of groundwater contaminated with trichloroethylene. The upper groundwater zone is treated with an air stripper, while the lower zone is treated with granulated activated carbon. Treated groundwater is reinjected into their respective zones.

Soil and Groundwater Remediation Systems, Arizona. Suzanne **p**erformed operation, maintenance, and sampling activities for two soil vapor extraction systems to remove tetrachloroethylene from subsurface soils at two different dry-cleaning facilities. She prepared soil vapor extraction GAC system test reports in accordance with Maricopa County Air Quality Department Permits.

ASTM Phase I Environmental Site Assessments, Arizona. Suzanne assisted with ASTM Phase I ESAs at various industrial facilities in central and southern Arizona. She evaluated site conditions and regulatory implications as they related to the owner's or potential buyer's property development plans.

Phoenix-Goodyear Airport-North Superfund Site, Focused Feasibility Study, Goodyear, Arizona. Suzanne was a member of team that prepared a source area remediation focused feasibility study report. She evaluated several technologies and alternatives to treat groundwater contaminated with trichloroethylene (TCE) and perchlorate. She analyzed remedial alternatives, including in-well air stripping, a hydraulic barrier, nano- and macro-scale zero-valent iron, anaerobic reductive dechlorination, in-situ chemical oxidation (permanganate), and electrical resistive heating. She prepared cost estimates, conceptual designs, remediation technology summaries, and sustainability evaluation of the alternatives.

Enhanced In-Situ Bioremediation (EISB) and Chemical Reduction Using a Nanoscale, Zero-Valent Metallic Alloy to Treat Co-disposed Chloroethanes and Chloroethenes in Groundwater, Manufacturing Facility, Canton, MA. Suzanne performed data analysis and prepared status reports on effectiveness of EISB in treating chlorinated solvents in shallow groundwater. She reported on the performance monitoring results for the permeable reactive barrier in deep zone groundwater.

Hayden Facilities RI/FS, ASARCO LLC, Hayden, Arizona. Suzanne served as Quality Assurance Officer for the air monitoring program at a copper smelting facility. She developed site-specific data validation procedures according EPA guidelines for several analytical methods.

Market Evaluation for Nanoscale Zero-Valent Iron, Stamford, Connecticut. Suzanne used EPA CERCLIS Public Access Database and select State databases to estimate the market size for potential use of nanoscale zero-valent iron (nZVI) as a remediation technology. She compiled competing vendor information and quotes to estimate the average cost of similar products. She utilized the U.S. Patent and Trademark Office database to analyze competing technologies.

AZPDES and NPDES Permits, Arizona. Suzanne prepared Arizona Pollutant Discharge Elimination System (AZPDES) and National Pollutant Discharge Elimination System (NPDES) permit renewal applications for a copper mining facility in Southern Arizona, which included updates to the facility's Storm Water Pollution Prevention Plan (SWPPP) and QA Manual.

Spill Prevention, Control and Countermeasure Plans, Aggregate Mining Facilities, Arizona. Suzanne assisted with a Spill Prevention, Control and Countermeasure Plans (SPCC) for aggregate mining facilities in Arizona. She performed site visit, evaluated fuel and oil tanks and secondary containment areas, assisted with calculations to verify compliance, and prepared report.

Copper Mining Facility, Miami, Arizona. Suzanne assisted with Toxic Release Inventory (TRI) and Toxic Substances Control Act (TSCA) reporting, both submitted to the EPA.

Storm Water Pollution Prevention Plan, Franciscan Friars of California, Gila County, Arizona. Suzanne updated the SWPPP for construction activities related to the closure of a historic Gibson copper mine, authorized under the Arizona Pollutant Discharge Elimination System "General Permit for Discharge from Construction Activities to Waters of the United States." The Former Gibson Mine is a small, historic copper mine, located approximately 7 miles southwest of Miami, Arizona, in Gila County. Construction activities covered under the updated SWPPP consisted of the excavation, hauling, and removal of approximately 80,000 tons of soil cover from the Mineral Creek side of the site to mine-scarred areas on the Pinto Creek side of the site. Also included was final grading of the site, which consisted of re-contouring and re-defining any portion of the drainages that were on site; and revegetation.

Stormwater Pollution Prevention Plans, Vulcan Materials Company, Western Division, Arizona. Suzanne prepared SWPPP for 11 aggregate mining facilities in Arizona. Performed site visits, analyzed stormwater flows, prepared reports, and completed Notices of Intent for the Arizona Department of Environmental Quality under a Multi-Sector General Permit.

Uranium Enrichment Facility, Lea County, New Mexico. Suzanne prepared quarterly and annual groundwater monitoring reports, semi-annual radioactive effluent release reports, and radiological environmental monitoring program reports in accordance with New Mexico Environment Department regulations and the Nuclear Regulatory Commission. Performed quarterly data validation on a variety of matrices and analytical methods. She prepared site-specific environmental monitoring procedures, which included field sampling techniques; data collection, management and validation; and an air modeling software package.

Rocket Testing and Research Facility, Western U.S. Suzanne analyzed and evaluated groundwater quality data, prepared reports, and managed data for this Resource Conservation and Recovery Act (RCRA) site. Assisted with management of sampling, analysis, and reporting of constituents of concern for fractured sandstone bedrock aquifer impacted by chlorinated solvents and emergent chemicals 1,4-dioxane, perchlorate, and n-nitrosodimethylamine (NDMA). Performed data validation of water quality data according to U.S. EPA National Functional Guidelines. Queried data from client environmental data management system and prepared summary tables, concentration plots, and water level hydrographs using Microsoft Excel programs. She prepared a quarterly analytical schedule using an Access database application, updated the site-specific Health & Safety Plan, and participated in lean training, which reduced cost of groundwater monitoring tasks by 25 percent.

Federal Superfund Site, Eastern Massachusetts. Suzanne performed data validation and quality assurance/quality control of soil and groundwater data according to U.S. EPA National Functional Guidelines. She performed third-party database updates.

Great Western Bank, Cortaro Ranch Property, Marana, Arizona. For site characterization of undeveloped land, Suzanne performed surficial soil sampling, analytical laboratory coordination, data analysis, and report preparation.

Twin Buttes Properties, Inc., Southern Arizona. Suzanne assisted with report and analytical table preparation for the characterization and analysis of current and historical hydrologic conditions at an inactive mine site near Sahuarita, Arizona in support of regulatory compliance.

Skyworks Solutions, Inc. Site, Newbury Park, California. Suzanne assisted with report and analytical table preparation for a subsurface investigation characterizing the lateral and vertical extent of soil and groundwater impacts from known releases of TCE, 1,4-dioxane and other organic compounds.

PUBLICATIONS

"Mixed Redox Catalytic Destruction of Chlorinated Solvents in Soils and Groundwater," with S. Gao, E. Rupp, M. Willinger, T. Foley, B. Barbaris, A.E., Saez, R.G. Arnold and E. Betterton. In Environmental Challenges In The Pacific Basin, 2008; Annals of the New York Academy of Sciences, Vol. 1140, pp 435-445. PMID: 18991945

INVITED LECTURER OR SPEAKER

"Catalytic Destruction of Perchloroethylene," with E. Betterton, R. Arnold and Eduardo Saez, Presenter - NASA Space Grant Student Symposium, Phoenix, Arizona. April 2007.

NICOLE MOONEY

Assistant Project Manager | Geologist

EDUCATION

B.S., Earth and Environmental Science with a minor in Oceanography, University of Michigan-Ann Arbor

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
8-Hour OSHA Hazardous Waste Worker Refresher Training (29 CFR 1910.120)
8-Hour OSHA HAZWOPER Supervisor for Construction Training
OSHA 10-Hour Construction Safety
OSHA 30-Hour Construction
NYC SST-307 8-Hour Fall Prevention for Construction
NYC SST-302 2-Hour Drug and Alcohol Awareness for Construction
DOT Hazmat Employee & RCRA Hazardous Waste Generator Training
American Red Cross Adult First Aid/CPR/AED Training and Bloodborne Pathogens Training
USACE Construction Quality Management for Contractors
Level I Antiterrorism Awareness Training

Nicole is a geologist with over four years of experience in site characterization and investigation, subsurface investigations, preparation of technical reports and work plans, and data collection and analysis. She has extensive experience conducting Phase I Environmental Site Assessments (ESAs), Phase II Environmental Site Investigations (ESIs), and other aspects of environmental due diligence. She has experience with preparation and overseeing execution of remedial investigation and actions at sites within the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and the New York City Mayor's Office of Environmental Remediation (NYCOER). She has performed soil, groundwater, and soil vapor sampling events and has drafted various site investigation plans and reports.

RELEVANT PROJECT EXPERIENCE

Environmental Investigation, Site Characterization, and Remediation

340 Myrtle Development LLC, 340 Myrtle Avenue, Brooklyn, New York. As a project geologist, Nicole coordinated and managed implementation of the Remedial Action Work Plan (RAWP) at the approximately 8,828 square foot site enrolled in the NYSDEC BCP. The remedial action included excavation and off-site disposal of soil, installation of an active sub-slab depressurization system (including cover system), installation of injection wells, and reinstallation of permanent monitoring wells for post-remedy groundwater monitoring. Nicole was responsible for the preparation of the Final Engineering Report (FER) and the Site Management Plan (SMP) which are undergoing review by the NYSDEC. Construction for the new development is currently ongoing and, when completed, the site will be improved with a new eight-story mixed-use commercial and residential building with a full cellar level.

B Contractors Group, LLC, 711-713 East 214th Street, Bronx, New York. As a project geologist, Nicole was responsible for coordinating and managing the implementation of the NYCOER-approved Remedial Action Plan (RAP) and preparing the Remedial Closure Report (RCR) for the approximately 6,252 square foot site. The redevelopment included a new eight-story residential building with a full cellar level.

650 Southern Blvd Bronx LLC, 650 Southern Boulevard, Bronx, New York. As a project geologist, Nicole was responsible for preparation and implementation of the Remedial Investigation Work Plan (RIWP), which included the installation of eleven soil borings, seven permanent groundwater monitoring wells (some of which extended into

bedrock), and seven soil vapor points, and the collection of soil, groundwater, and soil vapor samples. Nicole was also responsible for preparation of the Citizen Participation Plan (CPP), Remedial Investigation Report (RIR), and RAWP. The site is in the pre-construction phase.

Degraw Holdings LLC, 563 Sackett Street Site, Brooklyn, New York. As a project geologist, Nicole was responsible for due diligence during acquisition, including preparation of the Phase I ESA and Limited Phase II ESI. The initial Limited Phase II ESI and delineation sampling have been completed and the Limited Phase II ESI Delineation Report, Brownfield Cleanup Agreement (BCA) Major Amendment Application, and Supplemental Remedial Investigation Report (SRIR) are being drafted.

291 Wallabout Realty LLC, 291 Wallabout Street, Brooklyn, New York. As a project geologist, Nicole was responsible for the due diligence during acquisition of the property, including preparation of a Phase I ESA, Phase II ESI, BCP Application, and RIWP.

401 West 207th Realty LLC, 401 West 207th Street, New York, New York. As a project geologist, Nicole was responsible for oversight during implementation of the RAWP under the NYSDEC BCP. During remediation, Nicole observed and documented the excavation and proper disposal of on-site soil required for installation of the foundational elements. Nicole oversaw the proper cleaning and removal of two underground storage tanks encountered during excavation.

BCP Applications and Remedial Investigation Work Plans for NYSDEC. Nicole has prepared several BCP Application packages for various clients in New York State, which requires reviewing the site's history, including any previous investigation reports available, to assist with entry into the BCP to be remediated and redeveloped in accordance with applicable NYSDEC requirements. Nicole also prepares an RIWP to be submitted to the NYSDEC either concurrently or following submittal of the BCP Application for full investigation of the site to facilitate proper remedial action.

Excavation Oversight and CAMP Monitoring, Various Sites, Bronx, Brooklyn, and Queens, New York. As a project geologist, Nicole completed remedial oversight for several projects in the NYCOER cleanup program and NYSDEC BCP. Her responsibilities included excavation oversight, air monitoring, truck logging during off-site disposal of excavated materials, collection of endpoint and/or documentation samples, vapor barrier inspection, and oversight of installation of post-remedy groundwater monitoring wells.

Multiple Clients, Phase I ESAs and Due Diligence, Multiple Locations in New York. As a project geologist, Nicole completed several Phase I ESAs for buyers of properties in New York. She has extensive experience completing site reconnaissance and reviewing historical site documentation to identify potential environmental concerns at properties.

Multiple Clients, Phase II ESIs, Multiple Locations in New York. As a project geologist, Nicole conducted several Phase II ESIs for projects in New York, including oversight of the installation of soil borings, groundwater monitoring wells, and soil vapor points and the collection of soil, groundwater, and soil vapor samples. She assisted with the development of sampling plans based on previous environmental investigations and due diligence findings.

Former Grissom Air Force Base, Kokomo, Indiana. As a project geologist, Nicole was responsible for coordinating and performing quarterly groundwater sampling and/or Land Use Control (LUC) inspections in accordance with the deeds and Decision Documents for nine sites (FT001, FT002, SS190, SS035, SS053, SS058, LF003, LF004, and SS049) located on the 2,722-acre former Grissom Air Force Base under the Base Realignment and Closure (BRAC)/Environmental Construction Optimization Services (BECOS) program. Nicole was also responsible for the coordination and implementation of a Data Gap Investigation (DGI) at the SS035, SS053, and SS058 sites and a Site Investigation (SI) at the former Navy Skeet Range (site SR406). Nicole prepared LUC Inspection reports, Annual Groundwater Monitoring Reports, an SI Report, a DGI Report, and the Five-Year Review Report for this work.



BRIAN FITZPATRICK, CHMM

Corporate Director, Health and Safety

EDUCATION

M.P.A., Environmental Policy, Syracuse University
B.S., Environmental Science, University of Massachusetts-Amherst
A.S., Chemistry, Valley Forge Military Junior College
Commissioned Officer, United States Army

CERTIFICATIONS

Certified Hazardous Materials Manager (Reg. No. 13454)
Certified Department of Transportation Shipper
Certified International Air Transport Authority Shipper

PROFESSIONAL SOCIETIES

Alliance of Hazardous Materials Professionals
Academy of Certified Hazardous Materials Managers, New England Chapter

SPECIAL STUDIES AND COURSES

Department of Transportation
International Air Transport Authority
Incident Commander
Confined Space Entry and Rescue
Radiation Safety Officer
RCRA Hazardous Waste
Massachusetts Industrial Waste Water Operator Grade 2I (expired)

AWARDS

Presidents Club Award (one million hours worked without a recordable injury, Cabot Corporation
Chancellors Award for Excellence, Syracuse University

Brian has over 25 years of experience in developing, implementing, and managing a wide range of environmental, health, and safety (EH&S) solutions for a variety of clients. Brian has served as the Health and Safety Manager and Incident Commander at several research and development sites and has managed extensive programs to maintain and clean contaminated sites under Federal and State regulatory programs. He has provided expertise in managing EH&S programs as a consultant, and has actively developed, implemented, and managed these programs as an EH&S professional for various industries.

Brian is currently working as the Chief Health and Safety Officer for Haley & Aldrich, Inc. He, and his staff, are involved in every project Haley & Aldrich, Inc. undertakes. Brian is involved on several projects, directly overseeing the health and safety on the project site of our staff, our contractors, and the public. Brian also acts as support for our on-site health and safety staff on other larger construction and remediation projects.

Through Brian's leadership our safety culture and focus extend from the top of our organization to each and every Haley & Aldrich employee as well as subconsultants and subcontractors. Utilizing a Behavior Based Safety approach, Haley & Aldrich expects every project team member to play an important role in making our projects safe and has given authority to every Haley & Aldrich employee, subconsultant, and subcontractor to stop any activity at any time for health or safety concerns. Our record illustrates that our hard work is paying off. The company has gone 4 years without a lost time injury, and our TRIR and EMR have consistently improved each of the last 3 years.

RELEVANT PROJECT EXPERIENCE

Haley & Aldrich, Inc., Burlington, Massachusetts. As Chief Health and Safety Officer, Brian has led and facilitated the development and implementation of corporate health and safety (H&S) improvement plans to enhance compliance and improve H&S performance. In Brian's time with Haley & Aldrich, Inc., the company has realized dramatic improvement on H&S goals and in Key Performance Indicators. Brian is responsible for developing a risk competence culture, where our staff are empowered to look for and engage to address risk before anyone is injured. Brian oversees the development, implementation and continuous improvement of all H&S programs for the company. Additional responsibilities include:

- Developing a safety culture through incident reporting, root cause analysis, behavior-based safety, hazard recognition and risk assessment, communication, and developing leaders;
- Monitoring proposed and existing SH&E regulations and legislation to determine their impact on operations and to ensure continued compliance;
- Overseeing the safety, industrial hygiene, and toxicology programs for over 600 staff members engaged in remediation, construction, health and safety, consulting, and general office work across 28 offices in the United States and on assignment to international project sites;
- Continuously seeks to improve H&S performance as measured by the OSHA Incident Rating (IR) and Worker's Compensation Experience Modification Rating (EMR), as well as Leading Indicators developed with the management team; and
- Participating in the corporate audit program as an auditor or lead auditor;

Energy Client, California. As Chief Health and Safety Officer, Brian led and facilitated the Alliance Partnership Safety Council in 2017, is still an active contributor to the council, and hosts routine contractor safety forums for the client. Brian is actively involved in the development and implementation of program safety, health, and environmental (SH&E) plans to ensure safe operations on project sites. Brian developed permits and Health and Safety Plans for large projects and routinely audits the site safety. Additional responsibilities include:

- Driving reporting and behavior-based safety initiatives to support our internal safety culture and developing monthly summary reports to illustrate performance to our client.
- Develop, assess and continuously improve site safety plans and practices, including specific safety protocols for working safely over and around water.
- Worked as an extension of the client's organization to provide assurance that the remedy was completed safely and consistent with client-specific requirements.
- Support on-site safety personnel in ensuring the health and safety of the general public, our staff, and our sub-contracted employees.
- Audits and visits sites to ensure compliance with our internal policies and client-specific requirements.

Energy Client, Ohio. As Chief Health and Safety Officer, Brian supports the project team in developing and executing client and project specific health and safety measures, such as a site specific Health and Safety Plan, Job Hazard Analyses, Industrial Hygiene program, and site specific training. Brian also routinely visits the site to assess current practices and condition and to ensure continuous improvement. Additional responsibilities include:

- Develop, assess, and continuously improve site safety plans and practices, including specific safety protocols to comply with supplemental EH&S requirements such as the Duke Health and Safety Handbook, Environmental Supplemental, and EHS Keys to Life.
- Develop, assess, and continuously improve site safety plans and practices to address the risks associated with the work being performed on site, as well as the environmental conditions and simultaneous operations, including trenching and excavation, hot work, work over and near water, heavy equipment, HAZWOPER, etc.
- Worked as an extension of the client's organization to provide assurance that the remedy was completed safely and consistent with client-specific requirements.
- Support on-site safety personnel in ensuring the health and safety of the general public, our staff, and our sub-contracted employees.
- Audits and visits site to ensure compliance with our internal policies and client-specific requirements.

BRIAN A. FERGUSON

Senior Engineer

EDUCATION

M. S. Geotechnical Engineering, Tufts University, Medford, Massachusetts; 2012
B. S. Civil Engineering, State University of New York - Environmental, Science, and Forestry, Syracuse, New York; 2000
Ass. Science Degree in Applied Science and Technology (Nuclear Engineering), Thomas A. Edison State College, Trenton, New Jersey; 2000

PROFESSIONAL SOCIETIES

Order of the Engineer – 2000
Boston Society of Civil Engineers (BSCE)
American Society of Civil Engineers (ASCE)

SPECIAL STUDIES AND COURSES

American Concrete Institute – Certified Field Technician Certified Grade 1
Radiation Safety and Operations of Nuclear Testing Equipment – Troxler
40-Hour OSHA Hazardous Waste Operations Training (+ 8-Hour annual refresher)
10-Hour OSHA Construction training
Confined Space Entry Training
16-Hour Asbestos Operations and Maintenance

Mr. Ferguson has over six years of experience serving as project engineer on a variety of real estate development projects. His project experience has included monitoring field investigations and performing construction oversight, performing due diligence and engineering analyses, performing geotechnical analyses and developing geotechnical recommendations, and preparing geotechnical reports and project specifications.

In addition to providing engineering design support, Mr. Ferguson has managed and participated in a number of field service activities. Field work has included construction monitoring and documentation of contractors' deep and shallow foundation related construction, including slurry walls, caissons, pile driving, pile cap installation, earthwork, backfilling and compaction, installation of soldier pile and wood lagging support systems, installation of tie backs, reading inclinometers, conducting in-place field unit weight tests, tie-back load testing, seismograph installation, monitoring, and evaluating, and preparation of footing bearing surfaces. Other responsibilities have included site development activities, including placement of utilities and subgrade preparation for roads; observations and testing to determine that work is completed in compliance with contract documents; on-site soil management; sampling of soil and groundwater for chemical laboratory testing and conducting in situ field screening; maintenance of job records including pile driving logs, results of field density tests, records of caisson and footing installations; preparation of daily field reports; in contact with key personnel; and resolution of field related problems.

RELEVANT PROJECT EXPERIENCE

St. Elizabeths Hostpital – West Campus Forensic Evaluations, Washington, D.C. Project Engineer for forensic evaluations on the adaptive reuse of former hospital buildings. Responsibilities included coordination of a field exploration program, including test borings and test pits to obtain subsurface information for project design and construction, overseeing multiple field personnel, subcontractors, assisting with project management, reviewing subcontractors invoices, reviewing and summarizing subsurface data and writing data reports.

TUFTS University, New Central Energy Plant, Medford, MA. Project engineer for a new Central Energy Plant that will house new co-generation steam boilers, centralized chilled water and electrical transformer switchgear that is planned to occupy approximately 20,000 square feet across two or three levels. Responsibilities included coordination of construction monitoring, observing SOE and footing installation, assisting with project management,

reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Lahey Hospital and Medical Center – Stilts Infill Project, Burlington, MA Project Engineer for an addition to the existing Stilts building on the Lahey campus. Responsibilities included coordination and overseeing geotechnical and environmental subsurface investigations, coordination of construction monitoring, observing footing installation, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Gloucester Beauport Hotel, Gloucester, MA Project engineer for a four story hotel with a seawall constructed adjacent to tidal beach. Responsibilities included coordination and overseeing geotechnical and environmental subsurface investigations, coordination of construction monitoring, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings, design and implementation of a sub-slab gas mitigation system.

275 Wyman Street, New Office Building, Waltham, MA. Project engineer for a new office building and parking garage founded on a shallow foundation system. Responsibilities included preparing proposals, assisting with management and planning of a subsurface investigation program, summarizing subsurface data and reviewing geotechnical test boring logs, coordination of construction monitoring and instrumentation monitoring programs, reviewing weekly field construction reports, reviewing and responding to specialty geotechnical design submittals and RFIs by others and attending project meetings.

Suffolk University - 20 Somerset Street, Boston, MA Project engineer for design of 8-story academic building with two levels of below grade finished space. Responsibilities included coordination of construction monitoring, observing SOE and footing installation, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Worcester State University, New Student Housing, Worcester, MA Project engineer for design and construction of a 7-story residence/dining hall with a single level basement and a major site retaining wall structure. Responsibilities included overseeing geotechnical subsurface investigations, provided foundation recommendations and specifications, and prepared a retaining wall contract document. Responsibilities included coordination of construction monitoring, excavation and construction of footings, and soil reuse and management, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

University of Massachusetts Boston, General Academic Building No.1, Boston, MA. Project engineer responsible for assisting project manager in preliminary foundation engineering recommendations and construction considerations for a new academic building on a part of Columbia Point, a historic landfill area. Assisted in design phase services that included preparing foundation support design recommendations including the use of high allowable stresses for 190-ft long end-bearing H-piles and application of Slickcoat coating to address downdrag concerns and reduce foundation costs.

Waltham Watch Factory, Waltham, MA project engineer for redevelopment of former watch factory. Responsibilities included construction oversight of new precast parking garage, utilitiy upgrades, soil remediation and management, installation of gas mitigation systems, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Massachusetts Green High Performance Computing Center, Holyoke, MA. Project engineer for 60,000 sq. ft high level computing center and associated support utilities. Redevelopment of the site included recycling 50,000 cy of construction debris into the site fills at this historic site along the Connecticut River. Responsibilities included coordinating geotechnical and environmental field investigations, coordination of construction monitoring, seismic analysis, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

The Shops at Riverwood, Hyde Park, MA. The project consisted of the redevelopment of a colonial era paper mill. The multi-building complex was demolished and the concrete and brick from the previous buildings were recycled. The project involved crushing 50,000 cy of brick and concrete and placement of excavated soils and recycled brick and concrete as compacted fill materials to support proposed buildings, pavement areas, and achieve 5 to 9 ft. raises in grade. Field Representative was responsible for management and reuse of brick and concrete stockpiles, in-place density testing, coordination of test pits, installation of soldier pile and versa-lok walls, and backfilling of underground vaults. Remedial activities included: excavation of 5,000 cy of petroleum contaminated soils, on-site cement batching in a pug mill, and placement of compacted recycled materials in roadway areas; delineation, excavation and off-site disposal of TSCA-regulated PCB contaminated soils associated with historical Askarel transformers and dioxin-contaminated soils associated with historical bleaching operations; and disposition of 1,000 tons of paper mill sludge encountered within an abandoned granite-walled sluiceway structure. In addition, assisted with weekly project meetings, maintaining a record of material reuse, and providing weekly field reports.

Harvard Law School, Cambridge, MA. The Harvard Law School project is located on Massachusetts Avenue in Cambridge. The project consisted of a multistory building above ground with 5 levels below ground for a parking garage. Field Representative was responsible for overseeing the installation of slurry walls into bedrock and LBEs with three installation rigs while monitoring the removal of urban fill and transfer to several different receiving facilities from another portion of the site. The slurry walls were constructed into bedrock. Other Field Representative activities were: testing of the slurry, management of the excavated soils, and record keeping of the Contractor's obstruction and down time of the equipment. In addition, assisted with weekly project meetings, maintaining a record of obstruction and machine time, and providing weekly field reports.

KATHERINE R. MILLER

Project Manager

EDUCATION

B.S., Chemistry, University of Arizona

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120 and 40 CFR 265.16)
8-Hour OSHA Refresher Training (29 CFR 1910.120)
Level IV Data Validation Training

AWARDS

Pinnacle Award, 2009
Pathfinder Award, 2014

In her 10 years at Haley & Aldrich, Katherine has worked on soil and groundwater environmental investigations and the preparation of environmental reports for private, industrial, and government-based project clients. She is a qualified Data Validator capable of performing various levels of validation on laboratory water quality data according to U.S. Environmental Protection Agency (EPA) National Functional Guidelines and to U.S. Department of Energy radiochemical guidelines. She also has experience designing and maintaining databases for project-specific needs.

Project management responsibilities for a $1.5 million per year stormwater project include preparation of subcontractor bids and contracts; preparation of cost estimates, proposals, and reports; coordination of field testing programs; and interpretation of chemical testing results. She has interacted with local regulatory agencies.

RELEVANT PROJECT EXPERIENCE

Confidential Aerospace Manufacturer, Groundwater Monitoring, Western U.S. Katherine served as project manager for the comprehensive stormwater management program. Responsibilities included project finance management and data management including quality assurance/quality control (QA/QC) and interpretation of chemical testing results. Evaluated QA/QC of groundwater quality data, prepared reports and managed data for the site. Performed data validation of quarterly water quality data from over 300 locations according to EPA National Functional Guidelines and to DOE radiochemical guidelines over a six-year period. Also, responsible for updating and maintaining the integrity of over 200,000 records during that time period. Assisted with management of sampling, analysis, and reporting of constituents of concern, ensured compliance with post-closure permit monitoring and reporting requirements, Data Management Plan, QAPP, and Environmental Data Management System, and ensured and maintained 100% compliance with the QAPP and Data Management Plan. Additionally, prepared groundwater data summaries for proposed extraction wells including comparisons to site NPDES outfall limits in support of Groundwater Interim Measures planning.

Asarco Hayden Plant Site, Hayden, Arizona. Katherine assisted with field preparation, QA/QC of analytical data, and data validation as part of the Remedial Investigation/Feasibility Work Plan including soil, sediment, air, process water, surface water, and stormwater.

Former MGP Site, California. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation for the investigation of three large former MGP sites in an urban, residential setting; includes over 200 residential properties.

General Manufacturing, Leitchfield, Kentucky. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation for a soil and groundwater RCRA site. Groundwater monitoring is conducted annually at more than 50 locations for volatile organic compounds (VOCs), including 1,4-dioxane and semi-volatile organic compound (SVOCs).

Skyworks Solutions, Inc., Newbury Park, California. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation at groundwater remediation site. She monitored for VOCs, including 1,4-dioxane, and inorganic chemicals, including hexavalent chromium.

Teledyne Scientific Company, Thousand Oaks, California. Katherine assisted with report preparation for this groundwater assessment site. Monitored natural attenuation has been instituted as the long-term site remedy.

Port of Redwood City, Permitting and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Kiewit Infrastructure West, Sediment Quality Study, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Aeolian Yacht Harbor, Permitting, Eel Grass Conservation and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Marin County, Paradise Cay Permitting and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

APPENDIX I
Quality Assurance Project Plan

HALEY ALDRICH

www.haleyaldrich.com

QUALITY ASSURANCE PROJECT PLAN
4001 4TH AVENUE REDEVELOPMENT SITE
NYSDEC SITE NO. C224412
4001-4011 4TH AVENUE
BROOKLYN, NEW YORK

by
H & A of New York Engineering and Geology LLP
New York, New York

for
4th Ave Property LLC
New York, New York

File No. 0210815
July 2026

Executive Summary

This Quality Assurance Project Plan (QAPP) outlines the scope of the quality assurance and quality control (QA/QC) activities associated with the site monitoring activities associated with the Remedial Action Work Plan (RAWP) for 4001 4th Avenue in Brooklyn, New York (Site).

Protocols for sample collection, sample handling and storage, chain-of-custody procedures, and laboratory and field analyses are described herein or specifically referenced to related project documents.

Table of Contents

Page

Executive Summary i
List of Tables v
List of Attachments v

1. Project Description 1

1.1 PROJECT OBJECTIVES 1
1.2 SITE DESCRIPTION AND SITE HISTORY 1
1.3 LABORATORY PARAMETERS 1
1.4 SAMPLING LOCATIONS 1

2. Project Organization and Responsibilities 2

2.1 PROJECT TEAM 2
2.2 MANAGEMENT RESPONSIBILITIES 2
2.3 QUALITY ASSURANCE RESPONSIBILITIES 2
2.3.1 QA Officer 3
2.3.2 Data Validation Staff 3
2.4 LABORATORY RESPONSIBILITIES 3
2.4.1 Laboratory Project Manager 3
2.4.2 Laboratory Operations Manager 3
2.4.3 Laboratory QA Officer 3
2.4.4 Laboratory Sample Custodian 4
2.4.5 Laboratory Technical Personnel 4
2.5 FIELD RESPONSIBILITIES 4
2.5.1 Field Coordinator 4
2.5.2 Field Team Personnel 5

3. Sampling Procedures 6

3.1 SAMPLE CONTAINERS 6
3.2 SAMPLE LABELING 6
3.3 FIELD QC SAMPLE COLLECTION 6
3.3.1 Field Duplicate Sample Collection 6
3.4 GENERAL DECONTAMINATION PROCEDURES 6

4. Custody Procedures 8

4.1 FIELD CUSTODY PROCEDURES 8
4.1.1 Field Procedures 9
4.1.2 Transfer of Custody and Shipment Procedures 9
4.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES 10
4.3 STORAGE OF SAMPLES 10
4.4 FINAL PROJECT FILES CUSTODY PROCEDURES 10

Table of Contents

Page

5. Calibration Procedures and Frequency 12

5.1 FIELD INSTRUMENT CALIBRATION PROCEDURES 12
5.2 LABORATORY INSTRUMENT CALIBRATION PROCEDURES 12

6. Analytical Procedures 13

6.1 FIELD ANALYTICAL PROCEDURES 13
6.2 LABORATORY ANALYTICAL PROCEDURES 13
6.2.1 List of Project Target Compounds and Laboratory Detection Limits 13
6.2.2 List of Method-Specific Quality Control Criteria 13

7. Internal Quality Control Checks 14

7.1 FIELD QUALITY CONTROL 14
7.1.1 Field Blanks 14
7.1.2 Trip Blanks 14
7.2 LABORATORY PROCEDURES 14
7.2.1 Field Duplicate Samples 14
7.2.2 Matrix Spike Samples 15
7.2.3 Laboratory Control Sample Analyses 15
7.2.4 Surrogate Compound/Internal Standard Recoveries 15
7.2.5 Calibration Verification Standards 16
7.2.6 Laboratory Method Blank Analyses 16

8. Data Quality Objectives 17

8.1 PRECISION 17
8.1.1 Definition 17
8.1.2 Field Precision Sample Objectives 17
8.1.3 Laboratory Precision Sample Objectives 17
8.2 ACCURACY 18
8.2.1 Definition 18
8.2.2 Field Accuracy Objectives 18
8.3 LABORATORY ACCURACY OBJECTIVES 18
8.4 REPRESENTATIVENESS 19
8.4.1 Definition 19
8.4.2 Measures to Ensure Representativeness of Field Data 19
8.5 COMPLETENESS 19
8.5.1 Definition 19
8.5.2 Field Completeness Objectives 19
8.5.3 Laboratory Completeness Objectives 19
8.6 COMPARABILITY 20
8.6.1 Definition 20
8.6.2 Measures to Ensure Comparability of Laboratory Data 20

Table of Contents

Page

8.7 LEVEL OF QUALITY CONTROL EFFORT 20

9. Data Reduction, Validation, and Reporting 21

9.1 DATA REDUCTION 21
9.1.1 Field Data Reduction Procedures 21
9.1.2 Laboratory Data Reduction Procedures 21
9.1.3 Quality Control Data 21
9.2 DATA VALIDATION 21
9.3 DATA REPORTING 22

10. Performance and System Audits 23

10.1 FIELD PERFORMANCE AND SYSTEM AUDITS 23
10.1.1 Internal Field Audit Responsibilities 23
10.1.2 External Field Audit Responsibilities 23
10.2 LABORATORY PERFORMANCE AND SYSTEM AUDITS 23
10.2.1 Internal Laboratory Audit Responsibilities 23
10.2.2 External Laboratory Audit Responsibilities 24

11. Preventive Maintenance 25

11.1 FIELD INSTRUMENT PREVENTIVE MAINTENANCE 25
11.2 LABORATORY INSTRUMENT PREVENTIVE MAINTENANCE 25

12. Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness 26

12.1 FIELD MEASUREMENTS 26
12.2 LABORATORY DATA 26

13. Quality Assurance Reports 27

References 28

TABLE 1
ATTACHMENT A 2
PROJECT TEAM RESUMES 2

List of Tables

Table No.	Title
I	Summary of Analysis Method, Preservation Method, Holding Time, Sample Size Requirements, and Sample Containers

List of Attachments

Attachment	Title
A	Project Team Resumes

1. Project Description

This Quality Assurance Project Plan (QAPP) has been prepared as a component of the Remedial Action Work Plan (RAWP) for the 4001 4th Avenue Site in Brooklyn, New York (Site).

1.1 PROJECT OBJECTIVES

The primary objective for data collection activities is to collect sufficient data necessary to monitor the nature of any remaining soil impacts.

1.2 SITE DESCRIPTION AND SITE HISTORY

The general Site description and Site history are provided in the RAWP incorporated herein by reference.

1.3 LABORATORY PARAMETERS

The laboratory parameters for soil include:

- Target Compound List (TCL) volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260;
- TCL semi-volatile organic compounds (SVOCs) using EPA Method 8270;
- Total Analyte List (TAL) metals using EPA Method 6010;
- Polychlorinated biphenyls (PCBs) using EPA Method 8082;
- TCL pesticides using EPA Method 8081;
- Per- and polyfluoroalkyl substances (PFAS) using EPA Method 1633A; and,
- 1,4-dioxane using EPA Method 8270 SIM.

Note: PFAS will be collected in accordance with the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation (DER), Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC Part 375 Remedial Program, April 2023.

Laboratory parameters for disposal samples will be determined by the disposal facility after an approved facility has been determined.

1.4 SAMPLING LOCATIONS

The RAWP provides the locations of soil borings that will be sampled.

2. Project Organization and Responsibilities

This section defines the roles and responsibilities of the individuals who will perform the RAWP monitoring activities. A New York State Department of Health (NYSDOH)-certified analytical laboratory will perform the analyses of environmental samples collected at the Site.

2.1 PROJECT TEAM

The following project personnel are anticipated for oversight of the RAWP implementation. Applicable Project personnel resumes are provided in Appendix H of the RAWP and in Attachment A.

NYSDEC Case Manager	Shawn Roberts
NYSDOH Case Manager	Christopher Budd
Remediation Engineer	Suzanne M. Bell, P.E.
Qualified Environmental Professional (QEP)	Mari Conlon, P.G.
Project Manager	Paul Probasco, P.G.
Haley & Aldrich of New York* Health & Safety Director	Brian Fitzpatrick, CHMM
Health & Safety Officer (HSO)	Brian Ferguson
Quality Assurance (QA) Officer	Nicole Mooney
Third Party Validator	Katherine Miller

**H & A of New York Engineering and Geology LLP (Haley & Aldrich of New York)*

2.2 MANAGEMENT RESPONSIBILITIES

The Project Manager is responsible for managing the implementation of the RAWP and monitoring and coordinating the collection of data. The Project Manager is responsible for technical quality control (QC) and project oversight. The Project Manager's responsibilities include the following:

- Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule restraints;
- Review work performed to ensure quality, responsiveness, and timeliness;
- Communicate with the client point of contact concerning the progress of the monitoring activities;
- Assure corrective actions are taken for deficiencies cited during audits of RAWP monitoring activities; and
- Assure compliance with the Site Health and Safety Plan (HASP).

2.3 QUALITY ASSURANCE RESPONSIBILITIES

The QA team will consist of a QA Officer and the Data Validation Staff. QA responsibilities are described as follows:

2.3.1 QA Officer

The QA Officer reports directly to the Project Manager and will be responsible for overseeing the review of field and laboratory data. Additional responsibilities include the following:

- Assure the application and effectiveness of the QAPP by the analytical laboratory and the project staff; and,
- Provide input to the Project Manager as to corrective actions that may be required as a result of the above-mentioned evaluations.

The QA Officer will be assisted by the Data Validation Staff in the evaluation and validation of field and laboratory-generated data.

2.3.2 Data Validation Staff

The Data Validation Staff will be independent of the laboratory and familiar with the analytical procedures performed. The validation will include a review of each validation criterion as prescribed by the guidelines presented in Section 9.2 of this document and will be presented in a Data Usability Summary Report (DUSR) for submittal to the QA Officer.

2.4 LABORATORY RESPONSIBILITIES

The Environmental Laboratory Approval Program (ELAP)-approved laboratory to be used will be Alpha Analytical, located in Westborough, Massachusetts. Laboratory services in support of the RAWP monitoring include the following personnel:

2.4.1 Laboratory Project Manager

The Laboratory Project Manager will report directly to the QA Officer and Project Manager and will be responsible for ensuring all resources of the laboratory are available on an as-required basis. The Laboratory Project Manager will also be responsible for the approval of the final analytical reports.

2.4.2 Laboratory Operations Manager

The Laboratory Operations Manager will report to the Laboratory Project Manager and will be responsible for coordinating laboratory analysis, supervising in-house chain-of-custody reports, scheduling sample analyses, overseeing data review, and overseeing preparation of analytical reports.

2.4.3 Laboratory QA Officer

The Laboratory QA Officer will have sole responsibility for the review and validation of the analytical laboratory data. The Laboratory QA Officer will provide Case Narrative descriptions of any data quality issues encountered during the analyses conducted by the laboratory. The QA Officer will also define appropriate QA procedures, overseeing QA/QC documentation.

2.4.4 Laboratory Sample Custodian

The Laboratory Sample Custodian will report to the Laboratory Operations Manager and will be responsible for the following:

- Receive and inspect the incoming sample containers;
- Record the condition of the incoming sample containers;
- Sign appropriate documents;
- Verify chain-of-custody and its correctness;
- Notify the Project Manager and Operations Manager of sample receipt and inspection;
- Assign a unique identification number and enter each into the sample receiving log;
- Initiate transfer of samples to laboratory analytical sections; and
- Control and monitor access/storage of samples and extracts.

2.4.5 Laboratory Technical Personnel

The Laboratory Technical Staff will have the primary responsibility for the performance of sample analysis and the execution of the QA procedures developed to determine the data quality. These activities will include the proper preparation and analysis of the project samples in accordance with the laboratory's Quality Assurance Manual (QAM) and associated Standard Operating Procedures (SOPs).

2.5 FIELD RESPONSIBILITIES

2.5.1 Field Coordinator

The Field Coordinator is responsible for the overall operation of the field team and reports directly to the Project Manager. The Field Coordinator works with the project HSO to conduct operations in compliance with the project HASP. The Field Coordinator will facilitate communication and coordinate efforts between the Project Manager and the field team members.

Other responsibilities include the following:

- Develop and implement field-related work plans, ensuring schedule compliance, and adhering to management-developed project requirements;
- Coordinate and manage field staff;
- Perform field system audits;
- Oversee QC for technical data provided by the field staff;
- Prepare and approve text and graphics required for field team efforts;
- Coordinate and oversee technical efforts of subcontractors assisting the field team;
- Identify problems in the field; resolve difficulties in consultation with the Project QA Officer and Project Manager; implement and document corrective action procedures; and,
- Participate in preparation of the final reports.

2.5.2 Field Team Personnel

Field Team Personnel will be responsible for the following:

- Perform field activities as detailed in the RAWP and in compliance with the Field Sampling Plan (FSP) and QAPP.
- Immediately report any accidents and/or unsafe conditions to the Site HSO and take reasonable precautions to prevent injury.

3. Sampling Procedures

The FSP in the NYSDEC-approved Remedial Investigation Work Plan (RIWP) provides the SOPs for sampling required by the RAWP. Sampling will be conducted in general accordance with the NYSDEC Technical Guidance for Site Investigation and Remediation (DER-10) and the Sampling, Analysis and Assessment of PFAS under NYSDEC Part 375 Remedial Program (April 2023) when applicable.

3.1 SAMPLE CONTAINERS

Sample containers for each sampling task will be provided by the laboratory performing the analysis. The containers will be cleaned by the manufacturer to meet or exceed the analyte specifications established in the EPA's "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers," April 1992, OSWER Directive #9240.0-0.5A. Certificates of analysis for each lot of sample containers used will be maintained by the laboratory.

The appropriate sample containers, preservation methods, maximum holding times, and handling requirements for each sampling task are provided in Table I.

3.2 SAMPLE LABELING

Each sample will be labeled with a unique sample identifier that will facilitate tracking and cross-referencing of sample information. Field blanks and field duplicate samples will also be numbered with a unique sample identifier to prevent analytical bias of field QC samples.

Refer to the FSP for the sample labeling procedures.

3.3 FIELD QC SAMPLE COLLECTION

3.3.1 Field Duplicate Sample Collection

3.3.1.1 Soil Samples

Soil field duplicates will be collected as specified in the following procedure:

1. Soil for VOC analysis will be removed from the sampling device as specified in the FSP.
2. Soil for non-VOC analysis will be removed from the sampling device and collected into clean laboratory-provided containers.

3.4 GENERAL DECONTAMINATION PROCEDURES

Care must be taken to minimize the potential for transfer of contaminated materials to the ground or onto other materials. Regardless of the size or nature of the equipment being decontaminated, the process will utilize a series of steps that involve removal of gross material (dirt, grease, oil, etc.), washing with a detergent, and multiple rinsing steps. In lieu of a series of washes and rinse steps, steam cleaning with low-volume, high-pressure equipment (i.e., steam cleaner) is acceptable.

Exploration equipment and all monitoring equipment in contact with the sampling media must be decontaminated prior to initiating site activities, in between exploration locations to minimize cross-contamination, and prior to mobilizing off the Site after completion of Site work.

The following specific decontamination procedure is recommended for sampling equipment and tools:

- Brush loose soil off equipment;
- Wash equipment with laboratory-grade detergent (i.e., Alconox or equivalent);
- Rinse with tap water;
- Rinse equipment with distilled water;
- Allow water to evaporate before reusing equipment; and
- Wrap equipment in aluminum foil when not being used.

4. Custody Procedures

Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final project files. Custody of a sample begins when it is collected by or transferred to an individual and ends when that individual relinquishes or disposes of the sample.

A sample is under custody if:

1. The item is in actual possession of a person;
2. The item is in the view of the person after being in actual possession of the person;
3. The item was in actual possession and subsequently stored to prevent tampering; or
4. The item is in a designated and identified secure area.

4.1 FIELD CUSTODY PROCEDURES

Field personnel will keep written records of field activities on applicable preprinted field forms or in a bound field notebook to record data collecting activities. These records will be written legibly in ink and will contain pertinent field data and observations. Entry errors or changes will be crossed out with a single line, dated, and initialed by the person making the correction. Field forms and notebooks will be periodically reviewed by the Field Coordinator.

The beginning of each entry in the logbook or preprinted field form will contain the following information:

- Date;
- Start time;
- Weather;
- Names of field personnel (including subcontractors);
- Level of personal protective equipment (PPE) used at the Site; and
- Names of all visitors and the purpose of their visit.

For each measurement and sample collected, the following information will be recorded:

- Detailed description of sample location;
- Equipment used to collect the sample or make the measurement and the date the equipment was calibrated;
- Time sample was collected;
- Description of the sample conditions;
- Depth sample was collected (if applicable);
- Volume and number of containers filled with the sample; and
- Sampler's identification.

4.1.1 Field Procedures

The following procedure describes the process to maintain the integrity of the samples:

- Upon collection samples are placed in the proper containers. In general, samples collected for organic analysis will be placed in pre-cleaned glass containers, and samples collected for inorganic analysis will be placed in pre-cleaned plastic (polyethylene) bottles. Refer to the FSP for sample packaging procedures.
- Samples will be assigned a unique sample number and will be affixed to a sample label. Refer to the FSP for sample labeling procedures.
- Samples will be properly and appropriately preserved by field personnel in order to minimize loss of the constituent(s) of interest due to physical, chemical, or biological mechanisms.
- Appropriate volumes will be collected to ensure that the appropriate reporting limits can be successfully achieved and that the required QC sample analyses can be performed.

4.1.2 Transfer of Custody and Shipment Procedures

- A chain-of-custody record will be completed at the time of sample collection and will accompany each shipment of project samples to the laboratory. The field personnel collecting the samples will be responsible for the custody of the samples until the samples are relinquished to the laboratory. Sample transfer will require the individuals relinquishing and receiving the samples to sign, date, and note the time of sample transfer on the chain-of-custody record.
- Samples will be shipped or delivered in a timely fashion to the laboratory so that holding times and/or analysis times as prescribed by the methodology can be met.
- Samples will be transported in containers (coolers) that will maintain the refrigeration temperature for those parameters for which refrigeration is required in the prescribed preservation protocols.
- Samples will be placed in an upright position and limited to one layer of samples per cooler. Additional bubble wrap or packaging material will be added to fill the cooler. Shipping containers will be secured with strapping tape and custody tape for shipment to the laboratory.
- When samples are split with the NYSDEC representatives, a separate chain-of-custody will be prepared and marked to indicate with whom the samples are shared. The person relinquishing the samples will require the representative's signature acknowledging sample receipt.
- If samples are sent by a commercial carrier, a bill of lading will be used. A copy of the bill of lading will be retained as part of the permanent record. Commercial carriers will not sign the custody record as long as the custody record is sealed inside the sample cooler and the custody tape remains intact.
- Samples will be picked up by a laboratory courier or transported to the laboratory the same day they are collected, unless collected on a weekend or holiday. In these cases, the samples will be stored in a secure location until delivery to the laboratory. Additional ice will be added to the cooler as needed to maintain proper preservation temperatures.

4.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES

A Sample Custodian will be designated by the laboratory and will have the responsibility to receive all incoming samples. Once received, the custodian will document if the sample is received in good condition (i.e., unbroken, cooled, etc.) and that the associated paperwork, such as chain-of-custody forms, has been completed. The custodian will sign the chain-of-custody forms.

The custodian will also document if sufficient sample volume has been received to complete the analytical program. The Sample Custodian will then place the samples into secure, limited-access storage (refrigerated storage, if required). The Sample Custodian will assign a unique number to each incoming sample for use in the laboratory. The unique number will then be entered into the sample-receiving log, with the verified time and date of receipt also noted.

Consistent with the analyses requested on the chain-of-custody form, analyses by the laboratory's analysts will begin in accordance with the appropriate methodologies. Samples will be removed from secure storage with internal chain-of-custody sign-out procedures followed.

4.3 STORAGE OF SAMPLES

Empty sample bottles will be returned to secure and limited-access storage after the available volume has been consumed by the analysis. Upon completion of the entire analytical work effort, samples will be disposed of by the Sample Custodian. The length of time that samples are held will be at least 30 days after reports have been submitted. Disposal of remaining samples will be completed in compliance with all federal, state, and local requirements.

4.4 FINAL PROJECT FILES CUSTODY PROCEDURES

The final project files will be the central repository for all documents with information relevant to sampling and analysis activities as described in this QAPP. The Haley & Aldrich of New York Project Manager will be the custodian of the project file. The project files, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews, will be maintained in a secured, limited-access area and under the custody of the Project Director or their designee.

The final project file will include the following:

- Project plans and drawings;
- Field data records;
- Sample identification documents and soil boring/monitoring well logs;
- All chain-of-custody documentation;
- Correspondence;
- References, literature;
- Laboratory data deliverables;
- Data validation and assessment reports;
- Progress reports, QA reports; and

- Final report.

The laboratory will be responsible for maintaining analytical logbooks, laboratory data, and sample chain-of-custody documents. Raw laboratory data files and copies of hard copy reports will be inventoried and maintained by the laboratory for a period of six years, at which time the laboratory will contact the Haley & Aldrich of New York Project Manager regarding the disposition of the project-related files.

5. Calibration Procedures and Frequency

5.1 FIELD INSTRUMENT CALIBRATION PROCEDURES

Several field instruments will be used for both on-site screening of samples and for health and safety monitoring, as described in the HASP. On-site air monitoring for health and safety purposes may be accomplished using a vapor detection device, such as a photoionization detector (PID).

Field instruments will be calibrated at the beginning of each day and checked during field activities to verify performance. Instrument-specific calibration procedures will be performed in accordance with the instrument manufacturer's requirements.

5.2 LABORATORY INSTRUMENT CALIBRATION PROCEDURES

Reference materials of known purity and quality will be utilized for the analysis of environmental samples. The laboratory will carefully monitor the preparation and use of reference materials, including solutions, standards, and reagents, through well-documented procedures.

All solid chemicals and acids/bases used by the laboratory will be rated as "reagent grade" or better. All gases will be "high" purity or better. All Standard Reference Materials (SRMs) or Performance Evaluation (PE) materials will be obtained from approved vendors of the National Institute of Standards and Technology (NIST; formerly National Bureau of Standards), the EPA Environmental Monitoring Support Laboratories (EMSL), or reliable Cooperative Research and Development Agreement (CRADA)-certified commercial sources.

6. Analytical Procedures

Analytical procedures to be utilized for analysis of environmental samples will be based on referenced EPA analytical protocols and/or project-specific SOPs.

6.1 FIELD ANALYTICAL PROCEDURES

Field analytical procedures include the measurement of pH, temperature, oxidation-reduction potential (ORP), dissolved oxygen (DO), and specific conductivity during sampling of groundwater, and the qualitative measurement of VOCs during the collection of soil samples.

6.2 LABORATORY ANALYTICAL PROCEDURES

Laboratory analyses will be based on the EPA methodology requirements promulgated in:

- "Test Methods for Evaluating Solid Waste," SW-846, EPA, Office of Solid Waste, and promulgated updates, 1986.

6.2.1 List of Project Target Compounds and Laboratory Detection Limits

The method detection limits (MDLs) studies are performed by the laboratories in accordance with the procedures established in the Code of Federal Regulations, Title 40, Part 136.

Laboratory parameters for soil samples are listed in the RAWP. Laboratory parameters for disposal samples will be determined by the disposal facility after an approved facility has been determined.

6.2.2 List of Method-Specific Quality Control Criteria

The laboratory SOPs include a section that presents the minimum QC requirements for the project analyses. Section 7.0 references the frequency of the associated QC samples for each sampling effort and matrix.

7. Internal Quality Control Checks

This section presents the internal QC checks that will be employed for field and laboratory measurements.

7.1 FIELD QUALITY CONTROL

7.1.1 Field Blanks

Internal QC checks will include analysis of field blanks to validate equipment cleanliness. Whenever possible, dedicated equipment will be employed to reduce the possibility of cross-contamination of samples.

7.1.2 Trip Blanks

Trip blanks samples will be prepared by the project laboratory using ASTM International (ASTM) Type II or equivalent water placed within pre-cleaned 40-milliliter (mL) VOC vials equipped with Teflon septa. Trip blanks will accompany each sample delivery group (SDG) of environmental samples collected for analysis of VOCs.

Trip blank samples will be placed in each cooler that stores and transports project samples that are to be analyzed for VOCs.

7.2 LABORATORY PROCEDURES

Procedures which contribute to maintenance of overall laboratory QA/QC include appropriately cleaned sample containers, proper sample identification and logging, applicable sample preservation, storage, and analysis within prescribed holding times, and use of controlled materials.

7.2.1 Field Duplicate Samples

The precision or reproducibility of the data generated will be monitored through the use of field duplicate samples. Field duplicate analysis will be performed at a frequency of one in 20 project samples.

Precision will be measured in terms of the absolute value of the relative percent difference (RPD) as expressed by the following equation:

$$RPD = [|R1-R2|/[(R1+R2)/2]] \; X \; 100\%$$

Acceptance criteria for duplicate analyses performed on solid matrices will be 100 percent, air matrices will be 35 percent, and aqueous matrices will be 35 percent (or the absolute difference rule was satisfied if detects were less than five times the Reporting Limit [RL] for solid and aqueous matrices only). RPD values outside these limits will require an evaluation of the sampling and/or analysis procedures by the project QA Officer and/or laboratory QA Director. Corrective actions may include re-analysis of additional sample aliquots and/or qualification of the data for use.

7.2.2 Matrix Spike Samples

Ten percent of each project sample matrix for each analytical method performed will be spiked with known concentrations of the specific target compounds/analytes.

The amount of the compound recovered from the sample compared to the amount added will be expressed as a percent recovery. The percent recovery of an analyte is an indication of the accuracy of an analysis within the site-specific sample matrix. Percent recovery will be calculated for matrix spike and matrix spike duplicate (MS/MSD) samples using the following equation.

$$\%\ Recovery = \frac{Spiked\ Sample - Background}{Known\ Value\ of\ Spike} x100\%$$

If the QC value falls outside the control limits (Upper Control Limit [UCL] or Lower Control Limit [LCL]) due to sample matrix effects, the results will be reported with appropriate data qualifiers. To determine the effect a non-compliant MS recovery has on the reported results, the recovery data will be evaluated as part of the validation process.

7.2.3 Laboratory Control Sample Analyses

The laboratory will perform Laboratory Control Sample (LCS) analyses prepared from SRMs. The SRMs will be supplied from an independent manufacturer and traceable to NIST materials with known concentrations of each target analyte to be determined by the analytical methods performed. In cases where an independently supplied SRM is not available, the LCS may be prepared by the laboratory from a reagent lot other than that used for instrument calibration.

The laboratory will evaluate LCS analyses in terms of percent recovery using the most recent laboratory-generated control limits.

LCS recoveries that do not meet acceptance criteria will be deemed invalid. Analysis of project samples will cease until an acceptable LCS analysis has been performed. If sample analysis is performed in association with an out-of-control LCS sample analysis, the data will be deemed invalid.

Corrective actions will be initiated by the Haley & Aldrich of New York QA Officer and/or Laboratory QA Officer to investigate the problem. After the problem has been identified and corrected, the solution will be noted in the instrument run logbook, and re-analysis of project samples will be performed, if possible.

The analytical anomaly will be noted in the SDG Case Narrative and reviewed by the Data Validator. The Data Validator will confirm that appropriate corrective actions were implemented and recommend the applicable use of the affected data.

7.2.4 Surrogate Compound/Internal Standard Recoveries

For VOCs, surrogates will be added to each sample prior to analysis to establish purge and trap efficiency. Quantitation will be accomplished via internal standardization techniques.

The recovery of surrogate compounds and internal standards will be monitored by laboratory personnel to assess possible Site-specific matrix effects on instrument performance.

For SVOC analyses, surrogates will be added to the raw sample to assess extraction efficiency. Internal standards will be added to all sample extracts and instrument calibration standards immediately before analysis for quantitation via internal standardization techniques.

Method-specific QC limits are provided in the attached laboratory method SOPs. Surrogate compound/internal standard recoveries that do not fall within accepted QC limits for the analytical methodology performed will have the analytical results flagged with data qualifiers as appropriate by the laboratory and will not be noted in the laboratory report Case Narrative.

To ascertain the effect non-compliant surrogate compound/internal standard recoveries may have on the reported results, the recovery data will be evaluated as part of the validation process. The Data Validator will provide recommendations for corrective actions, including but not limited to additional data qualification.

7.2.5 Calibration Verification Standards

Calibration verification (CV) standards will be utilized to confirm instrument calibrations and performance throughout the analytical process. CV standards will be prepared as prescribed by the respective analytical protocols. Continuing calibration will be verified by compliance with method-specific criteria prior to additional analysis of project samples.

Non-compliant analysis of CV standards will require immediate corrective action by the project laboratory QA Officer and/or designated personnel. Corrective action may include re-analysis of each affected project sample, a detailed description of the problem, the corrective action undertaken, the person who performed the action, and the resolution of the problem.

7.2.6 Laboratory Method Blank Analyses

Method blank sample analysis will be performed as part of each analytical batch for each methodology performed. If target compounds are detected in the method blank samples, the reported results will be flagged by the laboratory in accordance with SOPs. The Data Validator will provide recommendations for corrective actions, including but not limited to additional data qualification.

8. Data Quality Objectives

Sampling that will be performed as described in the RAWP is designed to produce data of the quality necessary to achieve the minimum standard requirements of the field and laboratory analytical objectives described below. These data are being obtained with the primary objective of assessing levels of contaminants of concern associated with the Site.

The overall project data quality objective (DQO) is to implement procedures for field data collection, sample collection, handling, and laboratory analysis and reporting that achieve the project objectives. The following section is a general discussion of the criteria that will be used to measure the achievement of the project DQO.

8.1 PRECISION

8.1.1 Definition

Precision is defined as a quantitative measure of the degree to which two or more measurements are in agreement. Precision will be determined by collecting and analyzing field duplicate samples and by creating and analyzing laboratory duplicates from one or more of the field samples. The overall precision of measurement data is a mixture of sampling and analytical factors. The analytical results from the field duplicate samples will provide data on sampling precision. The results from duplicate samples created by the laboratory will provide data on analytical precision. The measurement of precision will be stated in terms of RPD. RPD is defined as the absolute difference of duplicate measurements divided by the mean of these analyses, normalized to a percentage.

8.1.2 Field Precision Sample Objectives

Field precision will be assessed through collection and measurement of field duplicate samples at a rate of one duplicate per 20 investigative samples. The RPD criteria for the project field duplicate samples will be +/- 100 percent for soil, +/- 35 percent for groundwater for parameters of analysis detected at concentrations greater than five times the laboratory RL, and +/- 35 percent for air for parameters of analysis detected at any concentration.

8.1.3 Laboratory Precision Sample Objectives

Laboratory precision will be assessed through the analysis of LCS and laboratory control sample duplicate (LCSD) and MS/MSD samples for groundwater and soil samples, and the analysis of laboratory duplicate samples for air and soil vapor samples. Air and soil vapor laboratory duplicate sample analyses will be performed by analyzing the same Summa canister twice. The RPD criteria for the air/soil vapor laboratory duplicate samples will be +/- 35 percent for parameters of analysis detected at concentrations greater than five times the laboratory RL.

8.2 ACCURACY

8.2.1 Definition

Accuracy relates to the bias in a measurement system. Bias is the difference between the observed and the "true" value. Sources of error are the sampling process, field contamination, preservation techniques, sample handling, sample matrix, sample preparation, and analytical procedure limitations.

8.2.2 Field Accuracy Objectives

Sampling bias will be assessed by evaluating the results of the field equipment rinse and trip blanks. Equipment rinse and trip blanks will be collected as appropriate based on sampling and analytical methods for each sampling effort.

If non-dedicated sampling equipment is used, equipment rinse blanks will be collected by passing ASTM Type II water over and/or through the respective sampling equipment utilized during each sampling effort. One equipment rinse blank will be collected for each type of non-dedicated sampling equipment used for the sampling effort. Equipment rinse blanks will be analyzed for each target parameter for the respective sampling effort for which environmental media have been collected. (Note: If dedicated or disposable sampling equipment is used, equipment rinse samples will not be collected as part of that field effort.)

Trip blank samples will be prepared by the laboratory and provided with each shipping container, which includes containers for the collection of groundwater samples for the analysis of VOCs. Trip blank samples will be analyzed for each VOC for which groundwater samples have been collected for analysis.

8.3 LABORATORY ACCURACY OBJECTIVES

Analytical bias will be assessed through the use of LCS and Site-specific MS sample analyses. LCS analyses will be performed with each analytical batch of project samples to determine the accuracy of the analytical system.

One set of MS/MSD analyses will be performed with each batch of 20 project samples collected for analysis to assess the accuracy of the identification and quantification of analytes within the Site-specific sample matrices. Additional sample volume will be collected at sample locations selected for the preparation of MS/MSD samples so that the standard laboratory RLs are achieved.

The accuracy of analyses that include a sample extraction procedure will be evaluated through the use of system monitoring or surrogate compounds. Surrogate compounds will be added to each sample, standard, blank, and QC sample prior to sample preparation and analysis. Surrogate compound percent recoveries will provide information on the effect of the sample matrix on the accuracy of the analyses.

8.4 REPRESENTATIVENESS

8.4.1 Definition

Representativeness expresses the degree to which sample data represent a characteristic of a population, a parameter variation at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the design of the sampling program. The representativeness criterion is satisfied through the proper selection of sampling locations, the quantity of samples, and the use of appropriate procedures to collect and analyze the samples.

8.4.2 Measures to Ensure Representativeness of Field Data

Representativeness will be addressed by prescribing sampling techniques and the rationale used to select sampling locations. Sampling locations may be biased (based on existing data, instrument surveys, observations, etc.) or unbiased (completely random or stratified-random approaches).

8.5 COMPLETENESS

8.5.1 Definition

Completeness is a measure of the amount of valid (usable) data obtained from a measuring system compared to the total amount anticipated to be obtained. The completeness goal for all data uses is that a sufficient amount of valid data be generated so that determinations can be made related to the intended data use with a sufficient degree of confidence. Valid data are determined by independent confirmation of compliance with method-specific and project-specific DQOs. The calculation of data set completeness will be performed by the following equation.

$$\frac{Number\ of\ Valid\ Sample\ Results}{Total\ Number\ of\ Samples\ Planned}\ X\ 100 = \%\ Complete$$

8.5.2 Field Completeness Objectives

Completeness is a measure of the number of valid measurements obtained from measurements taken in this project versus the number planned. Field completeness objective for this project will be greater than 90 percent.

8.5.3 Laboratory Completeness Objectives

Laboratory data completeness objective is a measure of the amount of valid data obtained from laboratory measurements. The evaluation of the data completeness will be performed at the conclusion of each sampling and analysis effort.

The completeness of the data generated will be determined by comparing the amount of valid data, based on independent validation, with the total laboratory data set. The completeness goal will be greater than 90 percent.

8.6 COMPARABILITY

8.6.1 Definition

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another.

8.6.2 Measures to Ensure Comparability of Laboratory Data

Comparability of laboratory data will be measured from the analysis of SRMs obtained from either EPA CRADA suppliers or the NIST. The reported analytical data will also be presented in standard units of mass of contaminant within a known volume of environmental media. The standard units for various sample matrices are as follows:

- Solid Matrices – micrograms per kilogram (µg/kg) for PFAS analyses, milligrams per kilogram (mg/kg) of media (Dry Weight).

8.7 LEVEL OF QUALITY CONTROL EFFORT

If non-dedicated sampling equipment is used, equipment rinse blanks will be prepared by field personnel and submitted for analysis of target parameters. Equipment rinse blank samples will be analyzed to check for potential cross-contamination between sampling locations that may be introduced during the investigation. One equipment rinse blank will be collected per sampling event to the extent that non-dedicated sampling equipment is used.

If necessary, a separate equipment rinse blank sample will be collected for PFAS to assess potential contamination introduced from utilized equipment. (Note: If dedicated or disposable sampling equipment is used, equipment rinse samples will not be collected as part of that field effort.)

Trip blanks will be used to assess the potential for contamination during sample storage and shipment. Trip blanks will be provided with the sample containers to be used for the collection of groundwater samples for the analysis of VOCs. Trip blanks will be preserved and handled in the same manner as the project samples. One trip blank will be included along with each shipping container containing project samples to be analyzed for VOCs.

Method blank samples will be prepared by the laboratory and analyzed concurrently with all project samples to assess potential contamination introduced during the analytical process.

Field duplicate samples will be collected and analyzed to determine sampling and analytical reproducibility. One field duplicate will be collected for every 20 or fewer investigative samples collected for off-Site laboratory analysis.

MS will provide information to assess the precision and accuracy of the analysis of the target parameters within the environmental media collected. One MS/MSD will be collected for every 20 or fewer investigative samples per sample matrix.

Note: Soil MS/MSD samples require triple sample volume for VOCs only.

9. Data Reduction, Validation, and Reporting

Data generated by the laboratory operation will be reduced and validated prior to reporting in accordance with the following procedures:

9.1 DATA REDUCTION

9.1.1 Field Data Reduction Procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. The pH, conductivity, temperature, turbidity, DO, ORP, and breathing zone VOC readings collected in the field will be generated from direct read instruments. The data will be written into field logbooks immediately after measurements are taken. If errors are made, data will be legibly crossed out, initialed, and dated by the field member, and corrected in a space adjacent to the original entry.

9.1.2 Laboratory Data Reduction Procedures

Laboratory data reduction procedures are provided by the appropriate chapter of the EPA's "Test Methods for Evaluating Solid Waste," SW-846, Third Edition. Errors will be noted and corrections made with the original notations crossed out legibly. Analytical results for soil samples will be calculated and reported on a dry weight basis.

9.1.3 Quality Control Data

QC data (e.g., laboratory duplicates, surrogates, MS, and MSD) will be compared to the method acceptance criteria. Data determined to be acceptable will be entered into the laboratory information management system.

Unacceptable data will be appropriately qualified in the project report. Case Narratives will be prepared, which will include information concerning data that fell outside acceptance limits and any other anomalous conditions encountered during sample analysis.

9.2 DATA VALIDATION

Data validation procedures of the analytical data will be performed by the Haley & Aldrich of New York QA Officer or designee using the following documents as guidance for the review process:

- "U.S. EPA National Functional Guidelines for Organic Data Review," "Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15," "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances Under NYSDEC's Part 375 Remedial Programs," and the "U.S. EPA National Functional Guidelines for Inorganic Data Review."
- The specific data qualifiers used will be applied to the reported results as presented and defined in the EPA National Functional Guidelines. Validation will be performed by qualified personnel at the direction of the Haley & Aldrich of New York QA Officer. Tier 1 data validation (the equivalent of EPA's Stage 2A validation) will be performed to evaluate data quality.

- The completeness of each data package will be evaluated by the Data Validator. Completeness checks will be administered on all data to determine that the deliverables are consistent with the NYSDEC Analytical Services Protocol (ASP) Category A and Category B data package requirements. The validator will determine whether the required items are present and request copies of missing deliverables (if necessary) from the laboratory.

9.3 DATA REPORTING

Data reporting procedures will be carried out for field and laboratory operations as indicated below:

- Field Data Reporting: Field data reporting will be conducted principally through the transmission of report sheets containing tabulated results of measurements made in the field and documentation of field calibration activities.
- Laboratory Data Reporting: The laboratory data reporting package will enable data validation based on the protocols described above. The final laboratory data report format will include the QA/QC sample analysis deliverables to enable the development of a DUSR based on NYSDEC DER-10, Appendix 2B.

10. Performance and System Audits

A performance audit is an independent quantitative comparison with data routinely obtained in the field or the laboratory. Performance audits include two separate, independent parts: internal and external audits.

10.1 FIELD PERFORMANCE AND SYSTEM AUDITS

10.1.1 Internal Field Audit Responsibilities

Internal audits of field activities will be initiated at the discretion of the Project Manager and will include the review of sampling and field measurements. The audits will verify that all procedures are being followed. Internal field audits will be conducted periodically during the project. The audits will include examination of the following:

- Field sampling records, screening results, and instrument operating records;
- Sample collection;
- Handling and packaging in compliance with procedures;
- Maintenance of QA procedures; and
- Chain-of-custody reports.

10.1.2 External Field Audit Responsibilities

External audits may be conducted by the Project Coordinator at any time during the field operations. These audits may or may not be announced and are at the discretion of the NYSDEC. The external field audits can include (but are not limited to) the following:

- Sampling equipment decontamination procedures;
- Sample bottle preparation procedures;
- Sampling procedures;
- Examination of HASPs;
- Procedures for verification of field duplicates; and
- Field screening practices.

10.2 LABORATORY PERFORMANCE AND SYSTEM AUDITS

10.2.1 Internal Laboratory Audit Responsibilities

The laboratory system audits are typically conducted by the laboratory QA Officer or designee on an annual basis. The system audit will include an examination of laboratory documentation, including sample receiving logs, sample storage, chain-of-custody procedures, sample preparation and analysis, and instrument operating records.

At the conclusion of internal system audits, reports will be provided to the laboratory's operating divisions for appropriate comment and remedial/corrective action where necessary. Records of audits and corrective actions will be maintained by the Laboratory QA Officer.

10.2.2 External Laboratory Audit Responsibilities

External audits will be conducted as required by the NYSDEC, NYSDOH, or designee. External audits may include any of the following:

- Review of laboratory analytical procedures
- Laboratory on-site visits
- Submission of performance evaluation samples for analysis

Failure of any of the above audit procedures can lead to laboratory de-certification. An audit may consist of, but not be limited to:

- Sample receipt procedures
- Custody, sample security, and log-in procedures
- Review of instrument calibration logs
- Review of QA procedures
- Review of logbooks
- Review of analytical SOPs
- Personnel interviews

A review of a data package from samples recently analyzed by the laboratory can include (but not be limited to) the following:

- Comparison of the resulting data to the SOP or method
- Verification of initial and continuing calibrations within control limits
- Verification of surrogate recoveries and instrument timing results
- Review of extended quantitation reports for comparisons of library spectra to instrument spectra, where applicable
- Assurance that samples are run within holding times

11. Preventive Maintenance

11.1 FIELD INSTRUMENT PREVENTIVE MAINTENANCE

The field equipment preventive maintenance program is designed to ensure the effective completion of the sampling effort and to minimize equipment downtime. Program implementation is concentrated in three areas:

- Maintenance responsibilities
- Maintenance schedules
- Inventory of critical spare parts and equipment

The maintenance responsibilities for field equipment will be assigned to the task leaders in charge of specific field operations. Field personnel will be responsible for daily field checks and calibrations and for reporting any problems with the equipment. The maintenance schedule will follow the manufacturer's recommendations. In addition, the field personnel will be responsible for determining that an inventory of spare parts will be maintained with the field equipment. The inventory will primarily contain parts that are subject to frequent failure, have limited useful lifetimes, and/or cannot be obtained in a timely manner.

11.2 LABORATORY INSTRUMENT PREVENTIVE MAINTENANCE

Analytical instruments at the laboratory will undergo routine and/or preventive maintenance. The extent of the preventive maintenance will be a function of the complexity of the equipment.

Generally, annual preventive maintenance service will involve cleaning, adjusting, inspecting, and testing procedures designed to reduce instrument failure and/or extend useful instrument life. Between visits, routine operator maintenance and cleaning will be performed according to manufacturer's specifications by laboratory personnel.

12. Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness

12.1 FIELD MEASUREMENTS

Field-generated information will be reviewed by the Field Coordinator and typically includes evaluation of bound logbooks/forms, data entry, and calculation checks. Field data will be assessed by the Project Coordinator, who will review the field results for compliance with the established QC criteria that are specified in Sections 7.0 and 8.0 of this QAPP. The accuracy of pH and specific conductance will be assessed using daily instrument calibration, calibration check, and blank data. Accuracy will be measured by determining the percent recovery (% R) of calibration check standards. Precision of the pH and specific conductance measurements will be assessed on the basis of the reproducibility of duplicate readings of a field sample and will be measured by determining the RPD. Accuracy and precision of the soil VOC screening will be determined using duplicate readings of calibration checks. Field data completeness will be calculated using the following equation:

$$Completeness = \frac{Valid\ (usable)\ Data\ Obtained}{Total\ Data\ Planned} \ X\ 100$$

12.2 LABORATORY DATA

Laboratory data will be assessed by the Haley & Aldrich of New York QA Officer or designee, who will review the laboratory results for compliance with the established QC criteria that are specified in Sections 7.0 and 8.0 of this QAPP.

13. Quality Assurance Reports

Critically important to the successful implementation of the QAPP is a reporting system that provides the means by which the program can be reviewed, problems identified, and programmatic changes made to improve the plan.

QA reports to management can include:

- Audit reports, internal and external audits, with responses
- Performance evaluation sample results: internal and external sources
- Daily QA/QC exception reports/corrective actions

QA/QC corrective action reports will be prepared by the Haley & Aldrich of New York QA Officer when appropriate and presented to the project and/or laboratory management personnel so that performance criteria can be monitored for all analyses from each analytical department. The updated trend/QA charts prepared by the laboratory QA personnel will be distributed and reviewed by various levels of the laboratory management.

References

1. New York State Department of Environmental Conservation, NYSDEC Analytical Services Protocol (ASP), Bureau of Environmental Investigation, 1991 with updates.

2. New York State Department of Environmental Conservation, NYSDEC, Division of Environmental Remediation, Technical Guidance for Site Investigation and Remediation, DER-10, May 2010.

3. New York State Department of Environmental Conservation, NYSDEC, Division of Environmental Remediation, Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC Part 375 Remedial Program, April 2023.

4. United States Environmental Protection Agency (1991). Preparation Aids for the Development of Category I Quality Assurance Project Plans. U.S. EPA/600/8-91/003, Risk Reduction Engineering Laboratory, Office of Research and Development, Cincinnati, Ohio, February 1991.

5. United States Environmental Protection Agency, (1992). Specifications and Guidance for Contaminant-Free Sample Containers. OSWER Directive 9240.0-05A, April 1992.

6. United States Environmental Protection Agency, (1993). Data Quality Objectives Process for Superfund Interim Final Guidance. U.S. EPA/540/R-93-071, Office of Solid Waste and Emergency Response (OSWER), September 1993.

7. United States Environmental Protection Agency, (1999). EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations. EPA QA/R-5 Interim Final, November 1999.

8. United States Environmental Protection Agency. Test Methods for Evaluating Solid Waste, Office of Solid Waste, U.S. EPA, SW-846, November 1986, with updates.

9. United States Environmental Protection Agency. U.S. EPA National Functional Guidelines for Organic Data Review. U.S. EPA 540/R-2017-002.

10. United States Environmental Protection Agency. U.S. EPA National Functional Guidelines for Organic Data Review. U.S. EPA 540/R-2017-001.

TABLE

TABLE I
SUMMARY OF ANALYSIS METHOD, PRESERVATION METHOD, HOLDING TIME, SAMPLE SIZE REQUIREMENTS, AND SAMPLE CONTAINERS
4001 4TH AVENUE REDEVELOPMENT SITE
4001-4011 4TH AVENUE
BROOKLYN, NEW YORK

Analysis/Method[2]	Sample Type	Preservation	Holding Time	Volume/Weight	Container[3]
Volatile Organic Compounds/8260	Soil	1 - 1 Vial MeOH/2 Vial Water, Cool, 4 ± 2 °C	14 days[1]	120 mL	3 - 40ml glass vials
Semivolatile Organic Compounds/8270	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 8 oz Glass
Pesticides/8081	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 4 oz Glass
Polychlorinated Biphenyls/8082	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 4 oz Glass
TAL Metals/6010	Soil	Cool, 4 ± 2 °C	180 days	60 mL	1 - 4 oz Glass
PFAS/1633A	Soil	Cool, 4 ± 2 °C	28 days extraction / 40 days analysis	To be determined by laboratory	1 - HDPE container
1,4-Dioxane/8270 SIM	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 8 oz Glass

Notes:

1. Terracores and encores must be frozen within 48 hours of collection
2. Equivalent method can be used.
3. Volume may vary by laboratory and/or equivalent method.

ATTACHMENT A
Project Team Resumes

SUZANNE BELL, PE

Program Manager, Environmental Engineer

EDUCATION

BS, Biosystems Engineering, University of Arizona

PROFESSIONAL REGISTRATIONS

AZ: Environmental Engineer (Reg. No. 61995)
NY: Professional Engineer (Reg No. 106301)

PROFESSIONAL COMMITTEES

American Council of Engineering Companies of New York – New York State Department of Environmental Conservation Committee Member – 2024-2025

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste and Operations Emergency Response Training (29 CFR 1910.120 and 40 CFR 265.16)
8-Hour HAZWOPER Refresher Course

Suzanne is a senior project manager with over 17 years of experience in the environmental consulting industry. She has worked on soil and groundwater environmental investigations, remediation projects, and prepared reports for private, industrial, and government clients. Her technical experience includes remediation systems; soil and groundwater feasibility studies; Phase I site investigations; environmental file review and historical research; stormwater assessments and SWPPP preparation; reclamation planning for the sand and gravel mining industry; air permitting; and data interpretation.

In New York, Suzanne has experience as an Engineer of Record in completing site closure documentation including Remedial Closure Reports reviewed by the Office of Environmental Remediation as well as Final Engineering Reports and Site Management Plans reviewed by the New York State Department of Environmental Conservation.

Suzanne has managed the investigation, remedial design, remediation and closeout of sites in the Brownfield Cleanup Program and petroleum spill case sites. Her background also includes developing and complying with approved site management plans overseeing the operation and maintenance of on-site engineering controls, such as soil vapor extraction systems, sub-slab depressurization systems, product recovery systems, and ensuring the protection of human health and the environment.

RELEVANT PROJECT EXPERIENCE

Bedford Beverly Redevelopment Site, Brooklyn, New York. Suzanne served as engineer of record for execution of Remedial Action Work Plans for an approximately 5.31-acre non-contiguous property located in the Flatbush neighborhood in the borough of Brooklyn, New York under the New York State Brownfield Cleanup Program (NYSBCP). The remedy included removal of thirteen undocumented underground storage tanks (USTs), removal of over 115,000 tons of non-hazardous and hazardous soil, hotspot excavations, injections of zerovalent iron to treat tetrachlorethylene in groundwater, injection of alkaline-activated persulfate to treat petroleum-based volatile organic compounds in groundwater and establishing a Site Management Plan (SMP) for Institutional and Engineering Controls. The site is being redeveloped from a vacant auto service center, vast open air parking lots, and a vacant commercial building into a vibrant community development. In addition to new residential housing, which includes affordable units, and commercial spaces, the project has preserved the highly recognizable Sears Roebuck & Company Department Store. This includes maintaining its historical architecture, updating the building to meet modern standards, introducing commercial spaces that were previously underutilizing, and maintaining the character of the neighborhood.

Development, EPA Site RCRA-02-2009-7306, NYSDEC Site 243016, Former Port Mobil Terminal, Staten Island, New York. Engineer and project manager responsible for the preparation of the feasibility study, preparation of the Interim Remedial Report, completion of the Interim Remedial Measure, completion of the remedial investigation stages, continued execution of the Monitoring and Natural Attenuation Program, preparation of the Remedial Action Work Plan/Remedial Designs, and RCRA Closure procedures for the Port Mobil Terminal Site under an Environmental Protection Agency and New York State DEC Consent Order. The Site has a footprint of approximately 240 acres with a planned development for commercial/industrial uses.

Rogers Snyder Brownfield Site, 858 Rogers Avenue and 2605 Snyder Avenue, Brooklyn, New York. Suzanne served as engineer of record for execution of Remedial Action Work Plan at the Rogers Snyder redevelopment project under the NYSBCP. Responsible for remedial oversight of excavation and removal of non-hazardous and hazardous soil, endpoint sample collection, air monitoring, communication with soil brokerage firm and environmental laboratory, preparation of the FER.

Former Garone Bros Auto Service Center Site, 352-362 Shepherd Avenue, Brooklyn, New York. Suzanne served as engineer of record for execution of Remedial Action Work Plan at the 352-362 Shepherd redevelopment project under the NYSBCP. Responsible for remedial oversight of excavation and removal of non-hazardous soil, removal of USTs, endpoint sample collection, air monitoring, communication with soil brokerage firm and environmental laboratory, preparation of the FER.

Former Fielder Waterproofing & Masonry Site, 91 Bruckner Boulevard, Bronx, New York. Suzanne served as engineer of record for execution of Remedial Action Work Plan at the 91 Bruckner redevelopment project under the NYSBCP. Responsible for remedial oversight of excavation and removal of non-hazardous and hazardous soil, removal of USTs, endpoint sample collection, air monitoring, communication with soil brokerage firm and environmental laboratory, preparation of the FER and SMP.

828 Metropolitan Avenue Site, 808-834 Metropolitan Avenue, Brooklyn, New York. Suzanne served as project manager and engineer of record for execution of Remedial Action Work Plan at the 828 Metropolitan Avenue redevelopment project under the NYSBCP. Responsible for remedial oversight of excavation and removal of non-hazardous soil, removal of USTs, endpoint sample collection, air monitoring, communication with soil brokerage firm and environmental laboratory, preparation of Daily Field Reports (DFRs) and the Final Engineering Report (FER).

Waterfront Property Management, 89-91 Gerry Street and 93 Gerry Street, Brooklyn, New York. Suzanne served as project manager for execution of Remedial Action Work Plans at the former Just4Wheels Site and Just4Wheels Site 2 under the New York State Brownfield Cleanup Program (NYSBCP). Responsible for remedial oversight of excavation and removal of non-hazardous and hazardous soil, endpoint sample collection, removal of USTs, air monitoring, dewatering system installation support, communication with soil brokerage firm and environmental laboratory, preparation of DFRs and the FER.

Multiple Clients, Remedial Investigation Work Plans and BCP Applications, New York City, New York. As project manager and engineer, Suzanne has prepared NYSBCP Applications and Remedial Investigation Work Plans for the New York State Department of Environmental Conservation (NYSDEC) for sites within the New York City boroughs.

Multiple Clients, Remedial Action Work Plans, New York City, New York. As project manager and engineer of record, Suzanne has prepared Remedial Action Work Plans for the NYSDEC for sites within the New York City boroughs.

Excavation Oversight and CAMP Monitoring, Various Sites, New York City, New York. Suzanne has served as project manager for projects under the New York City Office of Environmental Remediation (NYCOER) program and NYSBCP. Her responsibilities included managing excavation oversight, air monitoring, and logging trucks for off-site disposal.

Aerospace Manufacturing Facility, Feasibility Study and Remedial Action Plan, Chula Vista, CA. Suzanne co-authored feasibility studies for soil and ground water impacted by chlorinated solvents, metals, and PCBs. She screened ex-situ and in-situ remedial alternatives for effectiveness, implementability, and protectiveness of human health. She also assessed alternative cleanup levels for technical and economic feasibility of achieving background concentrations in accordance with State Water Resources Control Board Resolution 92-49. Additionally, she evaluated groundwater remedial alternatives, including bioremediation, monitored natural attenuation (MNA), pump and treat, chemical oxidation, chemical reduction, and engineered and institutional controls. Lastly, she prepared engineering cost estimates and conceptual designs. Assisted with the preparation of remedial action plans: a bioremediation remedy and MNA program for groundwater, and excavation of contaminated soil.

Aerospace Manufacturing Facility, Groundwater Remediation and Bioremediation Pilot Test, Riverside, CA. Suzanne assisted with data analysis and reporting for the bioremediation pilot test study for groundwater impacted by chlorinated solvents, hexavalent chromium, and 1,4-dioxane. She evaluated site data for trends indicative of MNA using statistical analysis.

Goodyear Tire & Rubber Company, Phoenix Goodyear Airport South Superfund Site, Goodyear, Arizona. Suzanne prepared reports and performed data analysis related to the groundwater monitoring program and operation and maintenance of groundwater treatment systems. Currently, two groundwater extraction and remediation systems are capable of treating more than 1 million gallons per day of groundwater contaminated with trichloroethylene. The upper groundwater zone is treated with an air stripper, while the lower zone is treated with granulated activated carbon. Treated groundwater is reinjected into their respective zones.

Soil and Groundwater Remediation Systems, Arizona. Suzanne **p**erformed operation, maintenance, and sampling activities for two soil vapor extraction systems to remove tetrachloroethylene from subsurface soils at two different dry-cleaning facilities. She prepared soil vapor extraction GAC system test reports in accordance with Maricopa County Air Quality Department Permits.

ASTM Phase I Environmental Site Assessments, Arizona. Suzanne assisted with ASTM Phase I ESAs at various industrial facilities in central and southern Arizona. She evaluated site conditions and regulatory implications as they related to the owner's or potential buyer's property development plans.

Phoenix-Goodyear Airport-North Superfund Site, Focused Feasibility Study, Goodyear, Arizona. Suzanne was a member of team that prepared a source area remediation focused feasibility study report. She evaluated several technologies and alternatives to treat groundwater contaminated with trichloroethylene (TCE) and perchlorate. She analyzed remedial alternatives, including in-well air stripping, a hydraulic barrier, nano- and macro-scale zero-valent iron, anaerobic reductive dechlorination, in-situ chemical oxidation (permanganate), and electrical resistive heating. She prepared cost estimates, conceptual designs, remediation technology summaries, and sustainability evaluation of the alternatives.

Enhanced In-Situ Bioremediation (EISB) and Chemical Reduction Using a Nanoscale, Zero-Valent Metallic Alloy to Treat Co-disposed Chloroethanes and Chloroethenes in Groundwater, Manufacturing Facility, Canton, MA. Suzanne performed data analysis and prepared status reports on effectiveness of EISB in treating chlorinated solvents in shallow groundwater. She reported on the performance monitoring results for the permeable reactive barrier in deep zone groundwater.

Hayden Facilities RI/FS, ASARCO LLC, Hayden, Arizona. Suzanne served as Quality Assurance Officer for the air monitoring program at a copper smelting facility. She developed site-specific data validation procedures according EPA guidelines for several analytical methods.

Market Evaluation for Nanoscale Zero-Valent Iron, Stamford, Connecticut. Suzanne used EPA CERCLIS Public Access Database and select State databases to estimate the market size for potential use of nanoscale zero-valent iron (nZVI) as a remediation technology. She compiled competing vendor information and quotes to estimate the average cost of similar products. She utilized the U.S. Patent and Trademark Office database to analyze competing technologies.

Arizona Pollutant Discharge Elimination System (AZPDES) and National Pollutant Discharge Elimination System (NPDES) Permits, Arizona. Suzanne prepared AZPDES and NPDES) permit renewal applications for a copper mining facility in Southern Arizona, which included updates to the facility's Storm Water Pollution Prevention Plan (SWPPP) and QA Manual.

Spill Prevention, Control and Countermeasure Plans, Aggregate Mining Facilities, Arizona. Suzanne assisted with a Spill Prevention, Control and Countermeasure Plans (SPCC) for aggregate mining facilities in Arizona. She performed site visit, evaluated fuel and oil tanks and secondary containment areas, assisted with calculations to verify compliance, and prepared report.

Copper Mining Facility, Miami, Arizona. Suzanne assisted with Toxic Release Inventory (TRI) and Toxic Substances Control Act (TSCA) reporting, both submitted to the EPA.

Storm Water Pollution Prevention Plan, Franciscan Friars of California, Gila County, Arizona. Suzanne updated the SWPPP for construction activities related to the closure of a historic Gibson copper mine, authorized under the Arizona Pollutant Discharge Elimination System "General Permit for Discharge from Construction Activities to Waters of the United States." The Former Gibson Mine is a small, historic copper mine, located approximately 7 miles southwest of Miami, Arizona, in Gila County. Construction activities covered under the updated SWPPP consisted of the excavation, hauling, and removal of approximately 80,000 tons of soil cover from the Mineral Creek side of the site to mine-scarred areas on the Pinto Creek side of the site. Also included was final grading of the site, which consisted of re-contouring and re-defining any portion of the drainages that were on site; and revegetation.

Stormwater Pollution Prevention Plans, Vulcan Materials Company, Western Division, Arizona. Suzanne prepared SWPPP for 11 aggregate mining facilities in Arizona. Performed site visits, analyzed stormwater flows, prepared reports, and completed Notices of Intent for the Arizona Department of Environmental Quality under a Multi-Sector General Permit.

Uranium Enrichment Facility, Lea County, New Mexico. Suzanne prepared quarterly and annual groundwater monitoring reports, semi-annual radioactive effluent release reports, and radiological environmental monitoring program reports in accordance with New Mexico Environment Department regulations and the Nuclear Regulatory Commission. Performed quarterly data validation on a variety of matrices and analytical methods. She prepared site-specific environmental monitoring procedures, which included field sampling techniques; data collection, management and validation; and an air modeling software package.

Rocket Testing and Research Facility, Western U.S. Suzanne analyzed and evaluated groundwater quality data, prepared reports, and managed data for this Resource Conservation and Recovery Act (RCRA) site. Assisted with management of sampling, analysis, and reporting of constituents of concern for fractured sandstone bedrock aquifer impacted by chlorinated solvents and emergent chemicals 1,4-dioxane, perchlorate, and n-nitrosodimethylamine (NDMA). Performed data validation of water quality data according to U.S. EPA National Functional Guidelines. Queried data from client environmental data management system and prepared summary tables, concentration plots, and water level hydrographs using Microsoft Excel programs. She prepared a quarterly analytical schedule using an Access database application, updated the site-specific Health & Safety Plan, and participated in lean training, which reduced cost of groundwater monitoring tasks by 25 percent.

Federal Superfund Site, Eastern Massachusetts. Suzanne performed data validation and quality assurance/quality control of soil and groundwater data according to U.S. EPA National Functional Guidelines. She performed third-party database updates.

Great Western Bank, Cortaro Ranch Property, Marana, Arizona. For site characterization of undeveloped land, Suzanne performed surficial soil sampling, analytical laboratory coordination, data analysis, and report preparation.

Twin Buttes Properties, Inc., Southern Arizona. Suzanne assisted with report and analytical table preparation for the characterization and analysis of current and historical hydrologic conditions at an inactive mine site near Sahuarita, Arizona in support of regulatory compliance.

Skyworks Solutions, Inc. Site, Newbury Park, California. Suzanne assisted with report and analytical table preparation for a subsurface investigation characterizing the lateral and vertical extent of soil and groundwater impacts from known releases of TCE, 1,4-dioxane and other organic compounds.

PUBLICATIONS

"Mixed Redox Catalytic Destruction of Chlorinated Solvents in Soils and Groundwater," with S. Gao, E. Rupp, M. Willinger, T. Foley, B. Barbaris, A.E., Saez, R.G. Arnold and E. Betterton. In Environmental Challenges in The Pacific Basin, 2008; Annals of the New York Academy of Sciences, Vol. 1140, pp 435-445. PMID: 18991945

INVITED LECTURER OR SPEAKER

"Catalytic Destruction of Perchloroethylene," with E. Betterton, R. Arnold and Eduardo Saez, Presenter - NASA Space Grant Student Symposium, Phoenix, Arizona. April 2007.



MARI C. CONLON

Senior Client Account Manager

EDUCATION

MS, Geology, Boston College

BS, Geology with a minor in Economics and Business, Lafayette College

PROFESSIONAL REGISTRATIONS

NY: Professional Geologist (License No. 000769)

PROFESSIONAL SOCIETIES

Big Apple Brownfield Awards, Co-Chair, 2018-2022

Big Apple Brownfield Awards Nomination Committee, 2016-2025

New York City Brownfield Partnership Executive Board, 2021-2025

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)

10-Hour OSHA Construction Safety

8-Hour OSHA Supervisor of Hazardous Waste (29 CFR 1910.120 & 29 CFR 1926.65)

Mari is a senior client account manager with experience in soil, groundwater and soil vapor investigation and a focus on remedial design and implementation. She is also experienced in completion of numerous Phase I Environmental Site Assessments and Phase II Environmental Site Investigations, site characterization, hazardous materials analysis, regulatory closure reports as well as remedial design and implementation.

Mari has experience in composing site closure documentation including Remedial Closure Reports and Noise Installation Reports reviewed by the Office of Environmental Remediation as well as Final Engineering Reports and Site Management Plans reviewed by the New York State Department of Environmental Conservation. Mari has also worked on city rezoning proposals by performing work associated with and composing the Hazardous Materials Analysis chapter included in Final Environmental Impact Statements published by New York City Department of Planning. Analysis methods were performed in accordance with the City Environmental Quality Review (CEQR) guidelines for neighborhoods including East New York, Brooklyn, Jerome Avenue, Brooklyn, Inwood, and Manhattan.

Mari has managed the investigation, remedial design, remediation and closeout of multiple inactive Resource Conservation and Recovery Act (RCRA) hazardous waste sites, New York State Superfund sites and petroleum spill case sites. Her background includes developing and complying with approved site management plans overseeing the operation and maintenance of on-site engineering controls, such as soil vapor extraction systems, sub-slab depressurization systems, product recovery systems, etc., and ensuring the protection of human health and the environment.

RELEVANT PROJECT EXPERIENCE

State and City Agencies

School Construction Authority, Waste Characterization and Excavation Materials Disposal Plan, Brooklyn, New York. Project manager for consulting services for New York Public School 127. Services included composition of an Excavated Materials Disposal Plan, collection of waste characterization samples and preparation of and preparation of a findings and recommendations report.

Department of City Planning, Rezoning Environmental Impact Statement, Bronx, New York. Project lead for analysis and composing the Hazardous Materials Chapter as per City Environmental Quality Review (CEQR) Technical Manual guidelines included in the Final Environmental Impact Statement (FEIS) for an approximately 92-block area primarily along Jerome Avenue and its east-west commercial corridors in the Bronx. The review assessed the potential for the

presence of hazardous materials in soil and/or groundwater at both the projected and potential development sites identified in the reasonable worst-case development scenario under the proposed East New York Rezoning Proposal. Procedures involved site inspections and review of historic Sanborn fire insurance maps, city directories and city/state regulatory databases. The assessment identified that each of the 146 projected and potential development sites has some associated concern regarding environmental conditions. As a result, the proposed zoning map actions include (E) designations (E-366) for all privately-held projected and potential development sites.

Department of City Planning, Rezoning Environmental Impact Statement, Brooklyn, New York. Project lead for performance analysis and composing the Hazardous Materials Chapter as per CEQR Technical Manual guidelines included in the FEIS for an approximately 190-block area of East New York, Cypress Hills, and Ocean Hill neighborhoods of Brooklyn, New York. The review assessed the potential for the presence of hazardous materials in soil and/or groundwater at both the projected and potential development sites identified in the reasonable worst-case development scenario under the proposed East New York Rezoning Proposal. Procedures involved site inspections and review of historic Sanborn fire insurance maps, city directories and city/state regulatory databases. The assessment identified that each of the 186 projected and potential development sites has some associated concern regarding environmental conditions. As a result, the proposed zoning map actions include (E) designations (E-366) for all privately-held projected and potential development sites.

Redevelopment and Remediation

Titan Equity Group, Hotel Redevelopment, Bronx, New York. Project manager for a hotel redevelopment in the south Bronx. The site has been assigned New York City Office of Environmental Remediation (NYC OER) E-Designation status for hazardous materials, noise, and air quality. Services included completion of a remedial investigation, composition of a Remedial Investigation Report and development of Hazardous Material Remedial Action Work Plan and Air Quality/Noise Remedial Action Plan as per NYC OER requirements.

The Related Companies, Chelsea Mixed-Use Redevelopment, New York, New York. Field geologist for oversight of the remediation of a mixed-use residential and commercial building, the second of a two-building development on 30th Street. Contaminants of concern included volatile and semi-volatile organic compounds associated with historic operations and underground storage tanks (USTs) located on the Site. The Site was given an E-designation (E-142) for hazardous materials and noise as part of the Highline/West Chelsea rezoning proposal. To satisfy the requirements of the E-designation program, soil was excavated to at least 12 feet below grade and bottom endpoint collected showing no contaminants of concern exceeding the New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives (SCO). By achieving Unrestricted Use SCOs, no engineering controls were necessary, although the building slab was included as part of development, and removal of the hazardous materials E-designation was requested.

Tishman Speyer, Long Island City Residential Development, Long Island City, New York. Field geologist for remedial oversight and implementation of a Community Air Monitoring Program during concurrent remediation and development of three Brownfield Cleanup Program (BCP) sites located in Long Island City, New York. The Sites were grossly contaminated with creosote, a carcinogenic chemical formed from the distillation of various tars. Remediation strategies included soil excavation and in-situ soil stabilization. To prevent migration of groundwater off-site, a temporary and later a permanent capture well system was installed on the western boundary of the property. The BCP site located on the western portion of the property left residual contamination in place requiring installation of a sub-slab depressurization system.

Queens West Development Corporation, Queens Waterfront Development, Long Island City, New York. Field geologist for performance of site management post remedial action. Services included annual groundwater monitoring, evaluation of engineering and institutional controls completion and Period Review Reports. In addition to conducting annual site management activities, responsibilities included composing a work plan to evaluate the transition from active sub-slab depressurization systems to passive. Upon NYSDEC approval, active systems were shut down for 30 days prior to a sub-slab vapor sampling event evaluation soil vapor, indoor and outdoor air conditions for

potential vapor intrusion risk. As results indicated no evidence of vapor intrusion, continued pressure monitoring was conducted for from the existing monitoring ports for one year assessing whether negative pressure was held by the existing slab by stack-effect or other passive processes.

Jim Beam Brands Co., Brownfield Cleanup Program Remediation Site, Long Island City, New York. Field geologist for oversight of the installation of an Electrical Resistive Heating (ERH) system implemented in order to remediate trichloroethylene groundwater plumes in shallow/intermediate and deep groundwater on- and off-site. The Site, a former stapler manufacturing facility, underwent various remedies, including a Soil Vapor Extraction system, air sparging, ozone injection and chemical oxidation using potassium permanganate injections, which resulted in little reduction to contamination levels and rebounding chlorinated solvents. Components of the ERH system installed included electrodes for delivery of steam, vapor recovery wells, and groundwater monitoring wells. The site is currently under remediation in the state BCP program.

Due Diligence and Site Characterization

Manufacturing Plants, Multiple Investors, Environmental and Compliance Assessment Portfolio United States. Project lead for completion of Phase I Environmental Site Assessments (ESAs) and Limited Compliance Reviews for multiple auto parts manufacturing facilities throughout the United States. Services included completion of Phase I ESAs in accordance with the American Society for Testing and Materials E1527-13 requirements and a limited review of each facility's compliance liabilities including issues pertaining to the Resource Conservation and Recovery Act, Greenhouse Gas Emission Standards and Tier II Emergency and Hazardous Chemical Inventory reporting requirements.

ARM Parking, Environmental Site Assessment and Subsurface Investigation, Brooklyn, New York. Project manager for site assessment and subsurface investigation of parking facility in Sunset Park neighborhood, Brooklyn, New York. Services included ground penetrating radar survey for former and current petroleum USTs, completion of a subsurface investigation of soils and composition of Limited Subsurface Investigation Report.

Spill Consulting

The Trump Organization, Spill Consulting Services, New York, New York. Project manager for consulting services provided after incidental release of calcium carbonate ice rink paint to the Central Park Pond from Wollman Rink. Services included liaising with NYSDEC regarding violations, consent order and required corrective action. Corrective action included designing alterations to the existing on-site drainage plans and routing all meltwater containing paint into the combined sewer system. Coordination was required with property owner, operations personnel, New York City Department of Parks and NYSDEC.

Richmond Gardens Apartments, Spill Management and Closure Services, Staten Island, New York. Project lead responsible for spill closure activities and reporting for Spill 1105661 located at the Richmond Gardens Apartment Complex in the Richmond neighborhood of Staten Island, New York. The spill was opened in 2011 when several underground storage tanks were identified adjacent to the apartments at Jersey Street and Hendricks Avenue. The tanks were cleaned and removed and impacted soils surrounding the tank area excavated to the extent possible. Excavation of all impacted material was not feasible due to the proximity of the tanks to the apartment buildings. Residual contamination in soil and groundwater remained and was monitored through 2016. Upon reviewing the groundwater monitoring data from over 12 consecutive quarters, it was apparent monitored natural attenuation was not a feasible option and an in situ chemical oxidation (ISCO) remedy was approved by NYSDEC. Due to success of the pilot test, the ISCO injection event was implemented utilizing pressure pulse technology to deliver the alkaline activated persulfate solution to the subsurface.

HALEY ALDRICH



PAUL G. PROBASCO, P.G., LSRP

Senior Project Manager, Hydrogeologist

EDUCATION

M.S., Environmental Sciences, University of Virginia
M.S., Hydrogeology, Rensselaer Polytechnic Institute
B.S., Geological Sciences, Cook College, Rutgers University

PROFESSIONAL REGISTRATIONS

2012/ PA: Professional Geologist (Reg. No. PG005055)
2018/ NY: Professional Geologist (Reg. No. 001138)
2021/ NJ: Licensed Site Remediation Professional (Reg. No. 835739)

PROFESSIONAL SOCIETIES

National Ground Water Association

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
8-Hour OSHA Site Supervisor Training

Paul is a hydrogeologist and project manager with over 18 years of experience in the environmental consulting industry. He applies his expertise in the investigation and remediation of contaminated sites for private and public-sector clients. He has managed and conducted site and remedial investigations, remedial planning and design, and remedial actions at sites in state and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulatory programs. Paul is skilled in technical groundwater investigations in unconsolidated and bedrock aquifers, assessment of soil conditions through core sampling and direct-sensing techniques, and application of analytical models toward understanding contaminant transport and fate. His environmental remediation experience focuses on management and oversight of in situ remedial approaches, including enhanced in situ bioremediation, chemical reduction and oxidation, and enhanced monitored natural attenuation.

RELEVANT PROJECT EXPERIENCE

Confidential clients – Brownfield redevelopment, multiple properties, Brooklyn, New York. As project manager, Paul managed due diligence environmental assessments and remedial investigations of sites pursuing entry into and sites within the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program. Coordinated and managed field investigations including a Phase II environmental site assessment and a remedial investigation of soil, groundwater, and soil vapor impacted from previous petroleum UST operations. Developed scopes of work and responsible for managing project budget, schedule, and communications with the client and NYSDEC. Prepared and managed multiple deliverables including project work plans and summary reports describing sampling activities and findings.

U.S. Navy – NAVFAC Mid-Atlantic, Former Naval Weapons Industrial Reserve Plant, groundwater remedial design, Bedford, Massachusetts. As project manager, Paul managed groundwater remedial design, pre-design aquifer testing, supplemental groundwater investigation, and vapor intrusion investigation activities at a former Navy installation. Responsible for managing project budget, schedule, and biweekly meetings with the client, EPA, and MassDEP. Coordinated and managed field activities that consisted of permanent monitoring well installations in a heterogeneous glacial till, aquifer pump and slug tests, temporary well installations and sampling, soil gas point installations and sampling, and the collection of sub-slab and indoor air samples from an off-site residence. Prepared and managed multiple deliverables including project work plans and a site management plan, preliminary assessment, groundwater

investigation report, community involvement plan, and technical memorandum describing focused groundwater and vapor intrusion investigation activities and findings.

U.S. Navy – NAVFAC Mid-Atlantic, Naval Station Newport, pre-design investigation at contaminated bedrock aquifer site, Middletown, Rhode Island. Paul served as project manager for a groundwater pre-design investigation at a contaminated bedrock aquifer site where previous in situ bioremediation had limited success with reducing chlorinated volatile organic compound (CVOC) concentrations in groundwater. He developed a hydraulic testing approach using pump tests and a bromide tracer test to improve understanding of the distribution of an amendment injected into a single well. Coordinated and managed vegetation clearing, a well inventory, two comprehensive site-wide groundwater gauging and sampling events, and preparation of a hydraulic testing work plan and a groundwater pre-design investigation report.

U.S. Navy – NAVFAC Mid-Atlantic, Naval Station Newport, remedial investigation at former tank farm, Portsmouth, Rhode Island. As project hydrogeologist, Paul developed a remedial investigation approach and conducted data analysis to apportion sources of total petroleum hydrocarbons (TPH) in soil at a former tank farm. The approach consisted of grid-based soil sampling across the previously delineated petroleum-impacted area; analysis of soil samples for TPH, saturated hydrocarbons, and biomarkers; and statistical analysis and petroleum fingerprinting of soil data to apportion heavy and mid-distillate components of the TPH that exceed the site cleanup goal. The approach was incorporated into the sampling and analysis plan for the site. Following soil sample and data acquisition, Paul managed data analysis and source apportionment.

U.S. Navy – NAVFAC Mid-Atlantic, Naval Station Newport, groundwater discharge to surface water investigation, Middletown, Rhode Island. Paul served as project hydrogeologist and developed an investigation approach that incorporated aerial infrared imaging, focused porewater sampling, and a vertical tracer study to evaluate groundwater discharge to an estuary. The approach was incorporated into the draft thermal imaging and vertical tracer testing work plan.

Confidential client – former New York air brake manufacturing facility, post-closure operations, maintenance, and monitoring, Watertown, New York. Paul was the project manager for ongoing operations, maintenance, and monitoring (OM&M) of a former manufacturing facility in the 19th year of a 30-year post-closure OM&M program. He managed project tasks, budget, and invoicing. Technical tasks included evaluation of groundwater elevation and chemical data to assess the long-term effectiveness of a groundwater pump and treat system that was installed to remove and prevent off-site transport of volatile organic compounds (VOCs) in groundwater. Paul prepared Annual Groundwater Monitoring Reports that presented findings from the data evaluation to the New York State Department of Environmental Conservation (NYSDEC), and prepared and submitted to NYSDEC a Periodic Review Report that summarized the protectiveness of engineering controls operated and maintained at the site during the previous three years.

Confidential client – former Henry Harris Landfill, remedial investigation and remedial action work plan development, Harrison Township, New Jersey. As the project geologist and task manager, Paul developed a conceptual site model for a former sanitary landfill site that incorporated understanding of the site hydrogeology, contaminant sources, and contaminant distribution to identify data gaps in completing the site remedial investigation (RI). He managed field activities to address data gaps with the RI, which included evaluation of groundwater-surface water interactions, installation of monitoring wells, and targeted soil sampling at soil-related areas of concern. Paul prepared a subsequent Remedial Action Work Plan for soil, groundwater, and surface water at the site, which incorporated the landfill closure plan and proposed Monitored Natural Attenuation (MNA) to address impacts to groundwater. Following implementation of a quarterly groundwater monitoring program, multiple lines of evidence in support of MNA as an effective remedy for groundwater were presented in a Groundwater Remedial Action Report.

Ingersoll Rand – manufacturing facility, pilot and full-scale bioremediation implementation, Hamilton, New Jersey. As project geologist**,** Paul managed and provided field oversight of a full-scale enhanced in situ bioremediation (EISB) remedy to address elevated concentrations of chlorinated VOCs in shallow groundwater at an active manufacturing facility. The full-scale remedy included delivery of emulsified vegetable oil (EVO), ZVI, and KB-1 Plus® microbial culture to outdoor and indoor injection locations. The full-scale remedy was implemented following the completion of a field-scale EISB pilot study that included delivery of amendments under pressure and gravity-fed conditions. Prior to the full-scale EISB remedy, a Groundwater Remedial Action Workplan was prepared that summarized the remedial investigation progress, results of the field pilot study, and scope of work for implementation of the full-scale remedy.

Ingersoll Rand – former manufacturing facility, remedial investigation and conceptual site model refinement, Phillipsburg, New Jersey. Paul served as the field geologist and task manager for the drilling, geophysical logging, packer testing, and construction of monitoring wells in a karst subsurface. Coordinated drilling, investigation-derived waste, and geophysical logging/packer testing subcontractors that included managing changes to the schedule based on variability in subsurface conditions. Monitoring well construction was based on the analytical results for(VOCs in groundwater samples collected from multiple depth intervals within each borehole. Dual or triplet monitoring wells were installed at multiple locations to characterize VOCs in groundwater with depth and provide data on VOC concentrations at the water table (shallow well) for evaluation of potential vapor intrusion.

In addition, Paul analyzed and summarized approximately 20 years of groundwater gauging and analytical data from approximately 80 monitoring and recovery wells at this 383-acre site as part of the conceptual site model development and refinement. Groundwater levels, fracture orientations, chlorinated VOC concentrations, and light nonaqueous phase liquid (LNAPL) extent data were evaluated as part of the conceptual site model development.



BRIAN FITZPATRICK, CHMM

Corporate Director, Health and Safety

EDUCATION

M.P.A., Environmental Policy, Syracuse University
B.S., Environmental Science, University of Massachusetts-Amherst
A.S., Chemistry, Valley Forge Military Junior College
Commissioned Officer, United States Army

CERTIFICATIONS

Certified Hazardous Materials Manager (Reg. No. 13454)
Certified Department of Transportation Shipper
Certified International Air Transport Authority Shipper

PROFESSIONAL SOCIETIES

Alliance of Hazardous Materials Professionals
Academy of Certified Hazardous Materials Managers, New England Chapter

SPECIAL STUDIES AND COURSES

Department of Transportation
International Air Transport Authority
Incident Commander
Confined Space Entry and Rescue
Radiation Safety Officer
RCRA Hazardous Waste
Massachusetts Industrial Waste Water Operator Grade 2I (expired)

AWARDS

Presidents Club Award (one million hours worked without a recordable injury), Cabot Corporation
Chancellors Award for Excellence, Syracuse University

Brian ensures the work we do for our clients is done safely – knowing this reduces costs, improves service quality and site conditions, and ultimately protects our clients' reputations. In addition to building the Haley & Aldrich Health & Safety (H&S) culture, Brian is hands-on with clients to help improve their and their partners' safety cultures.

He has extensive expertise in the Occupational Safety and Health Administration (OSHA) general industry, process safety management, and construction safety programs. He is an active member of the Alliance of Hazardous Materials Professionals and the New England chapter of the Academy of Certified Hazardous Materials Managers.

Brian knows an organization's success is predicated on empowering its people to safely work within the complex, living processes in which they operate. He is a student of human factors in the workplace, of the phenomena of human error and drift into failure, and of the safety applications of Lean techniques.

RELEVANT PROJECT EXPERIENCE

Haley & Aldrich, Inc., Burlington, Massachusetts. As Chief Health and Safety Officer, Brian has led and facilitated the development and implementation of corporate health and safety (H&S) improvement plans to enhance compliance and improve H&S performance. In Brian's time with Haley & Aldrich, Inc., the company has realized dramatic improvement on H&S goals and in Key Performance Indicators. Brian is responsible for developing a risk competence culture, where our staff are empowered to look for and engage to address risk before anyone is injured. Brian oversees the development, implementation and continuous improvement of all H&S programs for the company. Additional responsibilities include:

- Developing a safety culture through incident reporting, root cause analysis, behavior-based safety, hazard recognition and risk assessment, communication, and developing leaders;

- Monitoring proposed and existing SH&E regulations and legislation to determine their impact on operations and to ensure continued compliance;
- Overseeing the safety, industrial hygiene, and toxicology programs for over 600 staff members engaged in remediation, construction, health and safety, consulting, and general office work across 28 offices in the United States and on assignment to international project sites;
- Continuously seeks to improve H&S performance as measured by the OSHA Incident Rating (IR) and Worker's Compensation Experience Modification Rating (EMR), as well as Leading Indicators developed with the management team; and
- Participating in the corporate audit program as an auditor or lead auditor;

Energy Client, California. As Chief Health and Safety Officer, Brian led and facilitated the Alliance Partnership Safety Council in 2017, is still an active contributor to the council, and hosts routine contractor safety forums for the client. Brian is actively involved in the development and implementation of program safety, health, and environmental (SH&E) plans to ensure safe operations on project sites. Brian developed permits and Health and Safety Plans for large projects and routinely audits the site safety. Additional responsibilities include:

- Driving reporting and behavior-based safety initiatives to support our internal safety culture and developing monthly summary reports to illustrate performance to our client.
- Develop, assess and continuously improve site safety plans and practices, including specific safety protocols for working safely over and around water.
- Worked as an extension of the client's organization to provide assurance that the remedy was completed safely and consistent with client-specific requirements.
- Support on-site safety personnel in ensuring the health and safety of the general public, our staff, and our sub-contracted employees.
- Audits and visits sites to ensure compliance with our internal policies and client-specific requirements.

Energy Client, Ohio. As Chief Health and Safety Officer, Brian supports the project team in developing and executing client and project specific health and safety measures, such as a site specific Health and Safety Plan, Job Hazard Analyses, Industrial Hygiene program, and site specific training. Brian also routinely visits the site to assess current practices and condition and to ensure continuous improvement. Additional responsibilities include:

- Develop, assess, and continuously improve site safety plans and practices, including specific safety protocols to comply with supplemental EH&S requirements such as the Duke Health and Safety Handbook, Environmental Supplemental, and EHS Keys to Life.
- Develop, assess, and continuously improve site safety plans and practices to address the risks associated with the work being performed on site, as well as the environmental conditions and simultaneous operations, including trenching and excavation, hot work, work over and near water, heavy equipment, HAZWOPER, etc.
- Worked as an extension of the client's organization to provide assurance that the remedy was completed safely and consistent with client-specific requirements.
- Support on-site safety personnel in ensuring the health and safety of the general public, our staff, and our sub-contracted employees.
- Audits and visits site to ensure compliance with our internal policies and client-specific requirements.

BRIAN A. FERGUSON

Senior Health & Safety Manager

EDUCATION

MS, Geotechnical Engineering, Tufts University, Medford, Massachusetts
BS, Civil Engineering, State University of New York - Environmental, Science, and Forestry, Syracuse, New York
AS, Applied Science and Technology (Nuclear Engineering), Thomas A. Edison State College, Trenton, New Jersey

CERTIFICATIONS

BCSP Certified Safety Professional (#CSP-45145)
BCSP Associate Safety Professional (#ASP-31270)

PROFESSIONAL SOCIETIES

Associate Safety Professional – 2019
Order of the Engineer – 2000
Boston Society of Civil Engineers (BSCE)
American Society of Civil Engineers (ASCE)

SPECIAL STUDIES AND COURSES

American Concrete Institute – Certified Field Technician Certified Grade 1
Radiation Safety and Operations of Nuclear Testing Equipment – Troxler
40-Hour OSHA Hazardous Waste Operations Training (+ 8-Hour annual refresher)
10-Hour OSHA Construction training
Confined Space Entry Training
16-Hour Asbestos Operations and Maintenance
24-Hour Asbestos Inspector
Asbestos Inspector License (June 2018 and renewed Annually)

ENGINEERING EXPERIENCE

Brian has over 23 years of experience serving as a project engineer on a variety of real estate development projects. His project experience has included monitoring field investigations, performing construction oversight, performing due diligence, engineering analyses, performing geotechnical analyses, developing geotechnical recommendations, and preparing geotechnical reports, and project specifications.

As a project engineer, in addition to providing engineering design support, Brian has managed and participated in many field service activities. Field work has included construction monitoring and documentation of contractors' deep and shallow foundation-related construction, including slurry walls, caissons, pile driving, pile cap installation, earthwork, backfilling and compaction, installation of soldier pile and wood lagging support systems, installation of tie backs and rock anchors, reading inclinometers, conducting in-place field unit weight tests, tie-back load testing, seismograph installation, monitoring, and evaluating, and preparation of footing bearing surfaces. Other responsibilities have included site development activities, including placement of utilities and subgrade preparation for roads; observations and testing to determine that work is completed in compliance with contract documents; on-site soil management; sampling of soil and groundwater for chemical laboratory testing and conducting in situ field screening; maintenance of job records including pile driving logs, results of field density tests, records of caisson and footing installations; preparation of daily field reports; in contact with key personnel; and resolution of field related problems.

RELEVANT PROJECT EXPERIENCE

Fenway Center. Project engineer for the construction of laboratory space constructed over the Massachusetts Turnpike, two residential towers, and the Fenway Area consisting of 8 to 14 stories and multiple levels below grade. Construction responsibilities included coordination of construction monitoring, observing Support of Excavation (SOE) and footing installation, coordination of installation of Slurry Walls, assisting with project management, reviewing

weekly field construction reports, reviewing, and responding to geotechnical design submittals, and attending project meetings.

Massachusetts Institute of Technology, The Schwarzman College of Computing Project. Project Engineer for a new approximately eight stories above ground and one story below ground building and contains approximately 189,000 gross square feet (gsf) of mixed-use space for: offices, research laboratory, academic, event, collaboration, meetings, café, convening, and associated services. Responsibilities included coordination of construction monitoring, observing SOE, micropile, and Caisson Installation, assisting with project management, reviewing weekly field construction reports, reviewing, and responding to geotechnical design submittals, and attending project meetings. Brian also was the main point of contact for construction-related issues with the project owner and contractors.

Massachusetts Institute of Technology, Graduate Housing Project. Project Engineer for construction of two new five- to eight- story residential buildings with a total gross floor space of approximately 261,000 square feet (sq ft). Responsibilities included coordination of construction monitoring, observing SOE, micropile, and Caisson Installation, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals, and attending project meetings. Brian was the main point of contact for construction-related issues with the project owner and contractors and conducted Health & Safety Audits of Haley & Aldrich personnel during construction.

Edwards Vacuum Project. Project Engineer for a new single-level 101,000-sq ft building with a mezzanine located in the south portion of the proposed building. Responsibilities included developing subsurface exploration program coordination, writing the Geotech Report, and coordinating field staff to observe construction activities, including mass excavation of approximately 100,000 cubic yards of soil, installation of spread footing, and construction dewatering. Brian assisted with project management, reviewing weekly field construction reports, reviewing, and responding to geotechnical design submittals, and attending project meetings. Brian was the main point of contact for construction-related issues with the project owner and contractors and conducted Health & Safety Audits of Haley & Aldrich personnel during construction.

St. Elizabeth's Hospital – **West Campus Forensic Evaluations, Washington, D.C.** Project Engineer for forensic evaluations on the adaptive reuse of former hospital buildings. Responsibilities included coordination of a field exploration program, including test borings and test pits to obtain subsurface information for project design and construction, overseeing multiple field personnel and subcontractors, assisting with project management, reviewing subcontractors invoices, reviewing and summarizing subsurface data, and writing data reports.

NICOLE MOONEY

Assistant Project Manager | Geologist

EDUCATION

B.S., Earth and Environmental Science with a minor in Oceanography, University of Michigan-Ann Arbor

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
8-Hour OSHA Hazardous Waste Worker Refresher Training (29 CFR 1910.120)
8-Hour OSHA HAZWOPER Supervisor for Construction Training
OSHA 10-Hour Construction Safety
OSHA 30-Hour Construction
NYC SST-307 8-Hour Fall Prevention for Construction
NYC SST-302 2-Hour Drug and Alcohol Awareness for Construction
DOT Hazmat Employee & RCRA Hazardous Waste Generator Training
American Red Cross Adult First Aid/CPR/AED Training and Bloodborne Pathogens Training
USACE Construction Quality Management for Contractors
Level I Antiterrorism Awareness Training

Nicole is a geologist with over four years of experience in site characterization and investigation, subsurface investigations, preparation of technical reports and work plans, and data collection and analysis. She has extensive experience conducting Phase I Environmental Site Assessments (ESAs), Phase II Environmental Site Investigations (ESIs), and other aspects of environmental due diligence. She has experience with preparation and overseeing execution of remedial investigation and actions at sites within the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and the New York City Mayor's Office of Environmental Remediation (NYCOER). She has performed soil, groundwater, and soil vapor sampling events and has drafted various site investigation plans and reports.

RELEVANT PROJECT EXPERIENCE

Environmental Investigation, Site Characterization, and Remediation

340 Myrtle Development LLC, 340 Myrtle Avenue, Brooklyn, New York. As a project geologist, Nicole coordinated and managed implementation of the Remedial Action Work Plan (RAWP) at the approximately 8,828 square foot site enrolled in the NYSDEC BCP. The remedial action included excavation and off-site disposal of soil, installation of an active sub-slab depressurization system (including cover system), installation of injection wells, and reinstallation of permanent monitoring wells for post-remedy groundwater monitoring. Nicole was responsible for the preparation of the Final Engineering Report (FER) and the Site Management Plan (SMP) which are undergoing review by the NYSDEC. Construction for the new development is currently ongoing and, when completed, the site will be improved with a new eight-story mixed-use commercial and residential building with a full cellar level.

B Contractors Group, LLC, 711-713 East 214th Street, Bronx, New York. As a project geologist, Nicole was responsible for coordinating and managing the implementation of the NYCOER-approved Remedial Action Plan (RAP) and preparing the Remedial Closure Report (RCR) for the approximately 6,252 square foot site. The redevelopment included a new eight-story residential building with a full cellar level.

650 Southern Blvd Bronx LLC, 650 Southern Boulevard, Bronx, New York. As a project geologist, Nicole was responsible for preparation and implementation of the Remedial Investigation Work Plan (RIWP), which included the installation of eleven soil borings, seven permanent groundwater monitoring wells (some of which extended into

bedrock), and seven soil vapor points, and the collection of soil, groundwater, and soil vapor samples. Nicole was also responsible for preparation of the Citizen Participation Plan (CPP), Remedial Investigation Report (RIR), and RAWP. The site is in the pre-construction phase.

Degraw Holdings LLC, 563 Sackett Street Site, Brooklyn, New York. As a project geologist, Nicole was responsible for due diligence during acquisition, including preparation of the Phase I ESA and Limited Phase II ESI. The initial Limited Phase II ESI and delineation sampling have been completed and the Limited Phase II ESI Delineation Report, Brownfield Cleanup Agreement (BCA) Major Amendment Application, and Supplemental Remedial Investigation Report (SRIR) are being drafted.

291 Wallabout Realty LLC, 291 Wallabout Street, Brooklyn, New York. As a project geologist, Nicole was responsible for the due diligence during acquisition of the property, including preparation of a Phase I ESA, Phase II ESI, BCP Application, and RIWP.

401 West 207th Realty LLC, 401 West 207th Street, New York, New York. As a project geologist, Nicole was responsible for oversight during implementation of the RAWP under the NYSDEC BCP. During remediation, Nicole observed and documented the excavation and proper disposal of on-site soil required for installation of the foundational elements. Nicole oversaw the proper cleaning and removal of two underground storage tanks encountered during excavation.

BCP Applications and Remedial Investigation Work Plans for NYSDEC. Nicole has prepared several BCP Application packages for various clients in New York State, which requires reviewing the site's history, including any previous investigation reports available, to assist with entry into the BCP to be remediated and redeveloped in accordance with applicable NYSDEC requirements. Nicole also prepares an RIWP to be submitted to the NYSDEC either concurrently or following submittal of the BCP Application for full investigation of the site to facilitate proper remedial action.

Excavation Oversight and CAMP Monitoring, Various Sites, Bronx, Brooklyn, and Queens, New York. As a project geologist, Nicole completed remedial oversight for several projects in the NYCOER cleanup program and NYSDEC BCP. Her responsibilities included excavation oversight, air monitoring, truck logging during off-site disposal of excavated materials, collection of endpoint and/or documentation samples, vapor barrier inspection, and oversight of installation of post-remedy groundwater monitoring wells.

Multiple Clients, Phase I ESAs and Due Diligence, Multiple Locations in New York. As a project geologist, Nicole completed several Phase I ESAs for buyers of properties in New York. She has extensive experience completing site reconnaissance and reviewing historical site documentation to identify potential environmental concerns at properties.

Multiple Clients, Phase II ESIs, Multiple Locations in New York. As a project geologist, Nicole conducted several Phase II ESIs for projects in New York, including oversight of the installation of soil borings, groundwater monitoring wells, and soil vapor points and the collection of soil, groundwater, and soil vapor samples. She assisted with the development of sampling plans based on previous environmental investigations and due diligence findings.

Former Grissom Air Force Base, Kokomo, Indiana. As a project geologist, Nicole was responsible for coordinating and performing quarterly groundwater sampling and/or Land Use Control (LUC) inspections in accordance with the deeds and Decision Documents for nine sites (FT001, FT002, SS190, SS035, SS053, SS058, LF003, LF004, and SS049) located on the 2,722-acre former Grissom Air Force Base under the Base Realignment and Closure (BRAC)/Environmental Construction Optimization Services (BECOS) program. Nicole was also responsible for the coordination and implementation of a Data Gap Investigation (DGI) at the SS035, SS053, and SS058 sites and a Site Investigation (SI) at the former Navy Skeet Range (site SR406). Nicole prepared LUC Inspection reports, Annual Groundwater Monitoring Reports, an SI Report, a DGI Report, and the Five-Year Review Report for this work.

KATHERINE R. MILLER

Senior Project Manager

EDUCATION

BS, Chemistry, University of Arizona

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120 and 40 CFR 265.16)
8-Hour OSHA Refresher Training (29 CFR 1910.120)
Level IV Data Validation Training

AWARDS

Pinnacle Award, 2009
Pathfinder Award, 2014

In her 10+ years at Haley & Aldrich, Katherine has worked on soil and groundwater environmental investigations and the preparation of environmental reports for private, industrial, and government-based project clients. She is a qualified Data Validator capable of performing various levels of validation on laboratory water quality data according to US Environmental Protection Agency (EPA) National Functional Guidelines and to U.S. Department of Energy radiochemical guidelines. She also has experience designing and maintaining databases for project-specific needs.

Project management responsibilities for a $1.5 million per year stormwater project include preparation of subcontractor bids and contracts; preparation of cost estimates, proposals, and reports; coordination of field testing programs; and interpretation of chemical testing results. She has interacted with local regulatory agencies.

RELEVANT PROJECT EXPERIENCE

Confidential Aerospace Manufacturer, Groundwater Monitoring, Western U.S. Katherine served as project manager for the comprehensive stormwater management program. Responsibilities included project finance management and data management including quality assurance/quality control (QA/QC) and interpretation of chemical testing results. Evaluated QA/QC of groundwater quality data, prepared reports and managed data for the site. Performed data validation of quarterly water quality data from over 300 locations according to EPA National Functional Guidelines and to DOE radiochemical guidelines over a six-year period. Also, responsible for updating and maintaining the integrity of over 200,000 records during that time period. Assisted with management of sampling, analysis, and reporting of constituents of concern, ensured compliance with post-closure permit monitoring and reporting requirements, Data Management Plan, QAPP, and Environmental Data Management System, and ensured and maintained 100% compliance with the QAPP and Data Management Plan. Additionally, prepared groundwater data summaries for proposed extraction wells including comparisons to site NPDES outfall limits in support of Groundwater Interim Measures planning.

Asarco Hayden Plant Site, Hayden, Arizona. Katherine assisted with field preparation, QA/QC of analytical data, and data validation as part of the Remedial Investigation/Feasibility Work Plan including soil, sediment, air, process water, surface water, and stormwater.

Former MGP Site, California. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation for the investigation of three large former MGP sites in an urban, residential setting; includes over 200 residential properties.

General Manufacturing, Leitchfield, Kentucky. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation for a soil and groundwater RCRA site. Groundwater monitoring is conducted annually at more than 50 locations for volatile organic compounds (VOCs), including 1,4-dioxane and semi-volatile organic compound (SVOCs).

Skyworks Solutions, Inc., Newbury Park, California. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation at groundwater remediation site. She monitored for VOCs, including 1,4-dioxane, and inorganic chemicals, including hexavalent chromium.

Teledyne Scientific Company, Thousand Oaks, California. Katherine assisted with report preparation for this groundwater assessment site. Monitored natural attenuation has been instituted as the long-term site remedy.

Port of Redwood City, Permitting and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Kiewit Infrastructure West, Sediment Quality Study, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Aeolian Yacht Harbor, Permitting, Eel Grass Conservation and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Marin County, Paradise Cay Permitting and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

APPENDIX J
Proposed Remedial Action Project Schedule

REMEDIAL ACTION PROJECT SCHEDULE
4001 4TH AVENUE DEVELOPMENT
4001 4TH AVENUE, BROOKLYN, NEW YORK
BCP SITE NO. C224412

Task	Duration	Start	End	2026											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Design and Permitting	120	1/1/2026	5/1/2026												
NYSDEC BCP RAWP Review	105	2/4/2026	5/20/2026												
45-Day Public Comment for RAWP	45	5/20/2026	7/4/2026												
Preparation of EE	30	5/1/2026	5/31/2026												
Final RAWP Submission & Issuance of DD	2	7/27/2026	7/29/2026												
Implementation of RAWP	63	7/27/2026	9/28/2026												
Preparation of SMP	30	7/1/2026	7/31/2026												
NYSDEC & NYSDOH Review of SMP	45	8/1/2026	9/15/2026												
Preparation of FER	34	9/1/2026	10/5/2026												
SMP Revisions and Resubmission	15	9/16/2026	10/1/2026												
NYSDEC & NYSDOH Review of FER	45	10/6/2026	11/20/2026												
FER Revisions and Resubmission	10	11/21/2026	12/1/2026												
NYSDEC Issues COC	30	12/1/2026	12/31/2026												

Notes:

1. Schedule is preliminary and subject to change.

2. Implementation of RAWP does not include completion of building construction.

3. NYSDEC - New York State Department of Environmental Conservation

4. NYSDOH - New York State Department of Health

5. BCP - Brownfield Cleanup Program

6. RAWP - Remedial Action Work Plan

7. DD - Decision Document

8. EE - Environmental Easement

9. FER - Final Engineering Report

10. SMP - Site Management Plan

11. SVI - Soil Vapor Intrusion

12. COC - Certificate of Completion

APPENDIX K
Odor Control Suppressant Safety Data Sheet

SAFETY DATA SHEET

State Industrial Products
5915 Landerbrook Drive
Mayfield Heights, OH 44124
To Order Call: 1-866-747-2229

6935 Davand Drive
Mississauga, Ontario L5T 1L5
To Order Call: 1-800-668-6513

Royal Industrial Park, Bldg "M"
Local #5, Carr 869, km 1.5 Palmas
Cataño, P.R. 00962
To Order Call: 787-275-3185

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: BLANKET 510 WINTERGREEN
Product Description: A floating air freshener.
EPA Registration Number: NA

24 Hour Emergency CHEMTREC Number: 800-424-9300
MSDS Number: 123285
EPA Establishment Number: NA

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

FIFRA Hazard Classification:
Not Applicable

Acute toxicity; oral: Category 4
Skin corrosion/irritation: Category 3



Exclamation Mark

WARNING

Hazard Statements:
H302 Harmful if swallowed. H316_3 Causes mild skin irritation.

Precautionary Statements:
P270 Do not eat, drink or smoke when using this product. P264 Wash hands thoroughly after handling.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients	CAS Number	Weight	ACGIH	OSHA
Methyl Salicylate	119-36-8	<12%	NE	NE

The exact percentages have been withheld as a trade secret.

4. FIRST AID MEASURES

P332+P313 IF SKIN irritation occurs: Get medical attention. P301+P312 IF SWALLOWED: call a POISON CENTER or physician if you feel unwell.
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

5. FIRE FIGHTING MEASURES

Flashpoint(Method): >200°F [93°C]
Lower Explosive Limit(LEL): NA Upper Explosive Limit(UEL): NA Autoignition Temperature: NA
Flammable Properties: None Expected
Extinguishing Media: Carbon Dioxide, dry chemical, foam.
Fire Fighting Instructions: Wear a self-contained breathing apparatus with full protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Ventilate area. Halt spill at source, dike and contain spill. Flush with plenty of water to drain. Dispose of in accordance with Federal, State and Local Regulations regarding waste disposal.

7. HANDLING AND STORAGE

P402 Store in dry place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Use general or local ventilation to keep exposure levels below exposure limits.
Personal Protective Equipment:
Respiratory: Normal room ventilation is adequate. Use a NIOSH/MHSA approved respirator if exposure limits are exceeded.
Eye: Wear approved safety glasses or goggles with unperforated eyeshields where splashing may occur.
Skin: For repeated or prolonged contact, wear chemically impervious gloves such as Nitrile.
Other: An emergency eyewash station or source of clean potable water should be available in case of accidental eye contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Green
Physical State: Liquid.

Odor: Mint
pH: NA

Solubility in Water: Insoluble
Boiling Point: NA
Freezing Point: NA
Melting Point: NA

Diluted pH: NA
Specific Gravity: 0.902
VOC Content: <3%

10. STABILITY AND REACTIVITY

Stability: Stable
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Do not mix with any other chemicals.
Incompatibility: Solvents, caustics, acids or oxidizers
Hazardous Decomposition Products: Carbon Dioxide, Carbon Monoxide

11. TOXICOLOGICAL INFORMATION

This product contains no ingredient at 0.1% or greater that is listed as a human carcinogen.

Hazardous Ingredients	CAS Number	LD50	LC50
Methyl Salicylate	119-36-8	NE	NE

12. ECOLOGICAL INFORMATION

The product is not expected to be hazardous to the environment.

13. DISPOSAL CONSIDERATIONS

P501 Dispose of container in accordance with all Federal, State and Local Regulations regarding waste disposal.

14. TRANSPORT INFORMATION

DOT Shipping Data: Not Regulated
Canadian TDG: Not Regulated
For International Shipments by Air: Not Regulated
For International Shipments by Vessel: Not Regulated

15. REGULATORY INFORMATION

TSCA: All ingredients in this product are listed or exempt from listing on the TSCA Chemical Inventory.
CEPA: All ingredients in this product are listed or exempt from listing on the Canadian DSL/NDSL.
Proposition 65: This product contains no listed substances known to the State of California to cause cancer, birth defects or reproductive harm, at reportable levels under the statute.
SARA 313: This product contains no toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of1986 (40CFR372).
VOC: <3%

HMIS RATING: HEALTH = 1 FLAMMABILITY = 0 REACTIVITY = 0 PPE = B

WHMIS RATING: See hazards identified in Section 2 above.

16. OTHER INFORMATION

NA = Not Available or Not Applicable
NE = Not Established

Read and follow all label directions and precautions before using the product. This product is intended for industrial and institutional use only. NOT FOR HOUSEHOLD USE OR RESALE. KEEP OUT OF THE REACH OF CHILDREN. While we believe that the data contained herein is factual and the opinions expressed are those of qualified experts, the data are not to be taken as a warranty or representation for which the company assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of these data and information must be determined by the user to be in accordance with applicable Federal, State, and Local Laws and regulations.

Prepared On: 07/02/2018 Replaces: 08/11/2014

FICHE SIGNALÉTIQUE DE SÉCURITÉ

State Industrial Products
5915 Landerbrook Drive
Mayfield Heights, OH 44124
To Order Call: 1-866-747-2229

6935 Davand Drive
Mississauga, Ontario L5T 1L5
To Order Call: 1-800-668-6513

Royal Industrial Park, Bldg "M"
Local #5, Carr 869, km 1.5 Palmas
Cataño, P.R. 00962
To Order Call: 787-275-3185

1. IDENTIFICATION DU PRODUIT CHIMIQUE ET DE LA SOCIÉTÉ

Nom du produit : BLANKET 510 WINTERGREEN
Description du produit : Un refraîchissant d'air de flottement.
EPA Registration Number : NA

Numéro d'urgence CHEMTREC 24 h/24 : 800-424-9300
Numéro de la fiche signalétique de produit : 123285
EPA Establishment Number : NA

2. IDENTIFICATION DES DANGERS

VUE GÉNÉRALE D'URGENCE



Point
d'exclamation

AVERTISSEMENT

Mention de danger:
H302 Nocif en cas d'ingestion. H316_3 Provoque une légère irritation de la peau.

Conseils de prudence:
P270 Ne pas manger, boire ou fumer en manipulant ce produit. P264 Se laver soigneusement la peau après manutention.

3. COMPOSITION/INFORMATION SUR LES INGRÉDIENTS

Ingrédients dangereux	Numéro CAS	Poids	ACGIH	OSHA
salicylate de méthyle	119-36-8	<12%	NE	NE

The exact percentages have
been withheld as a trade secret.

4. PREMIERS SOINS

P332+P313 En cas d'irritation cutanée: consulter un médecin. P301+P312 EN CAS D'INGESTION : Appeler un CENTRE ANTIPOISON ou un médecin en cas de malaise. P301+P330+P331 EN CAS D'INGESTION : Rincer la bouche. NE PAS faire vomir.

5. EN CAS D'INCENDIE

Point d'éclair : >200°F [93°C]
Limite d'explosivité inférieure (LIE) : NA Limite d'explosivité supérieure (LSE) : NA
Température d'auto-inflammation : NA
Propriétés d'inflammabilité : aucune présumée
Moyens d'extinction : Dioxyde de carbone, poudre chimique, mousse extinctrice.
Lutte contre l'incendie : Porter un appareil respiratoire autonome et des vêtements de protection complète.

6. ÉMISSIONS ACCIDENTELLES

Ventiler la zone. Interrompre le déversement à la source, l'endiguer et le contenir. Évacuer à grande eau. Éliminer conformément aux réglementations fédérale, provinciale et locale en vigueuren matière d'élimination des déchets

7. MANIPULATION ET CONSERVATION

P402 Stocker dans un endroit sec.

8. EXPOSITION/PROTECTION INDIVIDUELLE

Moyens techniques : Assurer une ventilation forcée adéquate pour maintenir l'exposition en deçà de la valeur limite d'exposition.
Équipement de protection individuelle :
Respiratoire : La ventilation normale est suffisante. Si les limites d'exposition sont dépassées, utiliser un appareil respiratoire agréé NIOSH/MSHA.
Oculaire : Porter des lunettes de protection homologuées munies d'écrans latéraux non perforés.
Cutanée : En cas de contact répété ou prolongé, porter des gants de protection chimique.
Autre : Un bassin oculaire d'urgence ou une source d'eau potable propre devrait être prêt à être utilisé en cas de contact oculaire accidentel.

9. PROPRIÉTÉS PHYSIQUES ET CH IMIQUES

Aspect : Vert
État de la matière : Liquide
Solubilité dans l'eau : Insoluble
Contenu de VOC : <3%

Odeur : Menthe
Concentrer pH : NA
Dilué pH : NA
Densité : NA
Point de congélation/fusion : NA / NA

10. STABILITÉ ET RÉACTIVITÉ

Stabilité : Stable
Polymérisation dangereuse : Ne se produira pas.
Conditions à éviter : Ne pas mélanger avec d'autres produits chimiques.
Incompatibilité : Les solvants, les produits caustiques, acides ou oxydants
Produits de décomposition dangereuse : Monoxyde de carbone, dioxyde de carbone.

11. INFORMATIONS TOXICOLOGIQUES

Ce produit ne contient aucun ingrédient déclaré cancérogène humain à des teneurs supérieures ou égales à 0,1 %.

Ingrédients dangereux	Numéro CAS	LD50	LC50
salicylate de méthyle	119-36-8	NE	NE

12. INFORMATIONS ÉCOLOGIQUES

Le produit ne devrait pas être dangereuse pour l'environnement.

13. DESTRUCTION

P501 Éliminer le contenant conformément à tous les règlements fédéraux, d'État et locales en matière d'élimination des déchets.

14. TRANSPORT

INFORMATION DE TRANSPORT D.O.T. : non réglementé.
TMD AU CANADA : non réglementé.
Pour les expéditions internationales par Air : non réglementé.
Pour les expéditions internationales par Vessel : non réglementé.

15. INFORMATIONs RÉGLEMENTAIRES

TSCA : Tous les ingrédients contenus dans ce produit figurent ou sont exempts de figurer sur l'inventaire du TSCA.
CEPA : Tous les ingrédients contenus dans ce produit figurent ou sont exempts de figurer sur la LIS et la LES (Canada).
Proposition 65 : Ce produit ne contient aucune substance chimique reconnus dans l'État de Californie pour causer le cancer, des malformations congénitales ou d'autres problèmesde reproduction.
SARA 313 : Ne produit ne contient aucune substance chimique toxique devant être déclarée aux termes de la section 313 de la loi Emergency Planning andCommunity Right-To-Know Act de 1986 (40 CFR 372.65C).

CLASSIFICATION HMIS : SANTÉ = 1 INFLAMMABILITÉ = 0 RÉACTIVITÉ = 0 EPS = B

CLASSIFICATION SIMDUT : Voir les risques identifiés dans la section 2 ci-dessus.

16. AUTRES INFORMATIONS

néant = Non disponible ou sans objet
n.e. = Non établi

Lire et suivre toutes les instructions et les précautions d'emploi figurant sur l'étiquette avant d'utiliser le produit. Ces produits sont réservés uniquement à l'usage industriel et par les collectivités. CES PRODUITS NE SONT PAS DESTINÉS À L'USAGE DOMESTIQUE OU À LA REVENTE. GARDER HORS DE LA PORTÉE DES ENFANTS. Bien qu'à notre avis les informations énoncées ci-dessus soient réelles et que le jugement exprimé soit celui d'experts qualifiés, elles ne doivent pas être considérées comme une garantie ou une déclaration pour lesquelles la société assume une responsabilité légale. Ces informations sont données uniquement pour examen, investigation et vérification. L'utilisation des ces informations doit être déterminée par l'utilisateur conformément à la réglementation et à la loi fédérales, d'État et régionales applicables.

INFORMATIONS SUR LA SANTÉ ET LA SÉCURITÉ : (216) 861-7114

Date de Préparation: 07/02/2018 Remplace : 08/11/2014

PLANILLA DE DATOS DE SEGURIDAD

State Industrial Products
5915 Landerbrook Drive
Mayfield Heights, OH 44124
To Order Call: 1-866-747-2229

6935 Davand Drive
Mississauga, Ontario L5T 1L5
To Order Call: 1-800-668-6513

Royal Industrial Park, Bldg "M"
Local #5, Carr 869, km 1.5 Palmas
Cataño, P.R. 00962
To Order Call: 787-275-3185

State® Since 1911

1. PRODUCTO QUÍMICO Y DATOS DE LA COMPAÑÍA

Nombre del producto: BLANKET 510 WINTERGREEN
Descripción del producto: Un ambientador de aire flotante.
EPA Registration Number: NA

Núm. CHEMTREC las 24 horas: 800-424-9300
Número MSDS: 123285
EPA Establishment Number: NA

2. ENUMERACIÓN DE PELIGROS

DESCRIPCIÓN GENERAL DE LAS SITUACIONES DE EMERGENCIA



Signo de exclamación

ADVERTENCIA

H302 Nocivo en caso de ingestión. H316_3 Puede causar irritación leve de la piel.

P270 No comer, beber ni fumar durante su utilización. P264 Lavar la piel meticulosamente después de la manipulación.

3. COMPOSICIÓN/INFORMACIÓN SOBRE LOS COMPONENTES

Componentes peligrosos	Número CAS	Peso	ACGIH	OSHA
salicilato de metilo	119-36-8	<12%	NE	NE

The exact percentages have been withheld as a trade secret.

4. MEDIDAS DE PRIMEROS AUXILIOS

P332+P313 En caso de irritación cutánea: Consultar a un médico. P301+P312 EN CASO DE INGESTIÓN: llamar a un CENTRO DE TOXICOLOGÍA o médico SI se siente indispuesto. P301+P330+P331 EN CASO DE INGESTIÓN: Limpie la boca. NO provoque el vómito.

5. MEDIDAS PARA COMBATIR INCENDIOS

Pto. inflamabilidad: >200ºF [93ºC]
Límite explosivo inferior (LEL): NA Límite explosivo superior (UEL): NA Temperatura de autoignición: NA
Inflamabilidad: No se espera ninguna.
Medio extinguidor: Dióxido de carbono, productos químicos en polvo, espuma.
Instrucciones para combatir el fuego: Use un aparato de respiración independiente con indumentaria de protección total.

6. MEDIDAS EN CASO DE DERRAME ACCIDENTAL

Ventile el área. Coloque una barrera física y contenga el derrame en el propio sitio de origen. Limpie el derrame con agua en abundancia y vierta todo por el drenaje. Obedezca todos losreglamentos federales, estatales y locales relativos a la disposición final de residuos.

7. MANIPULACIÓN Y ALMACENAMIENTO

P402 Almacenar en un lugar seco.

8. CONTROL DE EXPOSICIÓN/PROTECCIÓN PERSONAL

Controles de ingeniería: Proveer suficiente ventilación mecánica para mantener la exposición por debajo del límite de concentración máxima (Threshold Limit Value, TLV).
Equipo de protección personal:
Respiratorio: Si el límite de exposición en el lugar de trabajo es excedido, se aconseja el uso de un respirador de aire ante la ausencia de control ambiental.
Ojos: Use gafas protectoras o gafas con protección lateral sin perforaciones aprobadas.
Piel: Si el contacto fuera prolongado o repetido, use guantes resistentes a productos químicos.
Otros: Una estación de lavaojos de emergencia o una fuente de agua potable limpia debe estar disponible en caso de contacto accidental con los ojos.

9. PROPIEDADES FÍSICAS Y QUÍMICAS

Aspecto: Verde
Estado de agregación: Líquido
Solubilidad en agua: Insoluble
Contenido de VOC: <3%

Olor: Menta
Concentrarse pH: NA
Diluido pH: NA
Peso específico: 0.902
Punto de congelación/fusión: NA / NA

10. ESTABILIDAD Y REACTIVIDAD

Estabilidad: Estable
Polimerización peligrosa: No ocurrirá.

Condiciones a evitar: No mezcle con otros productos químicos.
Incompatibilidad: Disolventes, productos cáusticos, ácidos u oxidantes
Productos de descomposición peligrosos: Monóxido de carbono, Dióxido de carbono.

11. INFORMACIÓN TOXICOLÓGICA

Este producto no contiene ningún componente en 0.1% o más del que se señale como un carcinógeno humano.

Componentes peligrosos	Número CAS	LD50	LC50
salicilato de metilo	119-36-8	NE	NE

12. INFORMACIÓN ECOLÓGICA

El producto no se espera que sea peligroso para el medio ambiente.

13. SUGERENCIAS PARA SU DISPOSICIÓN FINAL

P501 Elimine el recipiente en conformidad con todas las regulaciones federales, estatales y locales relacionadas con la eliminación de residuos.

14. INFORMACIÓN SOBRE TRANSPORTE

DATOS DE EMBARQUE SEGÚN EL DOT (Ministerio de Transporte de los EE.UU.): No se ha regulado.
TDG CANADIENSE: Producto no regulado. No se ha regulado.
Para los envíos internacionales de Air: No se ha regulado.
Para los envíos internacionales de Vessel: No se ha regulado.

15. INFORMACIÓN SOBRE REGLAMENTOS

TSCA: Todos los químicos de este producto están catalogados o están exentos de ser catalogados en el inventario químico de la Ley de Control de Sustancias Tóxicas(Toxic Substances Control Act, TSCA).
CEPA: Todos los químicos de este producto están catalogados o están exentos de ser catalogados en el DSL/NDSL canadiense.
Propuesta 65: Este producto no contiene sustancias registradas en el Estado de California como causante de cáncer, defectos de nacimiento u otros daños reproductivos.
SARA 313: Este producto no contiene sustancias tóxicas sujetas a los requisitos de información del Artículo 313 de la ley de 1986 (40 CFR 372.65) de Planeamiento anteemergencias y Derecho a Estar Informado de la Comunidad.

CLASIFICACIÓN HMIS: SALUD = 1 INFLAMABILIDAD = 0 REACTIVIDAD = 0 EQUIPO DE PROTECCIÓN PERSONAL= B

CLASIFICACIÓN WHMIS: Ver los riesgos identificados en la Sección 2 anterior.

16. OTRA INFORMACIÓN

NA = No disponible o No se aplica
NE = No se ha establecido

Antes de utilizar este producto, lea y obedezca todas las instrucciones y precauciones. Este producto fue formulado para utilizarse únicamente en el ámbito industrial e institucional. NO ES PARA REVENTA NI PARA USO EN EL ÁMBITO HOGAREÑO. MANTENGA FUERA DEL ALCANCE DE LOS NIÑOS.
Si bien se considera que los datos contenidos en esta planilla son correctos y las opiniones expresadas son las de calificados expertos, los datos no deberán considerarse como garantía ni como declaración por las que la compañía asume responsabilidad legal alguna. Estos datos se brindan sólo para evaluación, investigación y verificación por parte del cliente. El usuario es quien deberá determinar si cualquier uso que se dé a estos datos e información está de acuerdo con las leyes y reglamentos federales, estatales y locales aplicables.

INFORMACIÓN DE SEGURIDAD Y SALUD: (216) 861-7114

Preparado Encendido: 07/02/2018 Reemplaza: 08/11/2014

APPENDIX L
Proposed Development Plans

410 40TH STREET
BROOKLYN, NY 11232

PROJECT DATA

ADDRESS: 410 40TH STREET, BROOKLYN
BLOCK: 714
LOT: 6
ZONING MAP: 16b
ZONE: R7A, C2-4
LOT AREA: 10,017 SF

SCOPE OF WORK

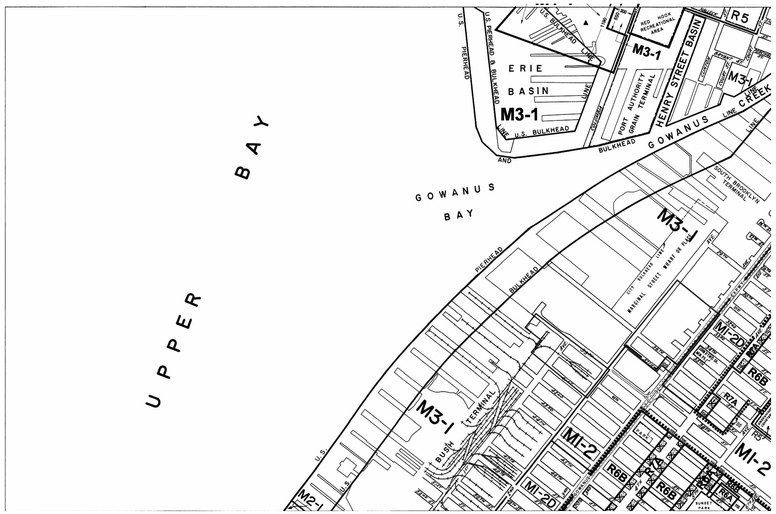
NEW CONSTRUCTION 4-STORY COMMUNITY FACILITY SCHOOL BUILDING.
THIS PROJECT DOES NOT INCLUDE MODULAR CONSTRUCTION.
- USE GROUP: 3A
- OCCUPANCY GROUP: E
- CONSTRUCTION CLASSIFICATION: IB

SEPARATE FILING

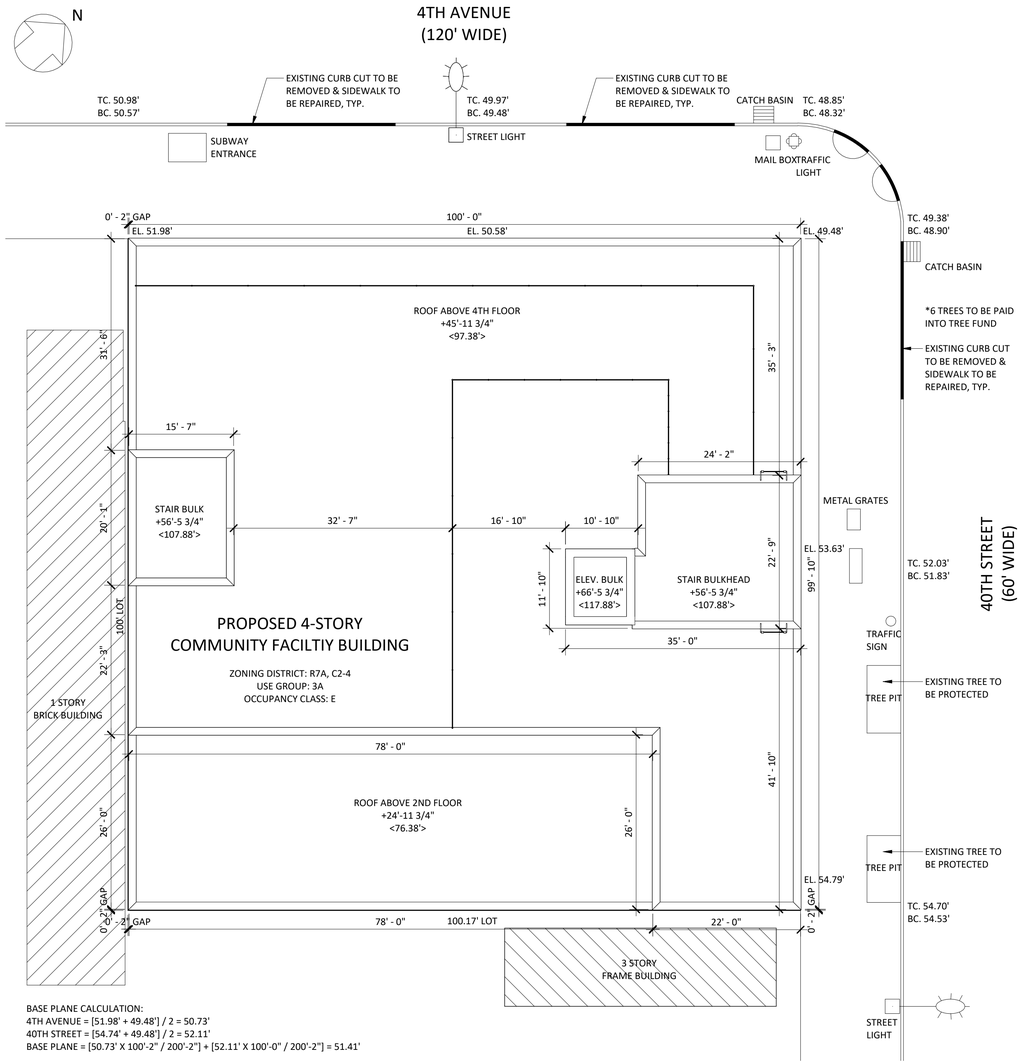
SOE	#B00933744-S1
FOUNDATION	#B00933744-S2
STRUCTURAL	#B00933744-S3
MECHANICAL	#B00933744-S4
PLUMBING	#B00933744-S5
BUILDER'S PAVEMENT PLAN	
STREET TREE	
PUBLIC ASSEMBLY SPACE	
SPRINKLER / STANDPIPE	#B00933744-S6
FIRE ALARM	TO BE FILED WITH FDNY
ELEVATOR	

DRAWING INDEX

Z-001	ZONING ANALYSIS, PLOT PLAN
Z-002	FLOOR AREA DIAGRAMS
A-001	BC NOTESS, EGRESS PLANS
A-002	BC NOTES, EGRESS PLANS
A-100	PROPOSED CELLAR PLAN
A-101	PROPOSED FIRST FLOOR PLAN
A-102	PROPOSED SECOND FLOOR PLAN
A-103	PROPOSED THIRD FLOOR PLAN
A-104	PROPOSED FOURTH FLOOR PLAN
A-105	PROPOSED ROOF PLAN
A-200	REFLECTED CEILING PLANS, LIGHTING SCHEDULE
A-201	REFLECTED CEILING PLANS, LIGHTING SCHEDULE
A-300	BUILDING ELEVATIONS
A-400	BUILDING LONGITUDINAL SECTION
A-401	BUILDING CROSS SECTION
A-500	BUILDING WALL SECTIONS
A-600	WALL & FLOOR DETAILS
A-700	SCHEDULES, ADA DIAGRAMS
EN-001	THERMAL BOUNDARY DIAGRAMS
EN-002	ENERGY ANALYSIS COMCHECK
EN-003	ENERGY ANALYSIS COMCHECK
EN-004	ENERGY ANALYSIS COMCHECK



TAX MAP 16b



BASE PLANE CALCULATION:
4TH AVENUE = [51.98' + 49.48'] / 2 = 50.73'
40TH STREET = [54.74' + 49.48'] / 2 = 52.11'
BASE PLANE = [50.73' X 100'-2" / 200'-2"] + [52.11' X 100'-0" / 200'-2"] = 51.41'

1 SITE PLAN
3/32" = 1'-0"

SPECIAL INSPECTION ITEMS

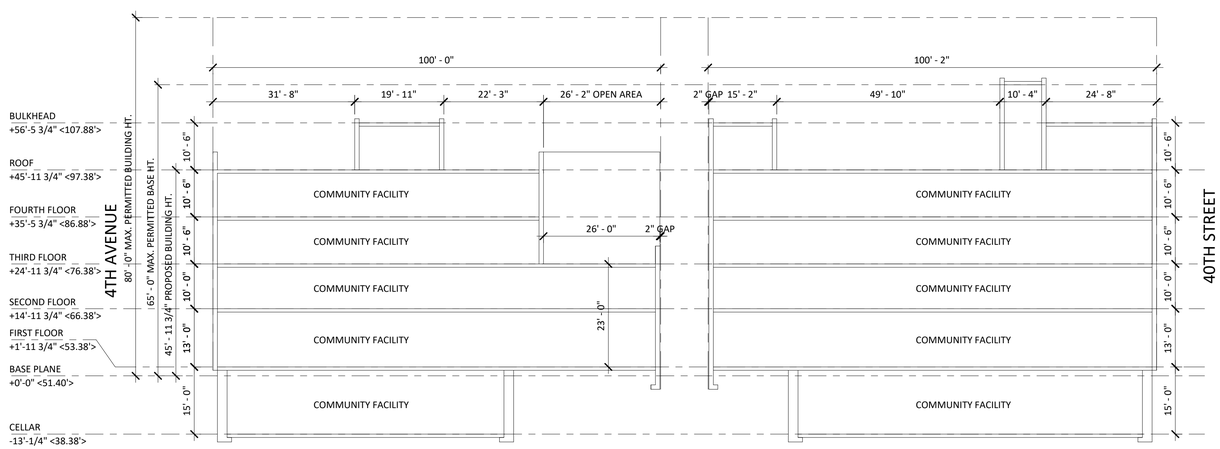
FIRE-RESISTANT PENETRATION & JOINTS	BC 1704.27
ENERGY CODE COMPLIANCE INSPECTION	BC 110.3.5
FIRE-RESISTANCE RATED CONSTRUCTION	BC 110.3.4

ENERGY CODE PROGRESS INSPECTION

PROTECTION OF EXPOSED FOUNDATION INSULATION	IIA1
INSULATION PLACEMENT AND R-VALUES	IIA2
FENESTRATION AND DOOR U-FACTOR AND PRODUCT RATINGS	IIA3
FENESTRATION AIR LEAKAGE	IIA4
FENESTRATION AREAS	IIA5
AIR BARRIER VISUAL INSPECTION	IIA6
AIR BARRIER TESTING	IIA7
SHUTOFF DAMPERS	IIB2
METERING	IIC1
INTERIOR LIGHTING POWER	IIC3
EXTERIOR LIGHTING POWER	IIC4
LIGHTING CONTROLS	IIC5
ELECTRIC MOTORS AND ELEVATORS	IIC6
MAINTENANCE INFORMATION	IID1

ZONING ANALYSIS

CHAPTER	ZR SECTION	PERMITTED / REQUIRED	PROPOSED
III - CHAPTER 2 USE REGULATIONS	ZR 32-00 GENERAL PROVISIONS	USE GROUP 1, 2, 3, 4, 5, 6, 7, 8, 9 & 14	PROPOSED USE GROUP 3A
III - CHAPTER 3 BULK REGULATIONS FOR COMMERCIAL OR COMMUNITY FACILITY BUILDING IN COMMERCIAL DISTRICTS	ZR 33-00 APPLICABILITY, DEFINITIONS AND GENERAL PROVISIONS		
	ZR 33-011 QUALITY HOUSING PROGRAM	THE APPLICABILITY OF THE QUALITY HOUSING PROGRAM TO #COMMERCIAL BUILDINGS#, #COMMUNITY FACILITY BUILDINGS# OR #BUILDINGS# USED PARTLY FOR #COMMERCIAL USE# AND PARTLY FOR #COMMUNITY FACILITY USE# IS SET FORTH. IN C1 AND C2 DISTRICTS MAPPED WITHIN R6 THROUGH R10 DISTRICTS WITH A LETTER SUFFIX, ALL #BUILDINGS# SHALL COMPLY WITH THE APPLICABLE HEIGHT AND SETBACK REGULATIONS FOR #QUALITY HOUSING BUILDINGS# SET FORTH IN ARTICLE III, CHAPTER 5.	C2-4 DISTRICT MAPPED WITHIN R7A DISTRICT QUALITY HOUSING APPLIES
	ZR 33-03 STREET TREE PLANTING IN COMMERCIAL DISTRICTS	C1 C2 C3 C4 C5 C6 C7 C8 IN ALL DISTRICTS, AS INDICATED, THE FOLLOWING SHALL PROVIDE #STREET# TREES IN ACCORDANCE WITH 26-41 (STREET TREE PLANTING) (a) #DEVELOPMENTS# OR #ENLARGEMENTS# THAT INCREASE THE #FLOOR AREA# ON A #ZONING LOT# BY 20 PERCENTS OR MORE.	4TH AVENUE FRONTAGE: 100'-2" / 25' = 4 STREET TREES REQUIRED 40TH STREET STREET FRONTAGE: 100' /25' = 4 STREET TREES REQUIRED
	ZR 26-41 STREET TREE PLANTING	ONE #STREET# TREE, PRE-EXISTING OR NEWLY PLANTED, SHALL BE PROVIDED FOR EVERY 25 FEET OF #STREET# FRONTAGE OF THE #ZONING LOT#.	6 TREES TO BE PAID INTO TREE FUND AND 2 EXISTING TRESS TO BE PROTECTED
	ZR 33-10 FLOOR AREA REGULATIONS		
	ZR 33-121 IN DISTRICTS WITH BULK GOVERENED BY RESIDENCE DISTRICT BULK REGULATIONS	C1-1 C1-2 C1-3 C1-4 C1-5 C2-1 C2-2 C2-3 C2-4 C2-5 IN THE DISTRICTS INDICATED, FOR A #ZONING LOT# CONTAINING A #COMMERCIAL# OR #COMMUNITY FACILITY USE#, THE MAXIMUM #FLOOR AREA RATIO# IS DETERMINED BY THE #RESIDENCE DISTRICT# WITHIN WHICH SUCH #COMMERCIAL DISTRICT# IS MAPPED AND SHALL NOT EXCEED THE MAXIMUM #FLOOR AREA RATIO# SET FORTH IN THE FOLLOWING TABLE: DISTRICT — FOR ZONING LOTS CONTAINING ONLY COMM. FACILITY USE R7A — 4.00	MAX. PERMITTED FLOOR AREA: 10,017 X 4.00 = 40,068 SF PROPOSED FLOOR AREA: = 36,866 SF / 10,017 SF = 3.67 FAR < 4.00 FAR SEE Z-002 FOR CALCULATIONS, COMPLIES.
	ZR 33-20 YARD REGULATIONS		
	ZR 33-25 MINIMUM REQUIRED SIDE YARDS	C1 C2 C3 C4 C5 C6 C7 C8 IN ALL DISTRICTS, AS INDICATED, NO #SIDE YARDS# ARE REQUIRED. HOWEVER, IF AN OPEN AREA EXTENDING ALONG A #SIDE LOT LINE# IS PROVIDED AT ANY LEVEL, IT SHALL BE: (a) AT LEAST EIGHT FEET WIDE AT EVERY POINT	26'-2" MIN. OPEN AREA AT THIRD FLOOR SEE PLOT PLAN, COMPLIES.
	ZR 33-261 BEYOND ON HUNDRED FEET OF STREET LINE	C1 C2 C3 C4 C5 C6 C7 C8 IN ALL DISTRICTS, AS INDICATED, FOR #CORNER LOTS#, THE PORTION OF A #SIDE LOT LINE# BEYOND 100 FEET OF THE #STREET LINE# THAT IT INTERSECTS SHALL BE CONSIDERED A #REAR LOT LINE# AND A #REAR YARD# WITH A MINIMUM DEPTH OF 20 FEET SHALL BE PROVIDED WHERE SUCH #REAR LOT LINE# COINCIDES WITH A #REAR LOT LINE# OF AN ADJOINING #ZONING LOT#.	NO REAR YARD REQUIRED SEE PLOT PLAN, COMPLIES.
	ZR 33-40 HEIGHT AND SETBACK REGULATIONS & ZR 35-60 MODIFICATION OF HEIGHT AND SETBACK REGULATIONS		
	ALL #BUILDINGS# IN #COMMERCIAL DISTRICTS# SHALL COMPLY WITH THE HEIGHT AND SETBACK REGULATIONS SET FORTH IN THIS SECTION. HOWEVER, THE HEIGHT AND SETBACK REGULATIONS OF THIS SECTION, SHALL NOT APPLY IN C1 AND C2 DISTRICTS MAPPED WITHIN R6 THROUGH R10 DISTRICTS WITH A LETTER SUFFIX. IN LIEU THEREOF, ALL #BUILDINGS# IN SUCH DISTRICT SHALL COMPLY WITH THE APPLICABLE #RESIDENTIAL# HEIGHT AND SETBACK REGULATIONS FOR #QUALITY HOUSING BUILDINGS# SET FORTH IN ARTICLE II, CHAPTER 3, AS MODIFIED BY ARTICLE III, CHAPTER 5.		
	ZR 35-651 STREET WALL LOCATION	(a) IN THE DISTRICTS INDICATED, AND IN C1 OR C2 DISTRICTS WHEN MAPPED WITHIN R6A, R6B, R7A, R7B OR R7X DISTRICTS, THE FOLLOWING SHALL APPLY: (1) AT LEAST 70 PERCENT OF THE #AGGREGATE WIDTH OF STREET WALLS# SHALL BE LOCATED WITHIN EIGHT FEET OF THE #STREET LINE# AND SHALL EXTEND TO AT LEAST THE MINIMUM BASE HEIGHT SPECIFIED IN SECTION 35-652, OR THE HEIGHT OF THE #BUILDING#, WHICHEVER IS LESS. (3) FOR #ZONING LOTS# BOUNDED BY MORE THAN ONE #STREET LINE#, THESE #STREET WALL# LOCATION PROVISIONS SHALL BE MANDATORY ALONG ONLY ONE #STREET LINE#.	100% OF STREET WALL ALONG 4TH AVENUE & 40TH STREET AT THE STREET LINE REACHING 45'-11 3/4" > 40'-0" MIN. REQ. SEE Z-001 FOR SETBACK DIAGRAM, COMPLIES.
	ZR 35-652 MAXIMUM HEIGHT OF BUILDINGS AND SETBACK REGULATIONS	(a) BASIC #BUILDING# HEIGHTS: FOR #QUALITY HOUSING BUILDINGS#, THE MINIMUM AND MAXIMUM BASE HEIGHT, AND MAXIMUM HEIGHT OF A #BUILDING OR OTHER STRUCTURE# SHALL BE AS SPECIFIED IN PARAGRAPH (a) OF SECTION 23-662 FOR THE #RESIDENCE DISTRICT# WITHIN WHICH SUCH #COMMERCIAL DISTRICT# IS MAPPED.	PROPOSED BUILDING HEIGHT = 45'-11 3/4" > 40'-0" MIN. REQ. SEE Z-001 FOR SETBACK DIAGRAM, COMPLIES.
	ZR 23-662 MAXIMUM HEIGHT OF BUILDINGS AND SETBACK REGULATIONS	(a) MAXIMUM #BUILDING# HEIGHT DISTRICT — MIN. BASE HEIGHT — MAX. BASE HEIGHT — MAX. BUILDING HEIGHT R7A — 40' — 65' — 80'	
III - CHAPTER 6 ACCESSORY OFF STREET PARKING AND LOADING REGULATIONS	ZR 36-00 REQUIRED ACCESSORY OFF-STREET PARKING SPACES FOR COMMERCIAL OR COMMUNITY FACILITY USES		
	ZR 36-21 GENERAL PROVISIONS	TYPE OF USE — PARKING SPACES REQUIRED — DISTRICTS COLLEGES, UNIVERSITIES OR SEMINARIES (FOR THAT #FLOOR AREA# USED FOR CLASSROOMS, LABORATORIES, STUDENT CENTERS OR OFFICES) — NONE REQUIRED — C2-4	NO PARKING REQUIRED, COMPLIES.
	ZR 36-70 BICYCLE PARKING		
	ZR 36-711 ENCLOSED BICYCLE PARKING SPACES	TYPE OF USE — BICYCLE PARKING REQUIRED COLLEGE, UNIVERSITIES OR SEMINARIES — 1 PER 5,000 SF OF FLOOR AREA (a) CLASSROOMS, STUDENT CENTERS, OFFICES	36,866 SF / 5,000 SF = 8 SPACES REQUIRED 8 SPACES, BICYCLE STORAGE PROVIDED ON 1ST FLOOR SEE A-100, COMPLIES.



HEIGHT AND SETBACK DIAGRAM

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

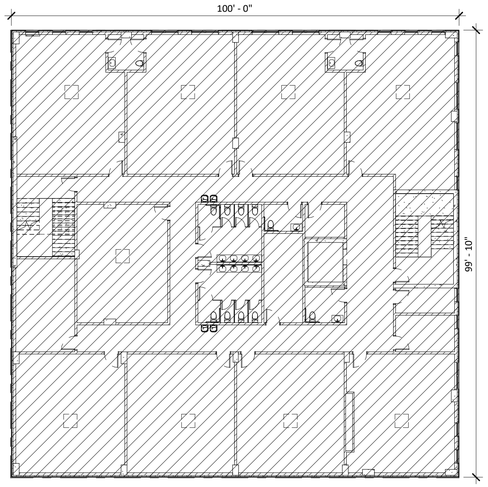
DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE — 01 OF 21
ZONING ANALYSIS, PLOT PLAN

SHEET NUMBER
Z-001.00

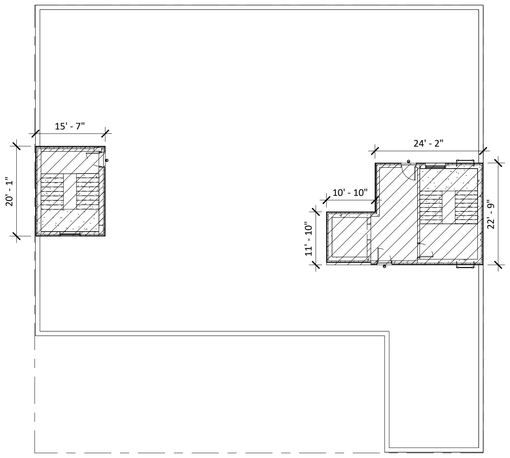
© 2023 DJLU ARCHITECT All Rights Reserved



GROSS AREA: 9,983 SF
DEDUCTIONS: 0 SF
ZONING AREA: 9,983 SF

100'-0" X 99'-10" = 9,983 SF

3 2ND FLOOR ZONING
1/16" = 1'-0"

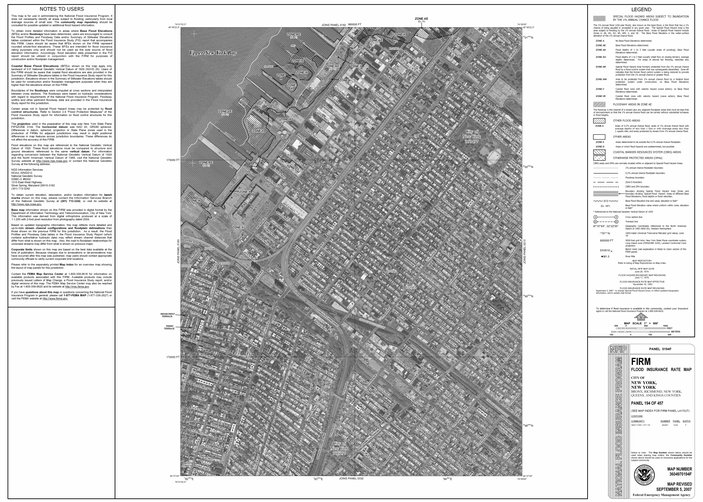


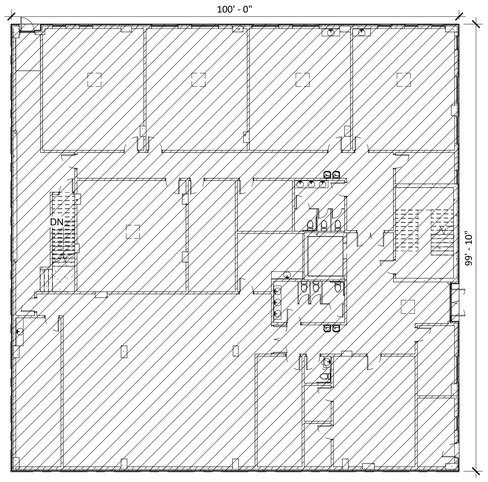
GROSS AREA: 990 SF
DEDUCTIONS: 0 SF
ZONING AREA: 990 SF

(20'-1" X 15'-7") + (24'-2" X 22'-9")
+ (10'-10" X 11'-10") = 990 SF

6 ROOF PLAN ZONING
1/16" = 1'-0"

ZONING FLOOR AREA CALCULATION			
LEVEL	GROSS AREA	DEDUCTION	ZONING AREA
ROOF	990 SF	0 SF	990 SF
4TH FL.	7,955 SF	0 SF	7,955 SF
3RD FL.	7,955 SF	0 SF	7,955 SF
2ND FL.	9,983 SF	0 SF	9,983 SF
1ST FL.	9,983 SF	0 SF	9,983 SF
CELLAR	5,376 SF	0 SF	0 SF
TOTAL	42,242 SF	0 SF	36,866 SF
FAR = 36,866 SF / 10,017 SF = 3.67 FAR			

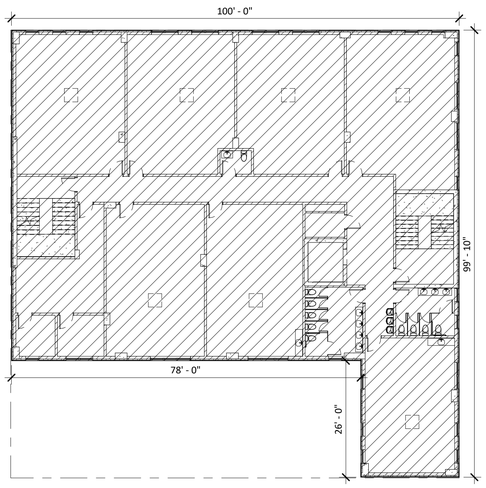




GROSS AREA: 9,983 SF
DEDUCTIONS: 0 SF
ZONING AREA: 9,983 SF

100'-0" X 99'-10" = 9,983 SF

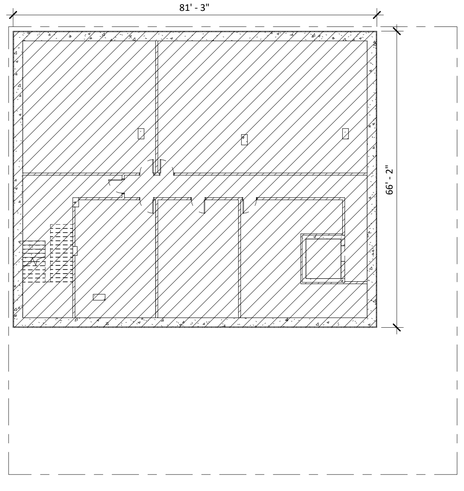
2 1ST FLOOR ZONING
1/16" = 1'-0"



GROSS AREA: 7,955 SF
DEDUCTIONS: 0 SF
ZONING AREA: 7,955 SF

(100'-0" X 99'-10") - (26'-0" X 78'-0")
= 7,955 SF

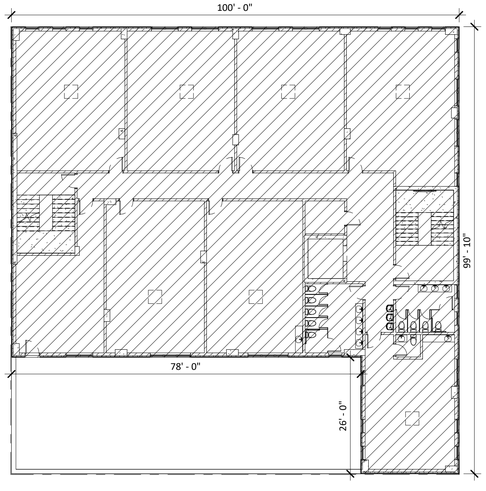
5 4TH FLOOR ZONING
1/16" = 1'-0"



GROSS AREA: 5,376 SF
DEDUCTIONS: 0 SF
ZONING AREA: 0 SF

81'-3" X 66'-2" = 5,376 SF

1 CELLAR ZONING
1/16" = 1'-0"



GROSS AREA: 7,955 SF
DEDUCTIONS: 0 SF
ZONING AREA: 7,955 SF

(100'-0" X 99'-10") - (26'-0" X 78'-0")
= 7,955 SF

4 3RD FLOOR ZONING
1/16" = 1'-0"

JOB NUMBER: B714-6
PROPERTY ADDRESS: 4001 4th AVENUE
BUILDING DEPARTMENT PURPOSES ONLY

SYMBOLS AND ABBREVIATIONS: FENCES, UTILITY POLE, CATCH BASIN, PARKING METER, TRAFFIC LIGHT, LIGHT, STREET LIGHT, FIRE HYDRANT, SIAMESE CONNECTION, SHUT OFF VALVE, HANDICAPPED PARKING, EXISTING TREE, DRAINS, TRAFFIC SIGN, CURB AND CURB CUT, OVERHEAD SERVICE, CABLE TV MANHOLE, MANHOLES

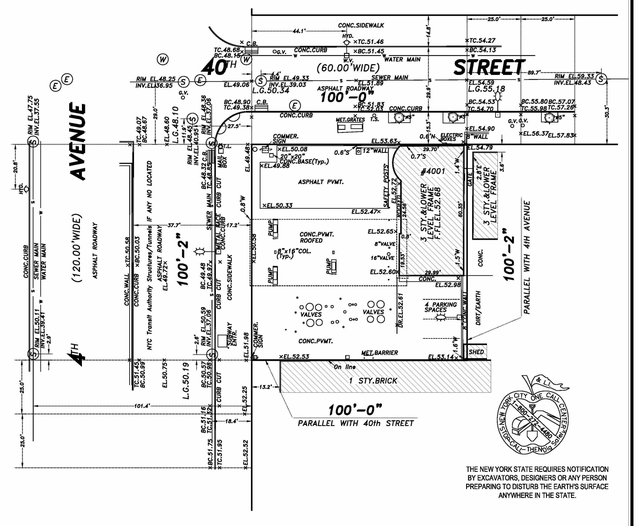
SYMBOLS AND ABBREVIATIONS: CITY MONUMENT, CUT CROSS, SET NAIL, SET STAKE, SET MARK (PAINTED), SET BENCHMARK, FIRE ESCAPE, PLATFORM, CELLAR ENTRANCE, AIR WAY, CONCRETE, PAVEMENT, AIR CONDITION, METAL, NORTH OF PROPERTY LINE, SOUTH OF PROPERTY LINE, EAST OF PROPERTY LINE, WEST OF PROPERTY LINE

GENERAL NOTES:
SUBSURFACE UTILITIES ARE NOT GUARANTEED BY SURVEYOR. HIGH CAUTION RECOMMENDED AND VERIFICATION WITH PROPER CITY AGENCIES, IS MANDATORY BEFORE COMMENCING ALL NEW WORK.
ALL SUBSURFACE AND OVERHEAD UTILITIES (AS TO SIZE , TYPE AND DEPTH) SHOWN ON THIS SURVEY ARE TAKEN FROM RECORDS OF GOVERNMENTAL AGENCIES AND UTILITY COMPANIES, UNLESS OTHERWISE NOTED AND SHOWN.
COVER OR DEPTH OF UTILITIES WHICH DERIVED FROM FIELD MEASUREMENTS SHOWN ON THIS SURVEY SHOULD BE VERIFIED WITH PROPER AGENCY PRIOR TO CONSTRUCTION OF PROJECT. INVERT ELEVATIONS ARE DERIVED FROM CITY AGENCY RECORDS WHEN NOT AVAILABLE BY FIELD SURVEY AND NOTED AS "PER RECORD" ON THE SURVEY.
ALL SUBSURFACE UTILITY AS TO LOCATION AND DEPTH, SHOULD BE RECHECKED AND LEGAL GRADES SHOULD BE VERIFIED WITH THE TOPOGRAPHICAL BUREAU, PREFERABLY IN WRITING BEFORE COMMENCING CONSTRUCTION.
THIS IS TO CERTIFY THAT THERE ARE NO STREAMS OR NATURAL WATER COURSES ON THE SURVEYED PROPERTY EXCEPT AS SHOWN AND/OR DESCRIBED ON THIS SURVEY.
ALL OPERATIONS OF UNDERGROUND FACILITIES AND ALL EXCAVATORS ARE OBLIGATED TO COMPLY WITH ARTICLE 36 OF THE GENERAL BUSINESS LAW AND WITH PROVISIONS OF INDUSTRIAL CODE PART (RULE NO.53) BEFORE ANY EXCAVATION OR DEMOLITION IS COMMENCED. EVERY EXCAVATOR IS REQUIRED BY THESE LAWS TO GIVE ADVANCE NOTICE TO EVERY OPERATOR OF UNDERGROUND FACILITIES OF HIS INTENT TO PERFORM EXCAVATION OR DEMOLITION WORK IN THE SPECIFIED AREA.
THE USER OF THE SURVEY EXPRESSLY UNDERSTANDS AND AGREES THAT THE SURVEYOR MAKES NO CLAIM AND DOES NOT GUARANTEE THAT THE SEWERS SHOWN HEREON ARE PUBLIC OR THAT ANY PROPERTIES SHOWN ON THE SURVEY WILL BE ABLE TO CONNECT TO SAME.
THE USER OF THIS SURVEY EXPRESSLY AGREES AND UNDERSTANDS THAT SHOULD JAROSLAW KRAWCZYK OR KABA LAND SURVEYING, PC. BE FOUND LIBEL IN A COURT OF LAW FOR ERRORS OR EMISSIONS ARISING FROM THIS SURVEY THAT THE LIMIT OF LIABILITY IS THE PRICE PAID FOR THIS SURVEY.
DO NOT USE THIS SURVEY UNLESS YOU AGREE AND CONSENT TO ALL OF THE ABOVE.
ALL ELEVATIONS SHOWN REFER TO NAVD 88 DATUM.
LEGAL GRADES SHOWN ON THE SURVEY REFER TO NAVD 88 DATUM.

NOTES:
SURVEYED AS IN POSSESSION. OFFSETS AND/OR DIMENSIONS SHOWN BETWEEN THE STRUCTURES AND PROPERTY LINES ARE FOR SPECIFIC PURPOSE AND USE AND THEREFORE ARE NOT INTENDED TO GUIDE ERECTION OF FENCES, RETAINING WALLS, POOLS, PLANTING AREAS, ADDITIONS TO STRUCTURES, SHEDS, GARAGES AND ANY OTHER CONSTRUCTION AND/OR DESIGN.
PLUMBINGS OF WALLS NOT VERIFIED.
UNDERGROUND AND SIDEWALK VAULTS NOT LOCATED AS PART OF THIS SURVEY.
PROPERTY CORNER MONUMENTS WERE NOT PLACED AS PART OF THIS SURVEY.
THIS SURVEY HAS BEEN PREPARED WITHOUT A FULL ABSTRACT OF TITLE, OTHER AGREEMENTS, COVENANTS AND/OR RESTRICTIONS AFFECTING AND/OR BENEFITING PARCEL SURVEYED, IF ANY, NOT INDICATED HEREON.
EASEMENTS IF ANY IF NOT SHOWN ON THIS SURVEY ARE NOT GUARANTEED.
SOME DIMENSIONS, FEATURES AND/OR LOCATIONS MAY NOT BE DRAWN TO SCALE TO PROVIDE CLARITY.
PARTY WALL(S) HEREON ARE SHOWN SCHEMATICALLY ONLY AND WERE NOT SURVEYED. LOCATION AND EXTENTS OF PARTY WALL(S) ARE NOT SHOWN ON THE SURVEY AND DENOTED BASED UPON RECORD DOCUMENTS IF AVAILABLE AND/OR EXTERIOR OBSERVATION ONLY, IF POSSIBLE. PARTY WALL(S) AND LOCATION/EXTENTS OF SAME MUST BE CONFIRMED AND VERIFIED BY THE USER OF THIS SURVEY. PARTY WALL(S) AND LOCATION/EXTENTS OF SAME ARE NOT VERIFIED OR CERTIFIED BY THE LAND SURVEYOR.
DO NOT USE THIS SURVEY UNLESS YOU AGREE AND CONSENT TO ALL OF THE ABOVE.

AREA=10016.7 SQ.FT.

GRAPHIC SCALE: 0 10 20 30 40 50



THE NEW YORK STATE REQUIRES NOTIFICATION BY EXCAVATORS, DESIGNERS ON ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE STATE.

kaBA surveying
phone:718-354-7279 718-470-2358
fax:718-247-5854 718-470-2264
338 JERICHO TURNPIKE, FLORAL PARK, NY 11001
SURVEYS@KABAPLS.COM

SURVEYED & GUARANTEED FOR:
DEPARTMENT OF BUILDINGS

JAROSLAW W. KRAWCZYK — No. 050759 — LICENSED LAND SURVEYOR — STATE OF NEW YORK

BOROUGH:KINGS
TOWN:BROOKLYN
BLOCK: 714 LOT:6

SURVEYED:
AUGUST 10, 2023-ARCHITECTURAL SURVEY

UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW. COPIES OF THIS SURVEY MAY NOT BEARING THE LAND SURVEYOR'S INKED SEAL OR EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE A VALID COPY. GUARANTEES OR CERTIFICATIONS INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED AND ON HIS BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. GUARANTEES OR CERTIFICATIONS ARE NOT TRANSFERRABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE
ZONING FLOOR AREA DIAGRAMS

02 OF 21

SHEET NUMBER
Z-002.00

© 2023 DJLU ARCHITECT All Rights Reserved

TABLE 504.3 ALLOWABLE BUILDING HEIGHT IN FEET										
OCCUPANCY		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
E	NS	UL	160	65	55	65	55	65	50	40
	S	UL	420	85	75	85	75	85	70	60

TABLE 506.2 ALLOWABLE AREA FACTOR										
OCCUPANCY		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
E	NS	UL	UL	26,000	10,500	23,500	5,600	25,500	8,400	5,500
	S1	UL	UL	78,000	31,500	70,500	16,800	76,500	25,200	16,500
	SM	UL	UL	52,000	21,000	47,000	11,200	51,000	16,800	11,000

TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS									
	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
BUILDING ELEMENT	A	B	A	B	A	B	HT	A	B
PRIMARY STRUCTURAL FRAME	3	2	1	0	1	0	HT	1	1
BEARING WALLS									
EXTERIOR	3	2	1	0	2	2	2	1	0
INTERIOR	3	2	1	0	1	0	1 / HT	1	0
NONBEARING WALLS AND PARTITIONS EXTERIOR	SEE TABLE 602								
NONBEARING WALLS AND PARTITIONS INTERIOR	0	0	0	0	0	0	SEE SECTION 602.4.6	0	0
FLOOR CONSTRUCTION AND SECONDARY MEMBERS	2	2	1	0	1	0	HT	1	0
ROOF CONSTRUCTION AND SECONDARY MEMBERS	1-1/2	1	1	0	1	0	HT	1	0

TABLE 602 FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE				
FIRE SEPARATION DISTANCE = X (FEET)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H	OCCUPANCY GROUP F-1, M, S-1	OCCUPANCY GROUP A, B, E, F-2, I, R, S-2, U
X < 5	ALL	3	2	1
5 < X< 10	IA	3	2	1
	OTHERS	2	1	1
10 < X< 30	IA, IB	2	1	1
	IIB, VB	1	0	0
	OTHERS	1	1	1
X > 30	ALL	0	0	0

TABLE 1006.3.2 STOREIS WITH ONE EXIT OR ACCESS TO ONE EXIT			
STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER FLOOR	MAXIMUM TRAVEL DISTANCE (FEET)
FIRST STORY ABOVE GRADE PLANE OR CELLAR	A, B,E, F, M, U, S	49	75

BC 1006.3.2 - SINGLE EXITS
A SINGLE EXIT OR ACCESS TO A SINGLE EXIT SHALL BE PERMITTED FROM ANY STORY OR OCCUPIED ROOF DESIGNED FOR HUMAN OCCUPANCY OR USE WHERE ONE OF THE FOLLOWING CONDITIONS EXISTS:
1. THE OCCUPANT LOAD, NUMBER OF DWELLING UNITS AND EXIT ACCESS TRAVEL DISTANCE DO NOT EXCEED THE VALUES IN TABLE 1006.3.2.

TABLE 1017.2 EXIT ACCESS TRAVEL DISTANCE		
OCCUPANCY	WITHOUT SPRINKLER SYSTEM	WITH SPRINKLER SYSTEM
A	SEE SECTION 1028.7	
E, F-1, M, R, S-1	150	200
B	200	300
F-2, S-2, U	200	250
H-1	NOT PERMITTED	75
H-2	NOT PERMITTED	100
H-3	NOT PERMITTED	150
H-4	NOT PERMITTED	175
H-5	NOT PERMITTED	200
I-1, I-2, I-3, I-4	NOT PERMITTED	200

TABLE 1006.2.1 SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY	
OCCUPANCY	MAXIMUM OCCUPANCY LOAD
A, E, M	74
B	74
F	49
H-1, H-2, H-3	3
H-4, H-5, I-1, I-3, I-4	10
I-2	SEE SECTION 407
R-1	20
R-2	20
S	29
U	74

BC 1023.2 - CONSTRUCTION
ENCLOSURES FOR INTERIOR EXIT STAIRWAYS SHALL BE CONSTRUCTED AS FIRE BARRIERS IN ACCORDANCE WITH SECTION 707. INTERIOR EXIT STAIRWAY SHALL HAVE A FIRE RESISTANCE RATING OF NOT LESS THAN 2 HOURS WHERE CONNECTING FOUR STORIES OR MORE.

BC 1023.3 - TERMINATION.
EXIT ENCLOSURES SHALL TERMINATE AT AN EXIT DISCHARGE OR A PUBLIC WAY.

BC 1023.7 - INTERIOR EXIT STAIRWAY WALLS.
EXTERIOR WALLS OF THE INTERIOR EXIT STAIRWAY SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 705 FOR EXTERIOR WALLS. OPENINGS WITHIN SUCH EXTERIOR WALLS SHALL BE PROTECTED BY OPENING PROTECTIVE HAVING A FIRE PROTECTION RATING OF NOT LESS THAN 3/4 HOUR.

TABLE 1004.1.1 MAX. FLOOR AREA ALLOWANCE PER OCCUPANT	
ASSEMBLY W/O FIXED SEATS (TABLES & CHAIRS)	15 NET
ACCESSORY STORAGE, MECHANICAL	300 GROSS
EDUCATIONAL (CLASSROOM)	20 NET
KITCHENS	200 GROSS
EXERCISE	50 GROSS

BC 1005.3.1 - STAIRWAYS
THE CAPACITY, IN INCHES, OF MEANS OF EGRESS STAIRWAYS SHALL BE CALCULATED BY MULTIPLYING THE OCCUPANT LOAD SERVED BY SUCH STAIRWAYS BY A MEANS OF EGRESS CAPACITY FACTOR OF 0.3 INCH PER OCCUPANT. WHERE STAIRWAYS SERVE MORE THAN ONE STORY, ONLY THE OCCUPANT LOAD OF EACH STORY CONSIDERED INDIVIDUALLY SHALL BE USED IN CALCULATING THE REQUIRED CAPACITY OF THE STAIRWAYS SERVING THAT STORY.

BC 1005.3.2 - OTHER EGRESS COMPONENTS
THE CAPACITY, IN INCHES, OF MEANS OF EGRESS COMPONENTS OTHER THAN STAIRWAYS SHALL BE CALCULATED BY MULTIPLYING THE OCCUPANT LOAD SERVED BY SUCH COMPONENT BY A MEANS OF EGRESS CAPACITY FACTOR OF 0.2 INCH PER OCCUPANT.

BC 1007.1.1 - TWO EXITS OR EXIT ACCESS DOORWAYS
EXCEPTION 2. REMOTE LOCATION IN SPRINKLERED BUILDINGS. WHERE A BUILDING IS EQUIPPED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM IN ACCORDANCE WITH SECTION 903.3.1.1 OR 903.3.1.2, THE SEPARATION DISTANCE OF THE EXIT DOORS OR EXIT ACCESS DOORWAYS SHALL NOT BE LESS THAN ONE-THIRD OF THE LENGTH OF THE MAXIMUM OVERALL DIAGONAL DIMENSION OF THE AREA SERVED.

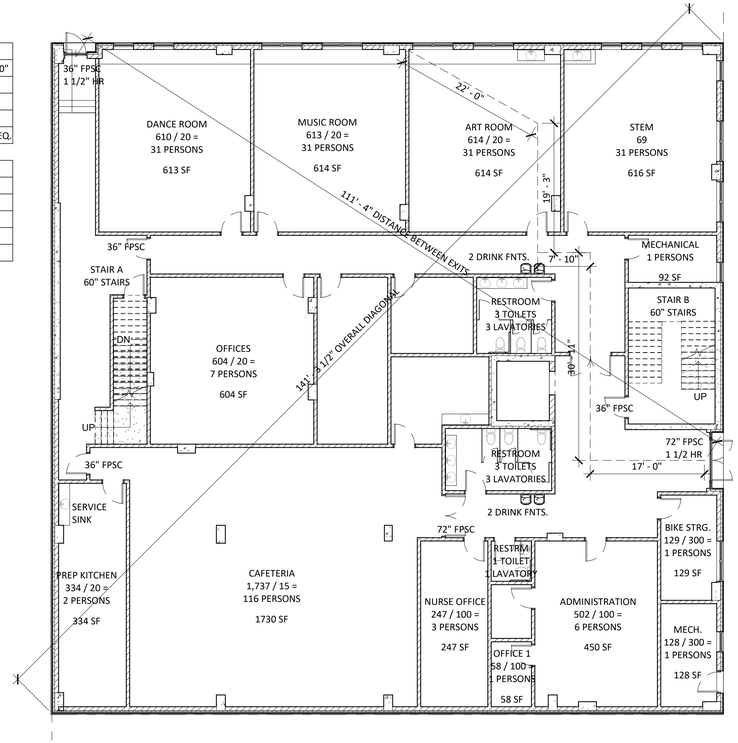
BC 1010.1.1.1 - DOOR WIDTH.
THE REQUIRED CAPACITY OF EACH DOOR OPENING SHALL BE SUFFICIENT FOR THE OCCUPANT LOAD THEREOF AND SHALL PROVIDE A MINIMUM CLEAR WIDTH OF 32 INCHES. CLEAR OPENINGS OF DOORWAYS WITH SWINGING DOORS SHALL BE MEASURED BETWEEN THE FACE OF THE DOOR AND THE STOP, WITH THE DOOR OPEN 90 DEGREES.

BC 1011.2 - STAIRWAY WIDTH.
THE REQUIRED CAPACITY OF STAIRWAYS SHALL BE DETERMINED AS SPECIFIED IN SECTION 1005, BUT THE MINIMUM WIDTH SHALL BE NOT LESS THAN 44 INCHES.

1020.2 - WIDTH AND CAPACITY (INTERIOR CORRIDOR).
THE REQUIRED CAPACITY OF CORRIDORS SHALL BE DETERMINED AS SPECIFIED IN SECTION 1005, BUT THE MINIMUM WIDTH SHALL BE NOT LESS THAN SIXTY-SIX INCHES; IN GROUP E SERVING CLASSROOMS.

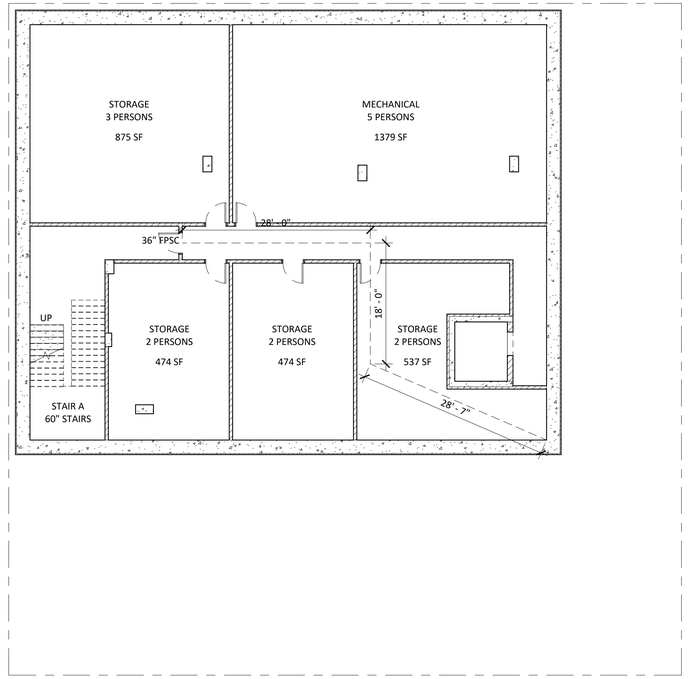
EGRESS ANALYSIS: OCCUPANCY GROUP E		
MAX. TRAVEL DISTANCE		22'-0" + 19'-3" + 7'-10" + 30'-11" + 17'-0" = 97'-0"
OCCUPANCY LOAD		315 PERSONS / 2 = 158 OCCUPANTS PER EXIT
DISTANCE BETWEEN EXITS		111'-4" > 1/3 X 141'-4" = 47'-2"
REQUIRED EGRESS WIDTH	DOOR	0.2 X 158 = 32", PROPOSED 36" DOORS
	STAIR	0.3 X 158 = 48", PROPOSED 60" STAIRS > 44" REQ.

PLUMBING FIXTURES: OCCUPANCY GROUP E	
OCCUPANCY LOAD	315 PERSONS
WATER CLOSETS REQUIRED	315 / 50 = 7 REQUIRED, 7 PROPOSED
LAVATORIES REQUIRED	315 / 50 = 7 REQUIRED, 7 PROPOSED
DRINKING FOUNTAINS REQUIRED	315 / 100 = 4 REQUIRED, 4 PROPOSED
SERVICE SINK REQUIRED	SERVICE SINK LOCATED ON 1ST FLOOR



2 1ST FLOOR EGRESS
3/32" = 1'-0"

EGRESS ANALYSIS: OCCUPANCY GROUP E		
MAX. TRAVEL DISTANCE		28'-7" + 18'-0" + 28'-0" = 74'-7"
OCCUPANCY LOAD		14 PERSONS = 1 EXIT REQUIRED
DISTANCE BETWEEN EXITS		N/A
REQUIRED EGRESS WIDTH	DOOR	0.2 X 14 = 2.8", PROPOSED 36" DOORS
	STAIR	0.3 X 14 = 4.2", PROPOSED 60" STAIRS > 44" REQ.



1 CELLAR EGRESS
3/32" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 03 OF 21

BC NOTES, EGRESS PLANS

SHEET NUMBER

A-001.00

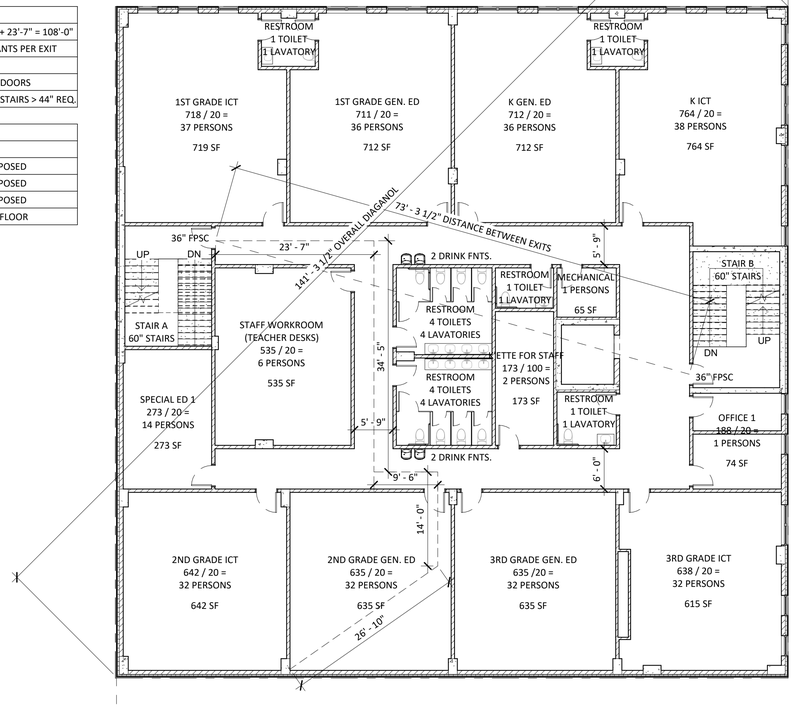
© 2023 DJLU ARCHITECT All Rights Reserved

PC TABLE 403.1 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES						
CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS	LAVATORIES	DRINK. FOUNTAINS	OTHER
EDUCATIONAL	E	EDUCATIONAL FACILITIES	1 PER 50	1 PER 50	1 PER 100	1 SERVICE SINK

TOTAL BUILDING PLUMBING FIXTURE COUNT (CELLAR THRU ROOF)		
OCCUPANTS = 14 + 315 + 330 +266 + 266 + 72 = 1,263		
	REQUIRED	*PROPOSED*
TOILETS	1,263 OCCUP. / 50 = 26 TOILETS	36 TOILETS
LAVATORIES	1,263 OCCUP. / 50 = 26 TOILETS	32 LAVATORIES
DRINKING FOUNTAIN	1,263 OCCUP. / 100 = 13 DRINKING FOUNTAINS	14 DRINKING FOUNTAINS
SERVICE SINK	1 SERVICE SINK	1 SERVICE SINK IN PREP KITCH.

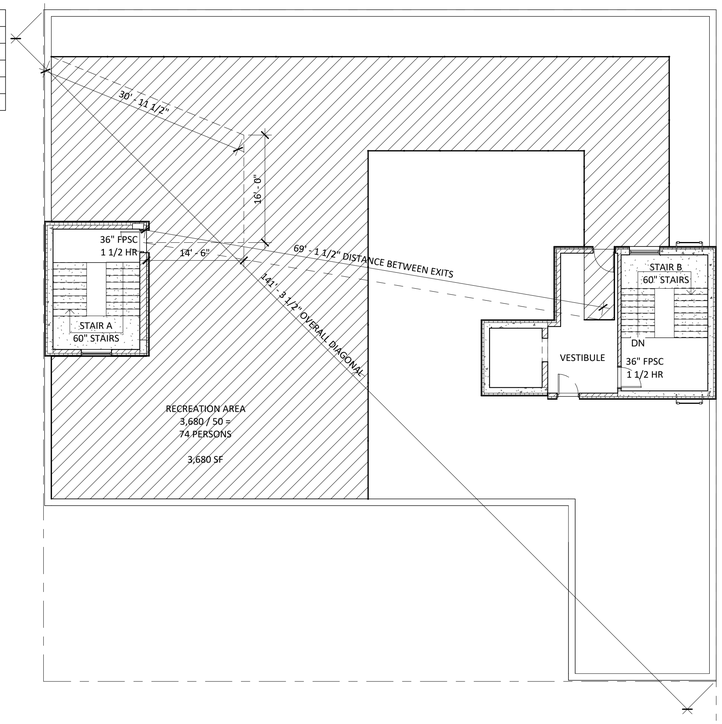
EGRESS ANALYSIS: OCCUPANCY GROUP E		
MAX. TRAVEL DISTANCE		26'-10" + 14'-0" + 9'-6" + 34'-5" + 23'-7" = 108'-0"
OCCUPANCY LOAD		330 PERSONS / 2 = 127 OCCUPANTS PER EXIT
DISTANCE BETWEEN EXITS		73'-4" > 1/3 X 141'-4" = 47'-2"
REQUIRED EGRESS WIDTH	DOOR	0.2 X 127 = 26", PROPOSED 36" DOORS
	STAIR	0.3 X 127 = 39", PROPOSED 60" STAIRS > 44" REQ.

PLUMBING FIXTURES: OCCUPANCY GROUP E	
OCCUPANCY LOAD	330 PERSONS
WATER CLOSETS REQUIRED	330 / 50 = 7 REQUIRED, 11 PROPOSED
LAVATORIES REQUIRED	330 / 50 = 7 REQUIRED, 11 PROPOSED
DRINKING FOUNTAINS REQUIRED	330 / 100 = 4 REQUIRED, 4 PROPOSED
SERVICE SINK REQUIRED	SERVICE SINK LOCATED ON 1ST FLOOR



1 2ND FLOOR EGRESS
3/32" = 1'-0"

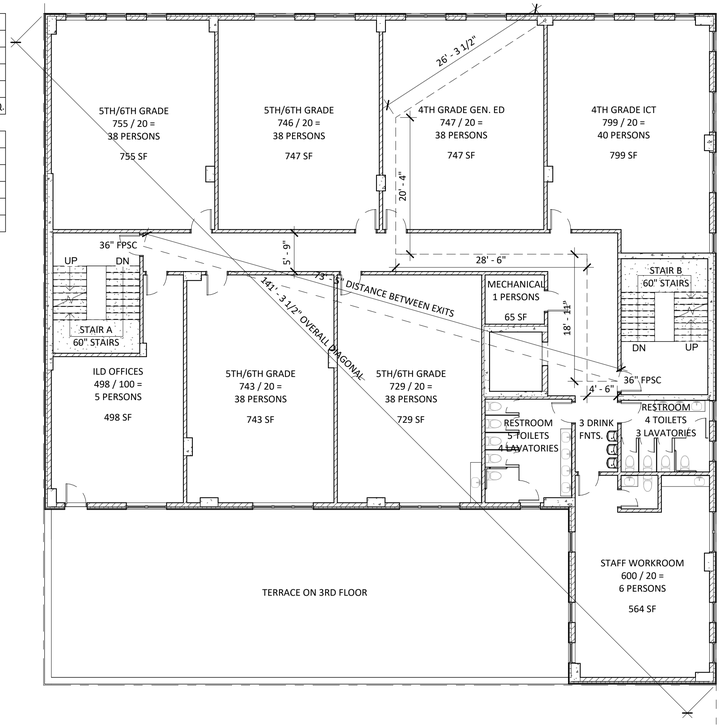
EGRESS ANALYSIS: OCCUPANCY GROUP E		
MAX. TRAVEL DISTANCE		31'-0" + 16'-0" + 14'=6" = 61'-6"
OCCUPANCY LOAD		74 PERSONS / 2 = 37 OCCUPANTS PER EXIT
DISTANCE BETWEEN EXITS		69'-2" > 1/3 X 141'-4" = 47'-2"
REQUIRED EGRESS WIDTH	DOOR	0.2 X 37 = 8", PROPOSED 36" DOORS
	STAIR	0.3 X 36 = 11", PROPOSED 60" STAIRS > 44" REQ.



3 ROOF PLAN EGRESS
3/32" = 1'-0"

EGRESS ANALYSIS: OCCUPANCY GROUP E		
MAX. TRAVEL DISTANCE		26'-4" + 20'-4" + 28'-6" + 18'-11" + 4'-6" = 98'-7"
OCCUPANCY LOAD		266 PERSONS / 2 = 133 OCCUPANTS PER EXIT
DISTANCE BETWEEN EXITS		73'-5" > 1/3 X 141'-4" = 47'-2"
REQUIRED EGRESS WIDTH	DOOR	0.2 X 133 = 27", PROPOSED 36" DOORS
	STAIR	0.3 X 133 = 40", PROPOSED 60" STAIRS > 44" REQ.

PLUMBING FIXTURES: OCCUPANCY GROUP E	
OCCUPANCY LOAD	266 PERSONS
WATER CLOSETS REQUIRED	266 / 50 = 6 REQUIRED, 9 PROPOSED
LAVATORIES REQUIRED	266 / 50 = 6 REQUIRED, 7 PROPOSED
DRINKING FOUNTAINS REQUIRED	266 / 100 = 3 REQUIRED, 3 PROPOSED
SERVICE SINK REQUIRED	SERVICE SINK LOCATED ON 1ST FLOOR



2 3RD/4TH FLOOR EGRESS
3/32" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 04 OF 21

PC NOTES, EGRESS PLANS

SHEET NUMBER

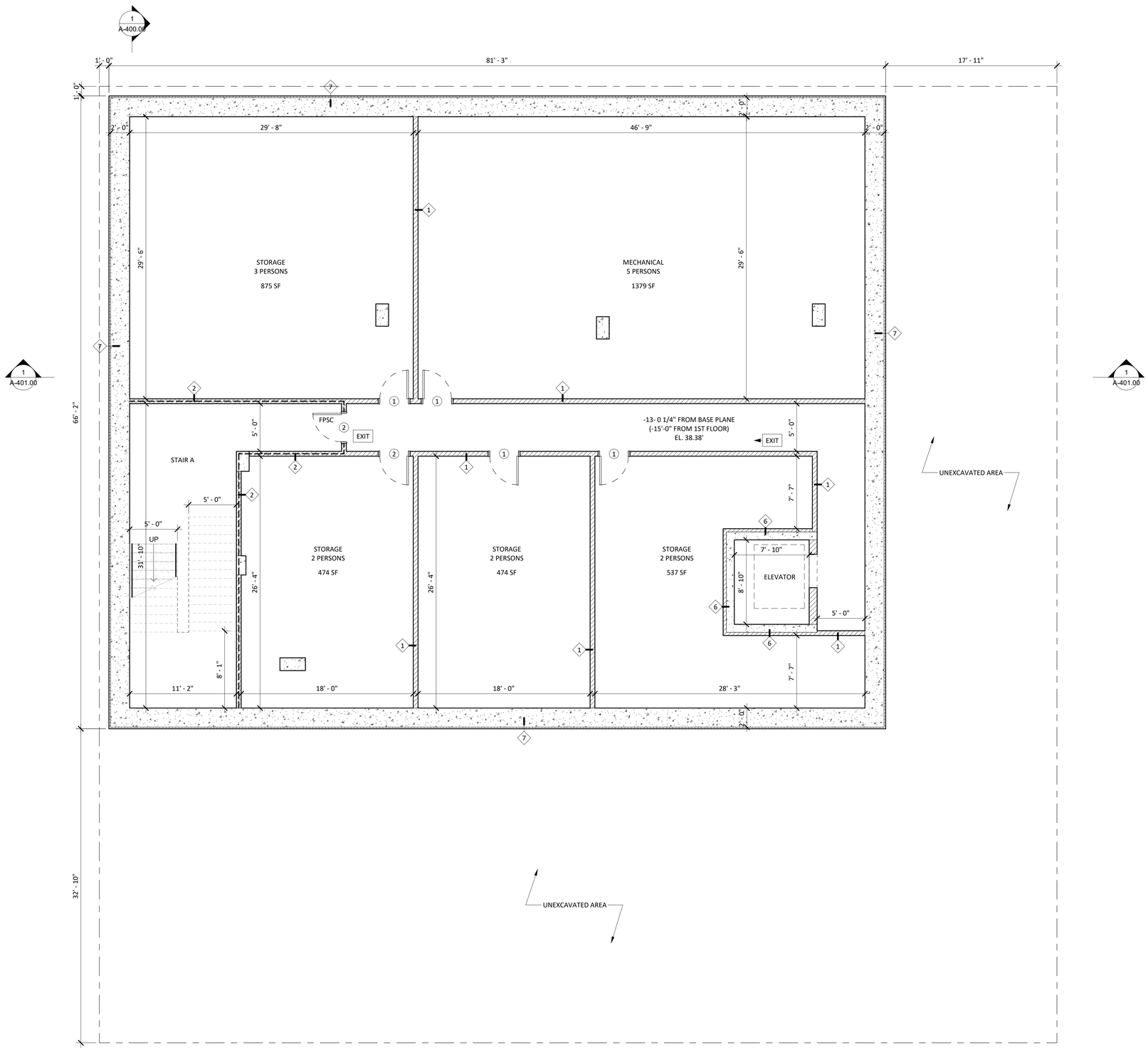
A-002.00

© 2023 DJLU ARCHITECT All Rights Reserved

LEGEND	
— — —	PROPERTY LINE
FPSC	FIRE PROOF SELF-CLOSING
RD/FD	ROOF / FLOOR DRAIN
	CAST IN PLACE CONCRETE
	METAL FRAMING WALL
EXIT	EXIT SIGN
X	WALL TYPE
X	DOOR TYPE
X	WINDOW TYPE
— — — —	2 HOUR FIRE RATING
	FDNY ROOF ACCESS

ELEVATOR DOOR TO BE GASKETED, WEATHERSTRIPPED, OR SEALED AS PER NYECC C402.5.4

ENTIRE BUILDING TO BE SPRINKLERED, FIRE PROTECTION DRAWINGS FILED SEPARATELY.



1 CELLAR PLAN
3/16" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 05 OF 21

PROPOSED
CELLAR PLAN

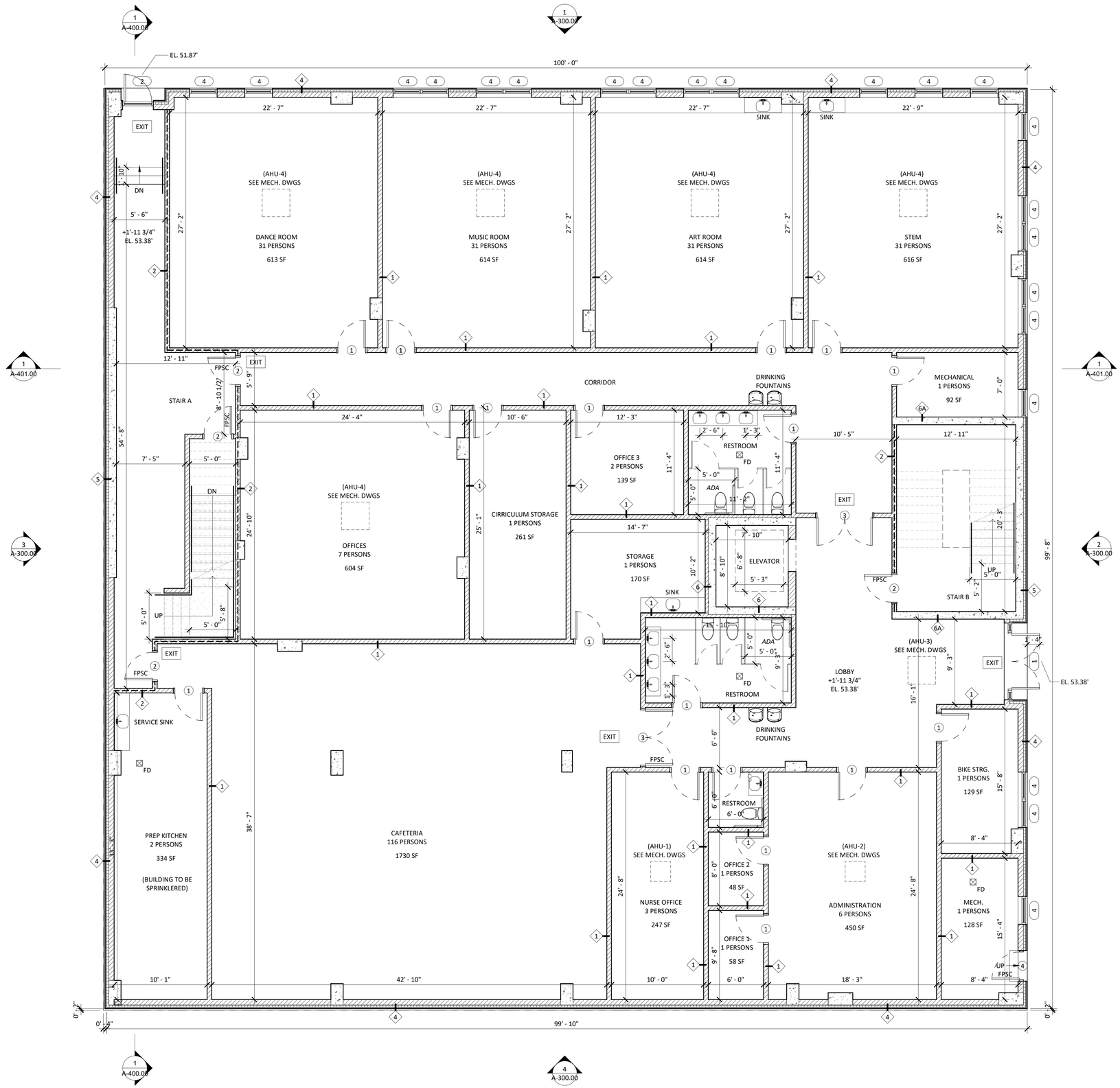
SHEET NUMBER
A-100.00

© 2023 DJLU ARCHITECT All Rights Reserved

LEGEND	
— — —	PROPERTY LINE
FPSC	FIRE PROOF SELF-CLOSING
RD/FD	ROOF / FLOOR DRAIN
	CAST IN PLACE CONCRETE
	METAL FRAMING WALL
EXIT	EXIT SIGN
X	WALL TYPE
X	DOOR TYPE
X	WINDOW TYPE
— — — —	2 HOUR FIRE RATING
	FDNY ROOF ACCESS

ELEVATOR DOOR TO BE GASKETED, WEATHERSTRIPPED, OR SEALED AS PER NYECC C402.5.4

ENTIRE BUILDING TO BE SPRINKLERED, FIRE PROTECTION DRAWINGS FILED SEPARATELY.



1 1ST FLOOR PLAN
3/16" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 05 OF 21

PROPOSED FIRST FLOOR

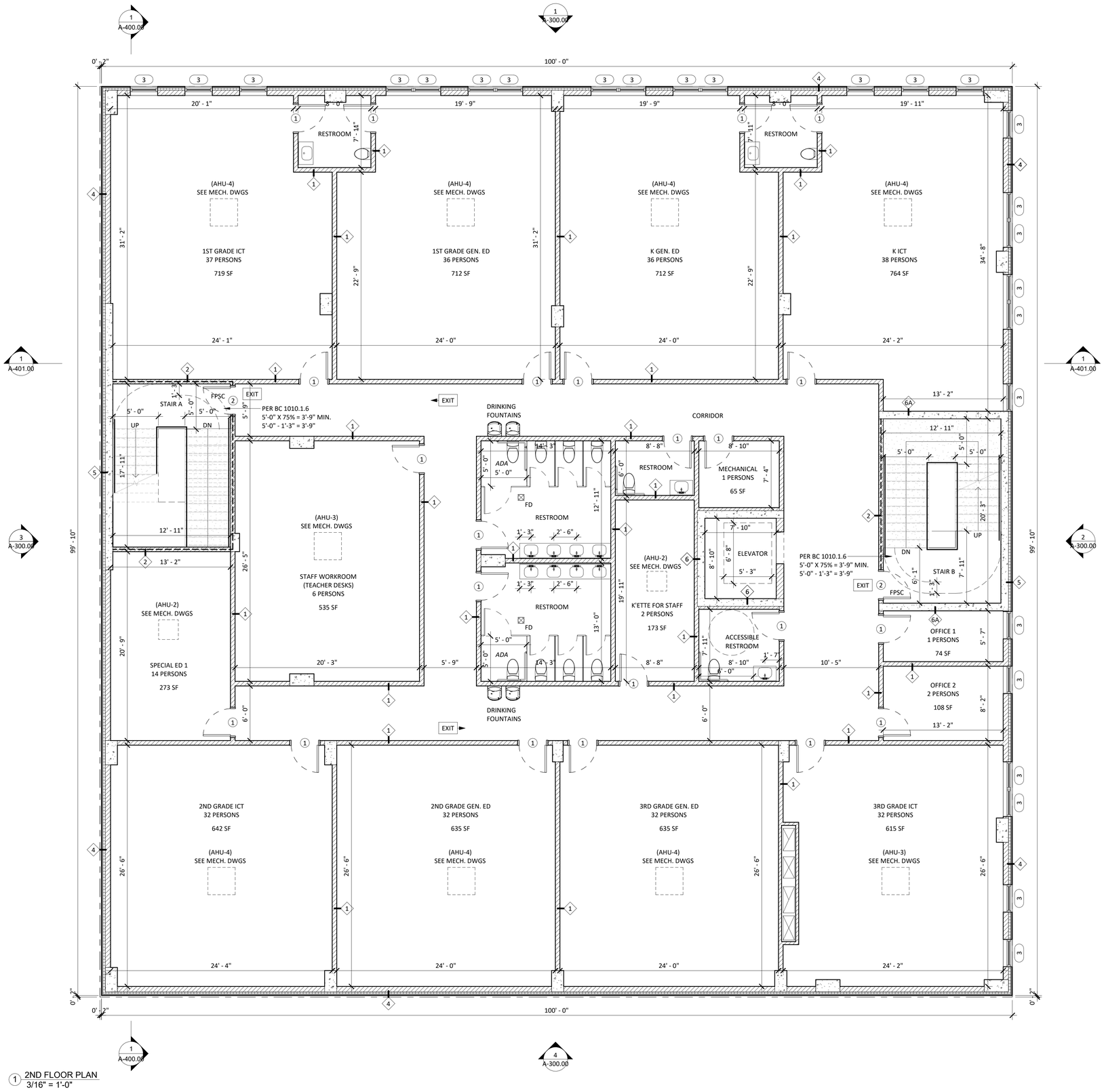
SHEET NUMBER
A-101.00

© 2023 DJLU ARCHITECT All Rights Reserved

LEGEND	
— — —	PROPERTY LINE
FPSC	FIRE PROOF SELF-CLOSING
⊠ RD/FD	ROOF / FLOOR DRAIN
	CAST IN PLACE CONCRETE
	METAL FRAMING WALL
EXIT	EXIT SIGN
X	WALL TYPE
X	DOOR TYPE
X	WINDOW TYPE
— — — — —	2 HOUR FIRE RATING
	FDNY ROOF ACCESS

ELEVATOR DOOR TO BE GASKETED, WEATHERSTRIPPED, OR SEALED AS PER NYECC C402.5.4

ENTIRE BUILDING TO BE SPRINKLERED, FIRE PROTECTION DRAWINGS FILED SEPARATELY.



1 2ND FLOOR PLAN
3/16" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 06 OF 21

PROPOSED SECOND FLOOR

SHEET NUMBER

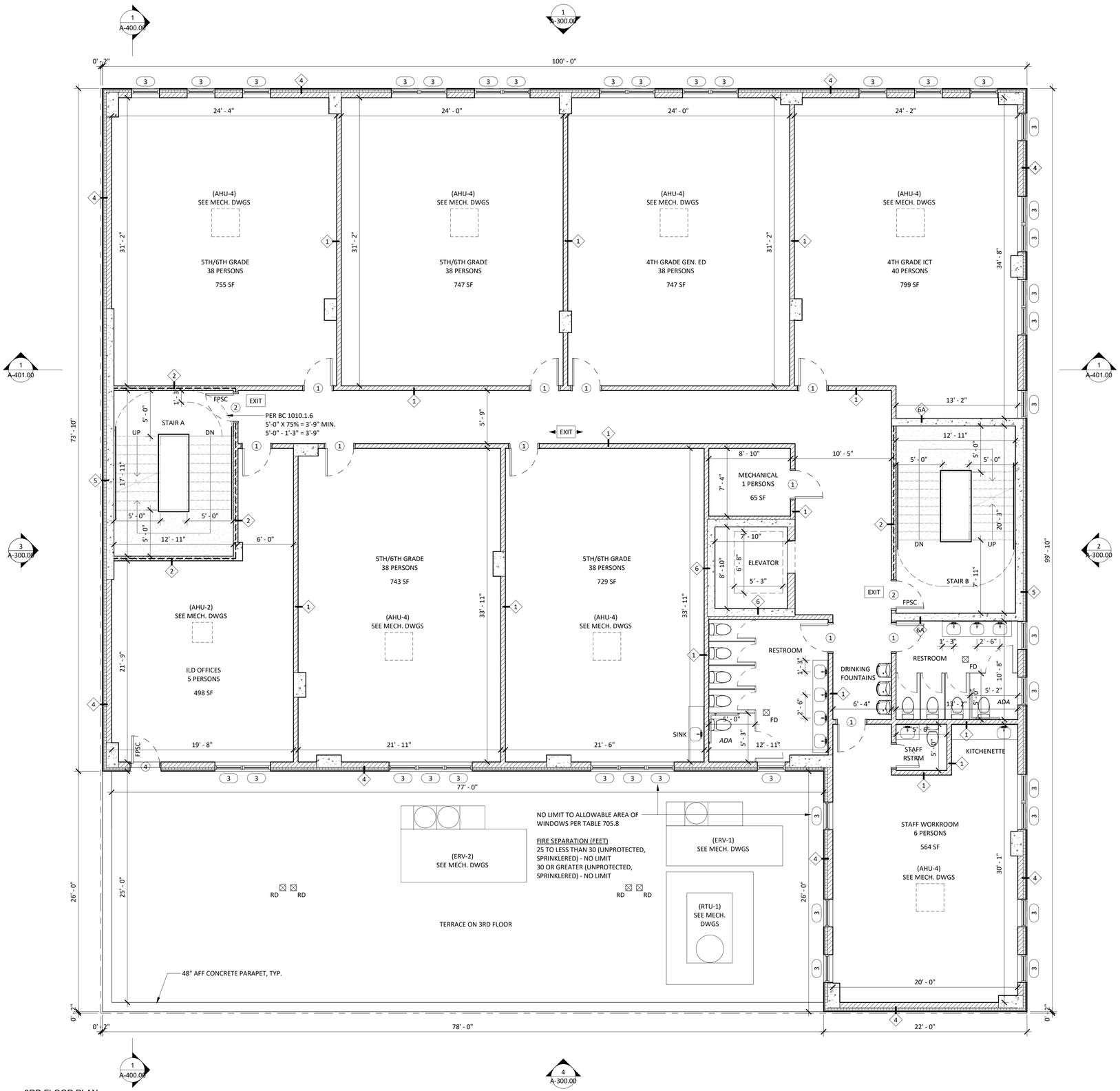
A-102.00

© 2023 DJLU ARCHITECT All Rights Reserved

LEGEND	
— — —	PROPERTY LINE
FPSC	FIRE PROOF SELF-CLOSING
RD/FD	ROOF / FLOOR DRAIN
	CAST IN PLACE CONCRETE
	METAL FRAMING WALL
EXIT	EXIT SIGN
X	WALL TYPE
X	DOOR TYPE
X	WINDOW TYPE
— — — —	2 HOUR FIRE RATING
	FDNY ROOF ACCESS

ELEVATOR DOOR TO BE GASKETED, WEATHERSTRIPPED, OR SEALED AS PER NYECC C402.5.4

ENTIRE BUILDING TO BE SPRINKLERED, FIRE PROTECTION DRAWINGS FILED SEPARATELY.



1 3RD FLOOR PLAN
3/16" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 07 OF 21

PROPOSED THIRD FLOOR

SHEET NUMBER

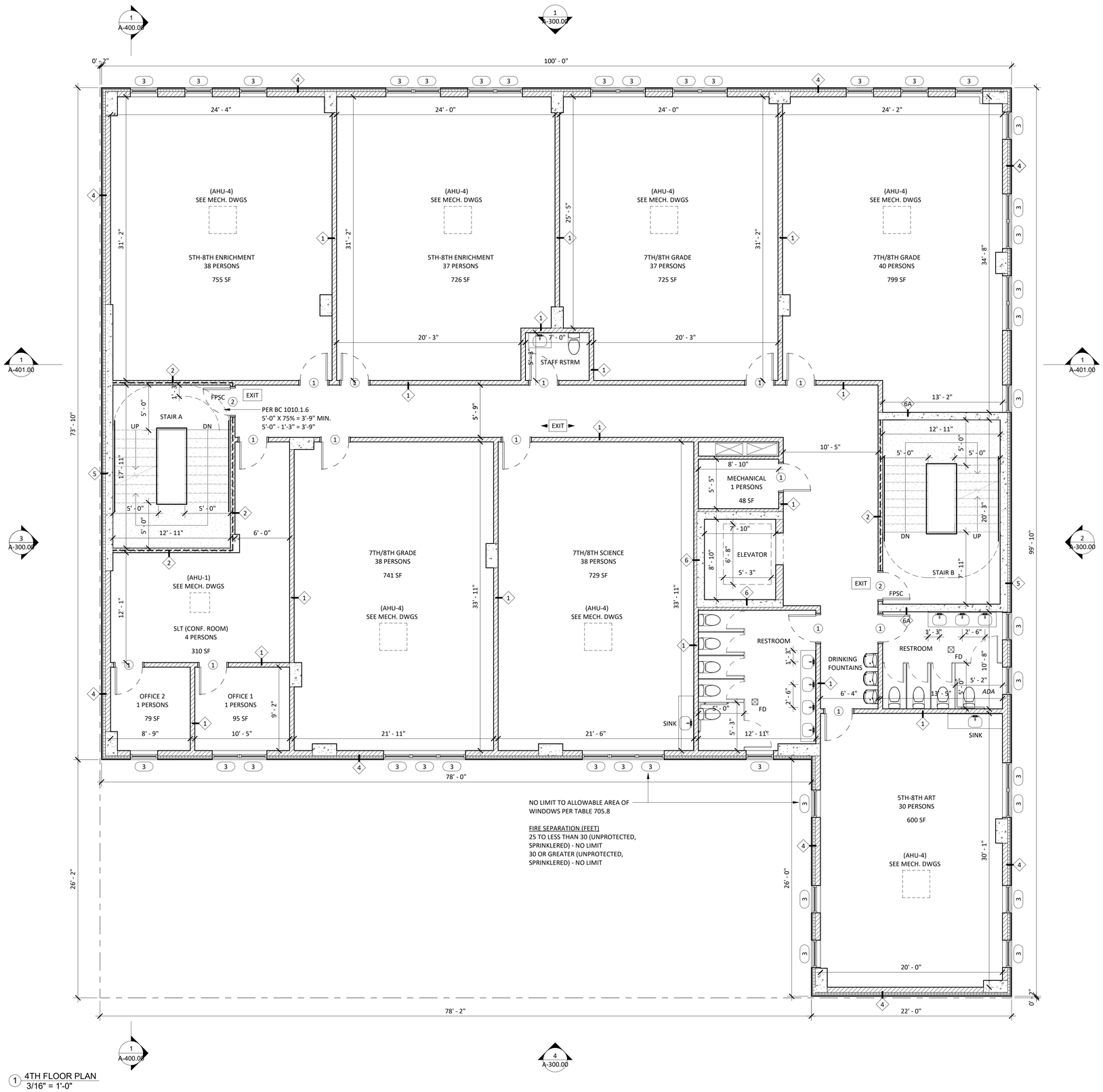
A-103.00

© 2023 DJLU ARCHITECT All Rights Reserved

LEGEND	
— — —	PROPERTY LINE
FPSC	FIRE PROOF SELF-CLOSING
RD/FD	ROOF / FLOOR DRAIN
	CAST IN PLACE CONCRETE
	METAL FRAMING WALL
EXIT	EXIT SIGN
X	WALL TYPE
X	DOOR TYPE
X	WINDOW TYPE
— — — — —	2 HOUR FIRE RATING
	FDNY ROOF ACCESS

ELEVATOR DOOR TO BE GASKETED, WEATHERSTRIPPED, OR SEALED AS PER NYECC C402.5.4

ENTIRE BUILDING TO BE SPRINKLERED, FIRE PROTECTION DRAWINGS FILED SEPARATELY.



1 4TH FLOOR PLAN
3/16" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 08 OF 21

PROPOSED FOURTH FLOOR

SHEET NUMBER
A-104.00

© 2023 DJLU ARCHITECT All Rights Reserved

LEGEND	
— — —	PROPERTY LINE
FPSC	FIRE PROOF SELF-CLOSING
RD/FD	ROOF / FLOOR DRAIN
	CAST IN PLACE CONCRETE
	METAL FRAMING WALL
EXIT	EXIT SIGN
X	WALL TYPE
X	DOOR TYPE
X	WINDOW TYPE
— — — — —	2 HOUR FIRE RATING
	FDNY ROOF ACCESS

ELEVATOR DOOR TO BE GASKETED, WEATHERSTRIPPED, OR SEALED AS PER NYECC C402.5.4

ENTIRE BUILDING TO BE SPRINKLERED, FIRE PROTECTION DRAWINGS FILED SEPARATELY.

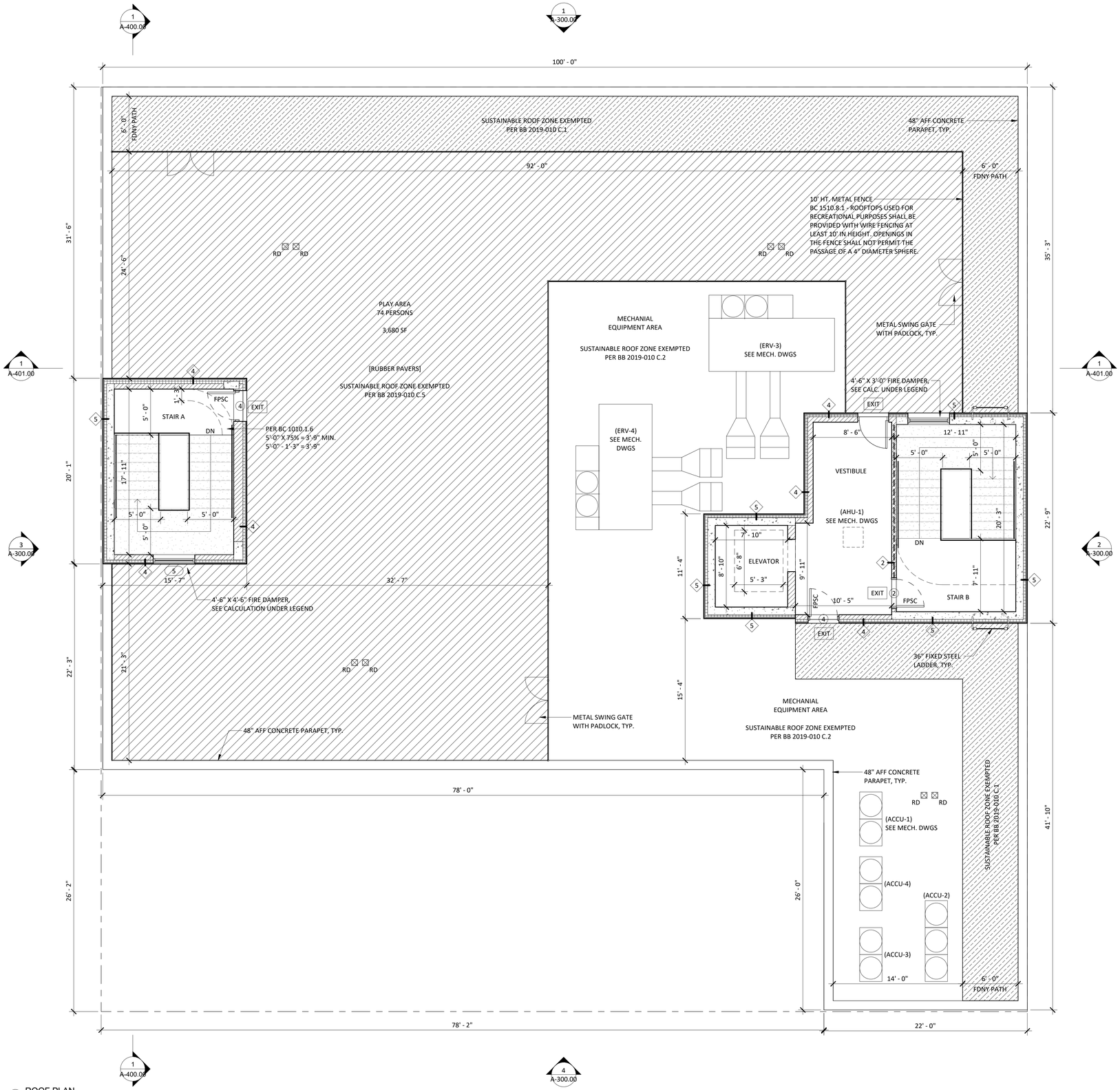
BC 708.12.1 SMOKE VENTING OF CLOSED SHAFTS:
ALL CLOSED SHAFTS HAVING A FLOOR AREA EXCEEDING 4 SF SHALL BE PROVIDED WITH A SMOKE VENT IN ACCORDANCE WITH THE FOLLOWING
BC 708.12.1.1 SMOKE VENT CONSTRUCTION:
SMOKE VENTS MAYBE CONSTRUCTED AS WINDOWS, LOUVERS, SKYLIGHTS, VENT DUCTS OR SIMILAR DEVICES.
BC 708.12.1.2 SMOKE VENT DIMENSIONS:
THE EFFECTIVE VENTING AREA SHALL NOT BE LESS THAN 3½ PERCENT OF THE MAXIMUM SHAFT AREA AT ANY FLOOR, BUT IN NO EVENT LESS THAN 72 SQUARE INCHES.

PER NYCECC 2020, C403.7.7, PROVIDE CLASS I MOTORIZED DAMPERS WITH AN AIR LEAKAGE RATE NOT GREATER THAN OF 4CFM/SF OF DAMPER SURFACE AREA. DAMPERS SHALL BE INSTALLED WITH AUTOMATIC CONTROLS CONFIGURED TO OPEN UPON THE ACTIVATION OF ANY FIRE ALARM INITIATING DEVICE OF THE BUILDING'S FIRE ALARM SYSTEM OR THE INTERRUPTION OF POWER TO THE DAMPER.

STAIR A
MAX SHAFT AREA: 262 SF AT 1ST FLOOR - ROOF
REQUIRED VENTING AREA: 262 X 3.5% = 9.17 SF
PROPOSED VENTING AREA: 4'-6" X 3'-0" = 13.50 SF

STAIR B
MAX SHAFT AREA: 567 SF AT 1ST FLOOR
REQUIRED VENTING AREA: 567 X 3.5% = 19.84 SF
PROPOSED VENTING AREA: 4'-6" X 4'-6" = 20.25 SF

BUILDING BULLETIN 2019-010
C. AREAS EXEMPTED FROM SUSTAINABLE ROOFING ZONE
1. AREAS REQUIRED TO BE SET ASIDE FOR SETBACKS OR ACCESS PURSUANT TO THE NEW YORK CITY FIRE CODE, NEW YORK CITY CONSTRUCTION CODES OR THE ZONING RESOLUTION OF THE CITY OF NEW YORK.
2. AREAS OCCUPIED BY ROOFTOP STRUCTURES, WATER TOWERS, GREENHOUSES, MECHANICAL EQUIPMENT, TOWERS, ANTENNAS, PARAPETS, GUARDRAILS, SOLAR THERMAL SYSTEMS, EQUIPMENT ACCESS PATHWAYS AND APPURTENANCES.
5. RECREATIONAL SPACES THAT ARE INTEGRAL TO THE PRINCIPAL USE OF THE BUILDING ON WHICH THE ROOFTOP IS LOCATED, INCLUDING BUT NOT LIMITED TO PLAYGROUNDS AND PARTICIPANT SPORT AREAS FOR SPORTS FACILITIES AND SCHOOLS, QUALITY HOUSING RECREATION SPACES, ROOF TERRACES AND PASSIVE RECREATION AREAS THAT ARE DOCUMENTED ON THE CERTIFICATE OF OCCUPANCY OR DEPARTMENT OF BUILDINGS APPROVED FILING.



1 ROOF PLAN
3/16" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

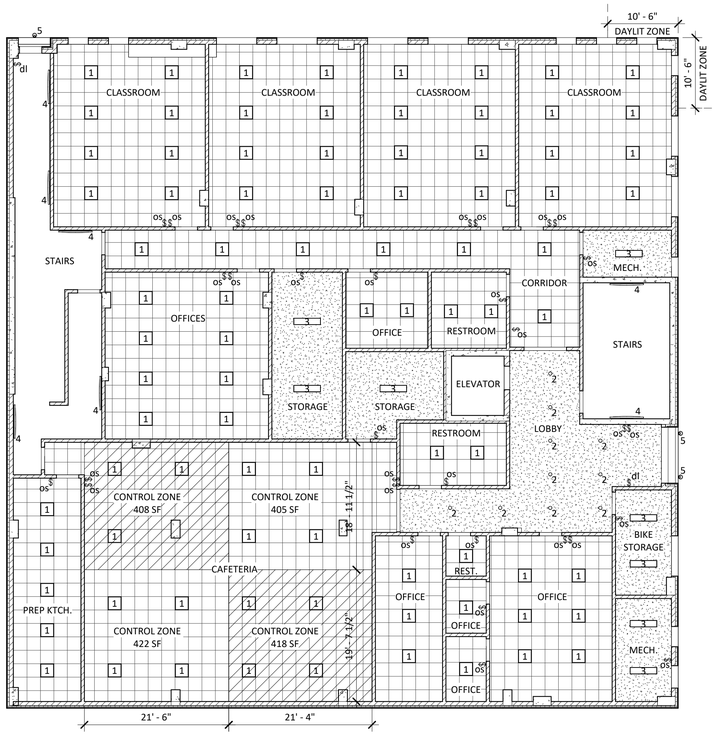
SHEET TITLE 09 OF 21

PROPOSED ROOF

SHEET NUMBER

A-105.00

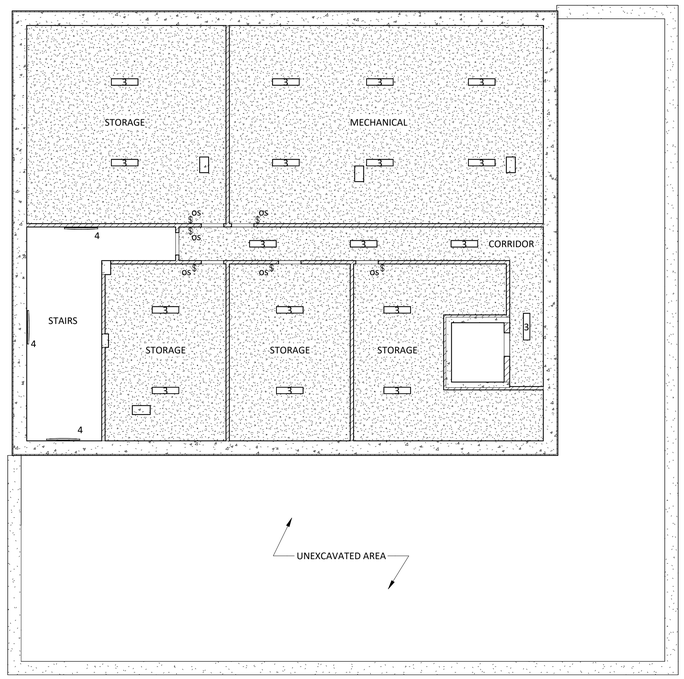
© 2023 DJLU ARCHITECT All Rights Reserved



1 1ST FLOOR RCP
3/32" = 1'-0"

INTERIOR LIGHTING POWER			
SPACE	*AREA (SF)*	*WATTAGE*	*LPD (W/SF)*
CLASSROOMS	2,457	32 X 36W = 1,152	1,152 / 2,457 = 0.47
OFFICES	1,549	21 X 36W = 756	756 / 1,549 = 0.49
RESTROOMS	308	5 X 36W = 108	108 / 308 = 0.58
STAIRS	829	7 X 40W = 280	280 / 829 = 0.33
CORRIDOR	528	7 X 36W = 252	252 / 528 = 0.48
MECHANICAL	220	3 X 24W = 72	72 / 220 = 0.32
FOOD PREP	330	5 X 36W = 180	180 / 330 = 0.54
CAFETERIA	1,730	15 X 36W = 540	540 / 1,730 = 0.31
LOBBY	530	10 X 16W = 160	160 / 530 = 0.30
STORAGE	560	5 X 24W = 120	120 / 560 = 0.21

EXTERIOR LIGHTING POWER			
SPACE	*OPENINGS*	*WATTAGE*	*LPD (W/SF)*
ENTRANCES	9'-0"	3 X 14W = 48	48 / 9' = 5.33



2 CELLAR RCP
3/32" = 1'-0"

INTERIOR LIGHTING POWER			
SPACE	*AREA (SF)*	*WATTAGE*	*LPD (W/SF)*
STAIRS	410	3 X 40W = 120	120 / 410 = 0.29
CORRIDOR	365	4 X 24W = 96	96 / 365 = 0.26
MECHANICAL	1,379	6 X 24W = 144	144 / 1,379 = 0.10
STORAGE	2,360	8 X 24W = 192	192 / 2,360 = 0.08

LIGHTING SCHEDULE

TAG	*FIXTURE TYPE*	*# OF FIXTURES*	*WATTAGE*	*EFFICACY lm/W*
1	2'X2' RECESSED CEILING LED	334	36W	92 lm/W
2	RECESSED HI-HAT LED	10	16W	68 lm/W
3	CEILING MOUNT LINEAR FLUORESCENT	8	24W	82 lm/W
4	SURFACE MOUNT LED STAIRWELL STRIP	20	40W	132 lm/W
5	EXTERIOR SURFACE MOUNT LIGHT	6	14W	74 lm/W

LIGHTING CONTROL NARRATIVE

SPACE	*CONTROL STRATEGY*
CORRIDOR/LOBBY	OCC. SENSOR; AUTO-OFF AFTER 15 MIN., FULL AUTO-ON, MANUAL CONTROL OFF
EGRESS ILLUMINATION	OCC. SENSOR; AUTO REDUCE LIGHTING POWER BY 50% AFTER 15 MIN, FULL AUTO -ON, MANUAL CONTROL OFF
CLASSROOM	OCCUPANT SENSOR; AUTO-OFF AFTER 15 MIN., MANUAL CONTROL ON / OFF
OFFICE	OCCUPANT SENSOR; AUTO-OFF AFTER 15 MIN., MANUAL CONTROL ON / OFF
STORAGE	OCC. SENSOR; AUTO-OFF AFTER 15 MIN., FULL AUTO-ON, MANUAL CONTROL OFF
RESTROOM	OCC. SENSOR; AUTO-OFF AFTER 15 MIN., FULL AUTO-ON, MANUAL CONTROL OFF
CAFETERIA	OCCUPANT SENSOR; 600 SF CONTROL ZONED, AUTO-OFF AFTER 15 MIN.
MECHANICAL	OCCUPANT SENSOR; AUTO-OFF AFTER 15 MIN., MANUAL CONTROL ON / OFF
EXTERIOR LIGHTING	PROVIDE DAYLIGHT SENSOR CONTROL TO AUTO. TURN OFF LIGHTING AS A FUNCTION OF AVAILABLE DAYLIGHT & CONTROL CONFIGURED TO AUTO. REDUCE LIGHTING POWER BY 30 PERCENT FROM 12 MIDNIGHT UNTIL 6 AM OR DURING ANY PERIOD WHEN NO ACTIVITY HAS BEEN DETECTED FOR 15 MINUTES.

TABLE C405.3.2(2) INTERIOR LIGHTING POWER ALLOWANCES

COMMON SPACE TYPES	*LPD (WATTS/SF)*	*C406.3 REDUCED LIGHTING POWER*
CLASSROOM/LECTURE HALL	0.74	0.74 X 90 = 0.66 W/SF
CORRIDOR	0.58	0.58 X 90 = 0.52 W/SF
DINING AREA	0.53	0.53 X 90 = 0.47 W/SF
FOOD PREPARATION AREA	0.92	0.92 X 90 = 0.82 W/SF
LOBBY	0.90	0.90 X 90 = 0.81 W/SF
MECHANICAL ROOM	0.39	0.39 X 90 = 0.35 W/SF
OFFICE (ENCLOSED)	0.85	0.85 X 90 = 0.76 W/SF
STAIRWELL	0.50	0.50 X 90 = 0.45 W/SF
RESTROOM	0.75	0.75 X 90 = 0.67 W/SF
STORAGE ROOM	0.43	0.43 X 90 = 0.38 W/SF

TABLE C405.4.2(2) EXTERIOR LIGHTING POWER ALLOWANCES

PEDESTRIAN AND VEHICULAR ENTRANCES AND EXITS	ZONE 2 = 12.6 WATTS PER LINEAR FEET OF OPENING

<u>OCCUPANT SENSOR CONTROLS</u>
- AS PER C405.2.1, OCCUPANT SENSOR CONTROLS SHALL BE INSTALLED TO CONTROL LIGHTS IN THE FOLLOWING SPACE TYPES: 1. CLASSROOMS/LECTURE 2. CONFERENCE/MEETING/MULTIPURPOSE 4. LOUNGES/BREAKROOM 5. ENCLOSED OFFICES, 7. RESTROOMS, 8. STORAGE ROOMS, 10. OTHER SPACES 300 SQUARE FEET OR LESS THAT ARE ENCLOSED BY FLOOR TO CEILING HEIGHT PARTITIONS, 13. CORRIDORS/TRANSITION AREAS 14. CAFETERIA
- AS PER C405.2.1.3, OCCUPANT SENSOR CONTROLS IN ALL OTHER OPEN OFFICE SPACES, CAFETERIA DINING SPACES, AND FAST FOOD DINING SPACES SHALL COMPLY WITH ALL THE FOLLOWING:
1. THE CONTROLS SHALL BE CONFIGURED SO THAT GENERAL LIGHTING CAN BE CONTROLLED SEPARATELY IN CONTROL ZONES WITH FLOOR AREAS NOT GREATER THAN 600 SF WITHIN THE OPEN PLAN OFFICE SPACE OR DINING SPACE. 2. THE CONTROLS SHALL AUTOMATICALLY TURN OFF GENERAL LIGHTING IN ALL CONTROL ZONES WITHIN 15 MINUTES AFTER ALL OCCUPANTS HAVE LEFT THE OPEN OFFICE SPACE OR DINING SPACE. 3. THE CONTROLS SHALL BE CONFIGURED SO THAT GENERAL LIGHTING POWER IN EACH CONTROL ZONE IS REDUCED BY NOT LESS THAN 80 PERCENT OF THE FULL ZONE GENERAL LIGHTING POWER IN A REASONABLY UNIFORM ILLUMINATION PATTERN WITHIN 15 MINUTES ALL OCCUPANTS LEAVING THAT CONTROL ZONE. CONTROL FUNCTIONS THAT SWITCH CONTROL ZONE LIGHTS COMPLETELY OFF WHEN THE ZONE IS VACANT MEET THIS REQUIREMENT. 4. THE CONTROLS SHALL BE CONFIGURED SUCH THAT ANY DAYLIGHT RESPONSIVE CONTROL WILL ACTIVATE OPEN PLAN OFFICE SPACE GENERAL LIGHTING OR CONTROL ZONE GENERAL LIGHTING ONLY WHEN OCCUPANCY FOR THE SAME AREA IS DETECTED.
- AS PER C405.2.1.4, IN NEW BUILDINGS, LUMINAIRES SERVING THE EXIT ACCESS AND PROVIDING MEANS OF EGRESS ILLUMINATION REQUIRED BY THE NEW YORK CITY BUILDING CODE, INCLUDING LUMINAIRES THAT FUNCTION AS BOTH NORMAL AND EMERGENCY MEANS OF EGRESS ILLUMINATION SHALL BE CONTROLLED BY A COMBINATION OF LISTED EMERGENCY RELAY AND OCCUPANCY SENSORS, OR SIGNAL FROM ANOTHER BUILDING CONTROL SYSTEM, THAT AUTOMATICALLY REDUCES THE LIGHTING POWER BY 50 PERCENT WHEN UNOCCUPIED FOR A PERIOD LONGER THAN 15 MINUTES.

<u>TIME-SWITCH CONTROLS</u>
- AS PER C405.2.2, EACH AREA OF THE BUILDING THAT IS NOT PROVIDED WITH OCCUPANCY SENSOR CONTROLS, SHALL BE PROVIDED WITH TIME SWITCH CONTROLS COMPLYING WITH SECTION C405.2.2.1.

<u>LIGHT-REDUCTION CONTROLS</u>
- AS PER C405.2.2.2, SPACES REQUIRED TO HAVE LIGHT-REDUCTION CONTROLS SHALL HAVE A MANUAL CONTROL THAT ALLOWS THE OCCUPANT TO REDUCE THE CONNECTED LIGHTING LOAD IN A REASONABLY UNIFORM ILLUMINATION PATTERN BY NOT LESS THAN 50%. LIGHTING REDUCTION SHALL BE ACHIEVED BY FOLLOWING: 2. DUAL SWITCHING OF ALTERNATE ROWS OF LUMINAIRES (EXCEPTION: LIGHT REDUCTION CONTROLS ARE NOT REQUIRED IN DAYLIGHT ZONES WITH DAYLIGHT RESPONSIVE CONTROLS)

<u>DAYLIGHT-RESPONSIVE CONTROL NOTES</u>
- AS PER C405.2.3.1, DAYLIGHT-RESPONSIVE CONTROLS SHALL COMPLY WITH ALL OF THE FOLLOWING:
2. DAYLIGHT RESPONSIVE CONTROLS WITHIN EACH SPACE SHALL BE CONFIGURED SO THAT THEY CAN BE CALIBRATED FROM WITHIN THAT SPACE BY AUTHORIZED PERSONNEL. 3. CALIBRATION MECHANISMS SHALL BE IN A LOCATION WITH READY ACCESS. 4. DAYLIGHT RESPONSIVE CONTROLS SHALL DIM LIGHTS CONTINUOUSLY FROM FULL DESIGN LIGHT POWER TO 40 PERCENT OF FULL DEIGN LIGHT POWER. 5. DAYLIGHT RESPONSIVE CONTROLS SHALL BE CONFIGURED TO COMPLETELY SHUT OFF ALL CONTROLLED LIGHTS. 6.LIGHTS IN SIDELIGHT DAYLIGHT ZONES IN ACCORDANCE WITH SECTION C405.2.3.2 FACING DIFFERENT CARDINAL ORIENTATIONS [I.E., WITHIN 45 DEGREES OF DUE NORTH, EAST, SOUTH, WEST] SHALL BE CONTROLLED INDEPENDENTLY OF EACH OTHER.

<u>EXTERIOR LIGHTING CONTROLS</u>
AS PER C405.2.6, EXTERIOR LIGHTING SYSTEMS SHALL BE PROVIDED WITH THE FOLLOWING CONTROLS:
- LIGHTS SHALL BE AUTOMATICALLY TURNED OFF WHEN DAYLIGHT IS PRESENT AND SATISFIES THE LIGHTING NEEDS.
- LIGHTING SHALL BE CONTROLLED SO THAT THE TOTAL WATTAGE OF SUCH LIGHTING IS AUTOMATICALLY REDUCED BY NOT LESS THAN 50 PERCENT BY SELECTIVELY SWITCHING OFF OR DIMMING LUMINAIRES FROM NOT LATER THAN MIDNIGHT TO NOT EARLIER THAN 6AM OR DURING ANY TIME WHERE ACTIVITY HAS NOT BEEN DETECTED FOR 15 MINUTES OR MORE.
- TIME SWITCH CONTROLS SHALL HAVE A CLOCK CAPABLE OF BEING PROGRAMMED FOR NOT FEWER THAN 7 DAYS, THEY SHALL BE CAPABLE OF BEING SET FOR SEVEN DIFFERENT DAY TYPES PER WEEK, THEY SHALL INCORPORATE AN AUTOMATIC HOLIDAY SETBACK FEATURE, AND THEY SHALL HAVE A PROGRAM BACKUP CAPABILITIES THAT PREVENT THE LOSS OF PROGRAM AND TIME SETTINGS FOR A PERIOD OF NOT LESS THAN 10 HOURS IN THE EVENT THAT POWER IS INTERRUPTED.

<u>ELEVATOR EQUIPMENT AND CABS</u>
AS PER C405.8.1, FOR THE LUMINAIRES IN EACH ELEVATOR CAB, NOT INCLUDING SIGNALS AND DISPLAYS, THE SUM OF THE LUMENS DIVIDED BY THE SUM OF THE WATTS SHALL BE NOT LESS THAN 35 LUMENS PER WATT. VENTILATION FANS IN ELEVATORS THAT DO NOT HAVE THEIR OWN AIR CONDITIONING SYSTEM SHALL NOT CONSUME MORE THAN 0.33 W/CFM AT THE MAXIMUM RATED SPEED OF THE FAN. CONTROLS SHALL BE PROVIDED THAT WILL DE-ENERGIZE VENTILATION FANS AND LIGHTING SYSTEMS WHEN THE ELEVATOR IS STOPPED, UNOCCUPIED AND WITH ITS DOORS CLOSED FOR OVER 15 MINUTES.

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

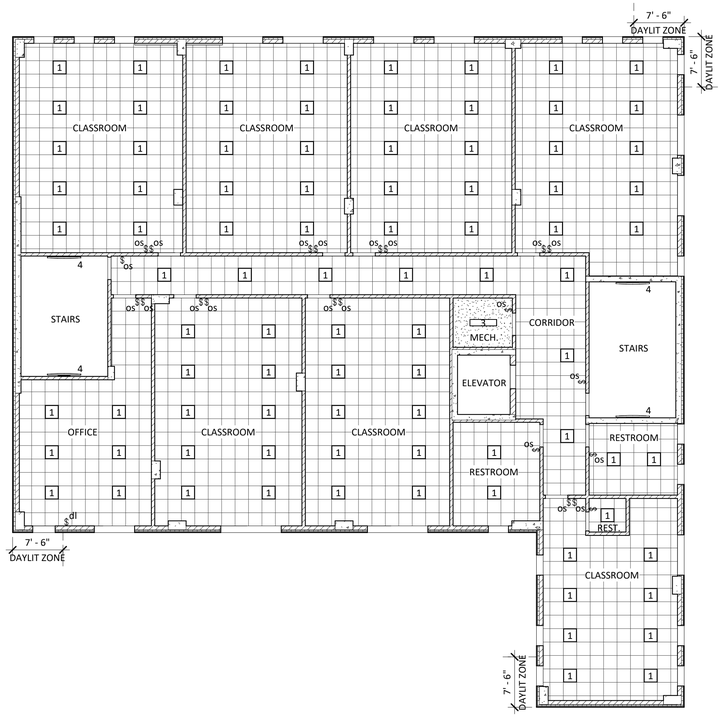
SHEET TITLE 10 OF 21

REFLECTED CEILING PLANS

SHEET NUMBER

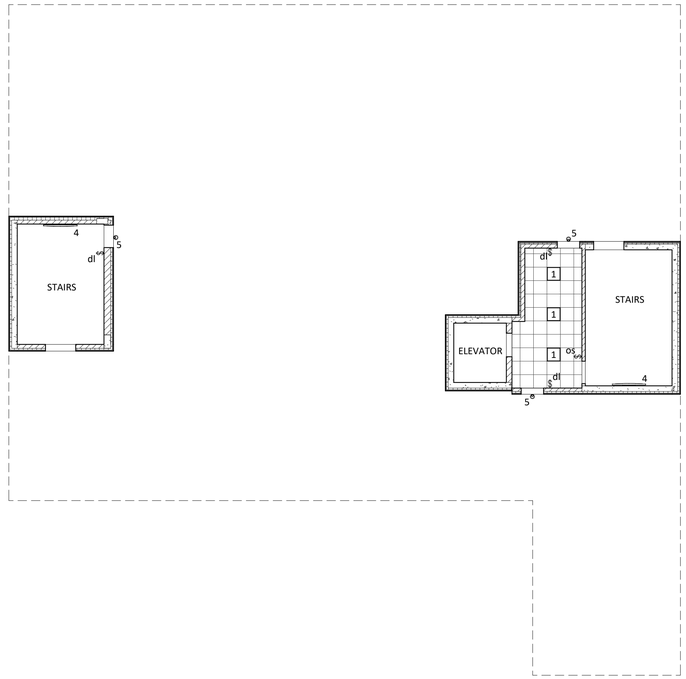
A-200.00

© 2023 DJLU ARCHITECT All Rights Reserved



INTERIOR LIGHTING POWER			
SPACE	*AREA (SF)*	*WATTAGE*	*LPD (W/SF)*
CLASSROOMS	5,084	68 X 36W = 2,448	2,448 / 5,084 = 0.48
OFFICES	498	6 X 36W = 216	216 / 498= 0.43
RESTROOMS	364	5 X 36W = 180	180 / 364 = 0.49
STAIRS	493	4 X 40W = 160	160 / 493 = 0.32
CORRIDOR	670	8 X 36W = 288	288 / 670 = 0.43
MECHANICAL	65	1 X 24W = 24	24 / 65 = 0.37

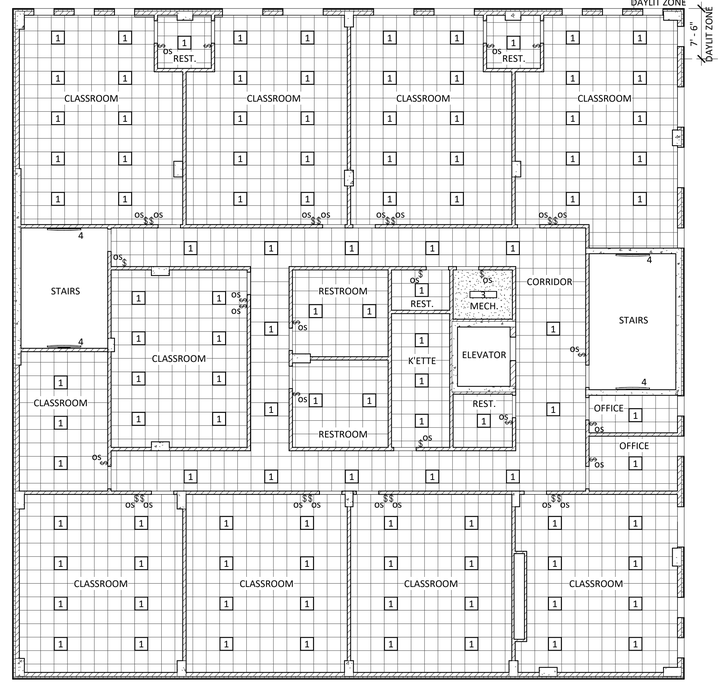
1 3RD FLOOR RCP
3/32" = 1'-0"



INTERIOR LIGHTING POWER			
SPACE	*AREA (SF)*	*WATTAGE*	*LPD (W/SF)*
STAIRS	493	2 X 40W = 80	80 / 493 = 0.16
CORRIDOR	196	3 X 36W = 108	108 / 196 = 0.55

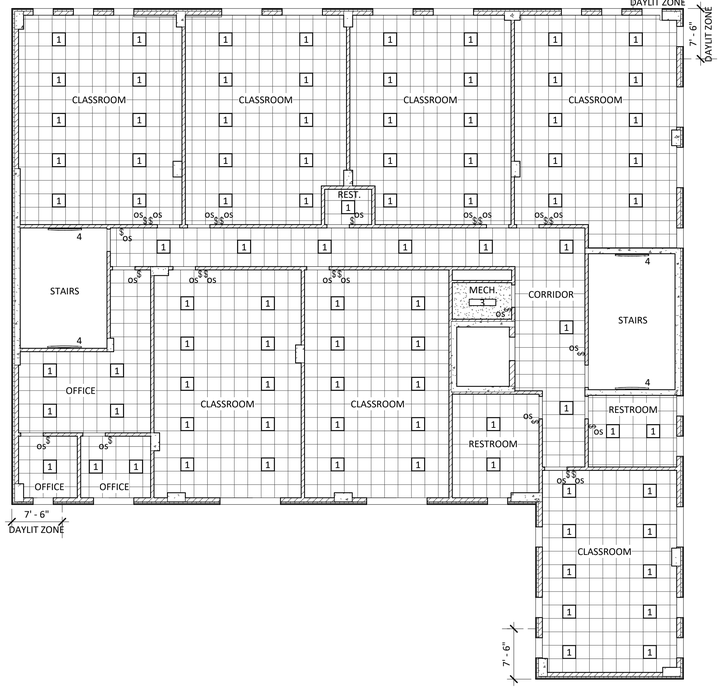
EXTERIOR LIGHTING POWER			
SPACE	*OPENINGS*	*WATTAGE*	*LPD (W/SF)*
ENTRANCES	9'-0"	3 X 14W = 42	42 / 9' = 4.66

2 ROOF RCP
3/32" = 1'-0"



INTERIOR LIGHTING POWER			
SPACE	*AREA (SF)*	*WATTAGE*	*LPD (W/SF)*
CLASSROOMS	6,242	83 X 36W = 2,988	2,988 / 6,242 = 0.48
OFFICES	108	2 X 36W = 72	72 / 108 = 0.66
RESTROOMS	617	8 X 36W = 288	288 / 617 = 0.46
STAIRS	493	4 X 40W = 160	160 / 493 = 0.32
KITCHENETTE	173	3 X 36W = 108	108 / 173 = 0.62
CORRIDOR	1,274	14 X 36W = 504	504 / 1,274 = 0.40
MECHANICAL	65	1 X 24W = 24	24 / 65 = 0.37

3 2ND FLOOR RCP
3/32" = 1'-0"



INTERIOR LIGHTING POWER			
SPACE	*AREA (SF)*	*WATTAGE*	*LPD (W/SF)*
CLASSROOMS	5,075	70 X 36W = 2,520	2,520 / 5,075 = 0.50
OFFICES	484	7 X 36W = 252	252 / 484= 0.52
RESTROOMS	373	5 X 36W = 180	180 / 373 = 0.49
STAIRS	493	4 X 40W = 160	160 / 493 = 0.32
CORRIDOR	670	8 X 36W = 288	288 / 670 = 0.43
MECHANICAL	48	1 X 24W = 24	24 / 48 = 0.50

4 4TH FLOOR RCP
3/32" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 11 OF 21

REFLECTED CEILING PLANS

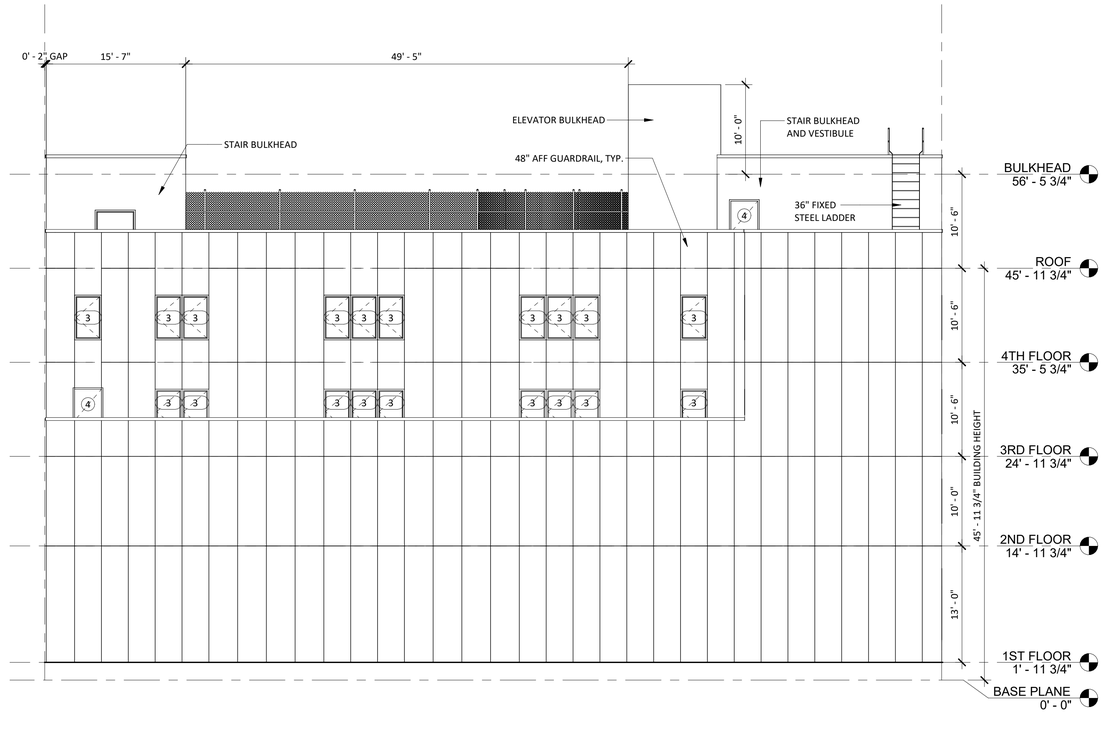
SHEET NUMBER

A-201.00

© 2023 DJLU ARCHITECT All Rights Reserved



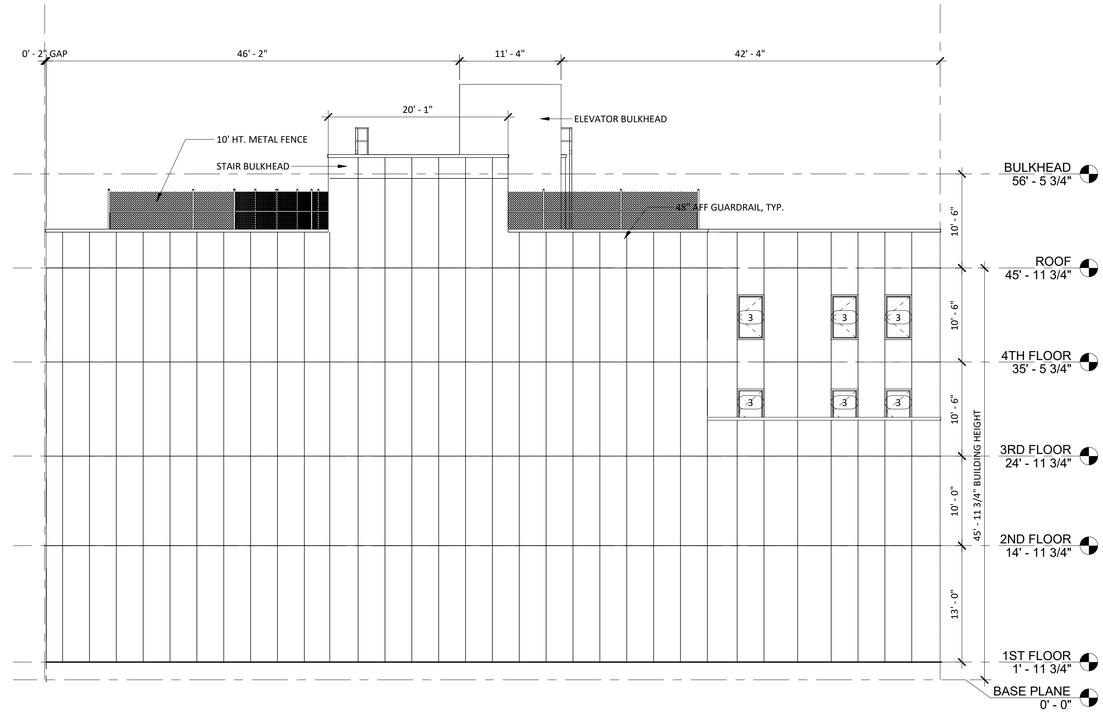
2 ELEVATION ON 40TH STREET
1/8" = 1'-0"



4 SIDE ELEVATION 1
1/8" = 1'-0"



1 ELEVATION ON 4TH AVENUE
1/8" = 1'-0"



3 SIDE ELEVATION 2
1/8" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

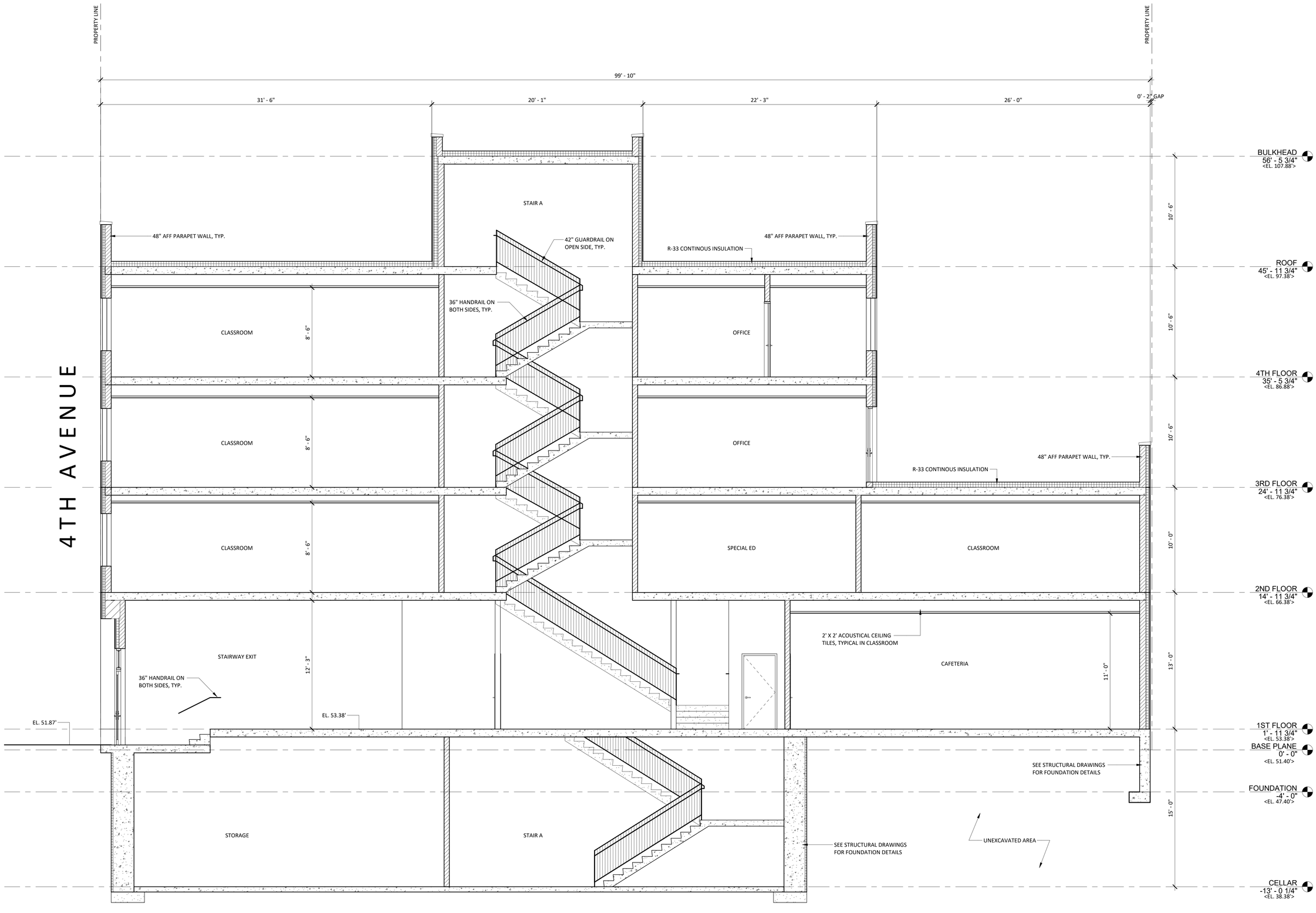
SHEET TITLE 12 OF 21

BUILDING ELEVATIONS

SHEET NUMBER

A-300.00

© 2023 DJLU ARCHITECT All Rights Reserved



1 LONGITUDINAL SECTION
1/4" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

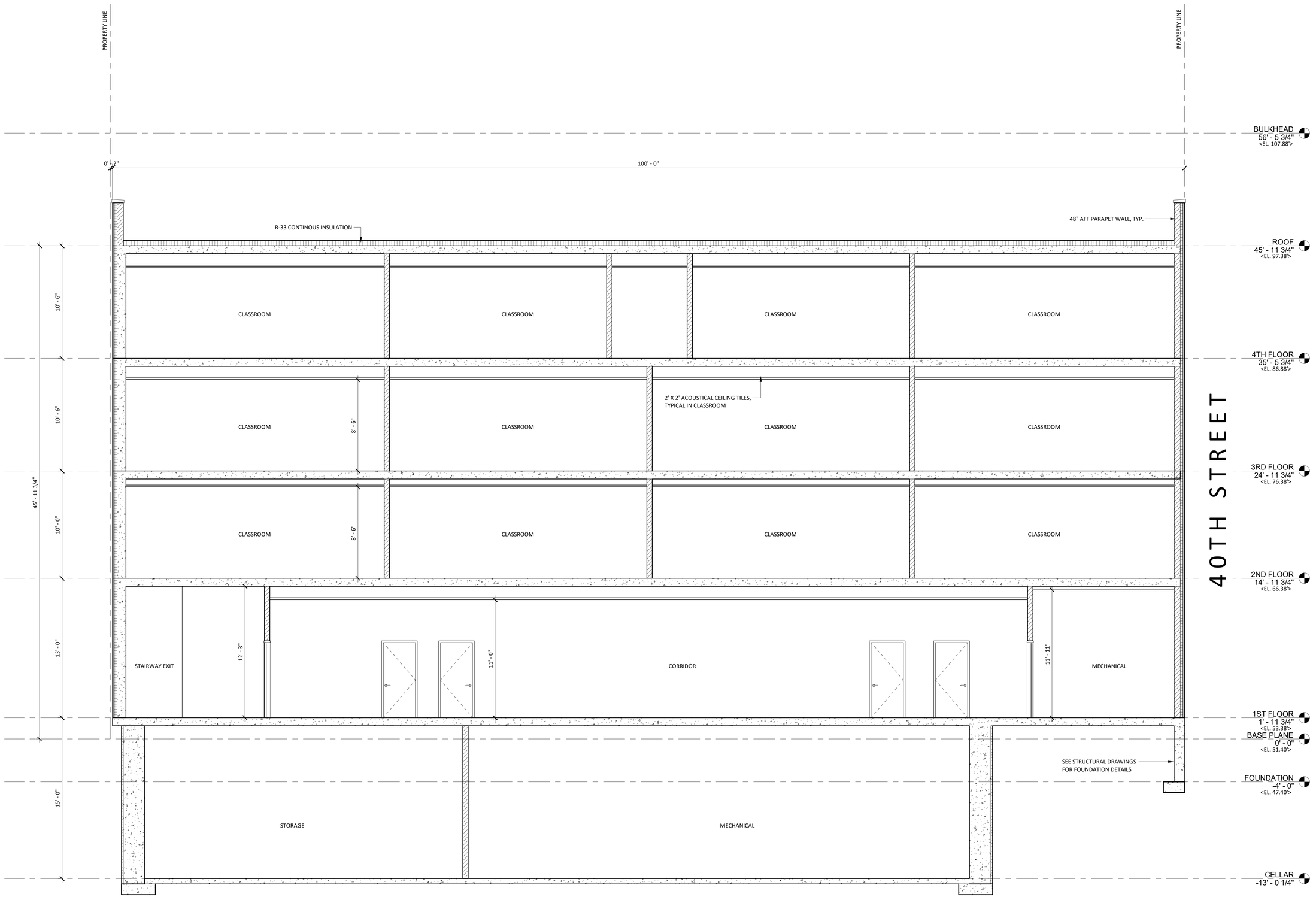
DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 13 OF 21
BUILDING LONGITUDINAL SECTION

SHEET NUMBER
A-400.00

© 2023 DJLU ARCHITECT All Rights Reserved



1 CROSS SECTION
1/4" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

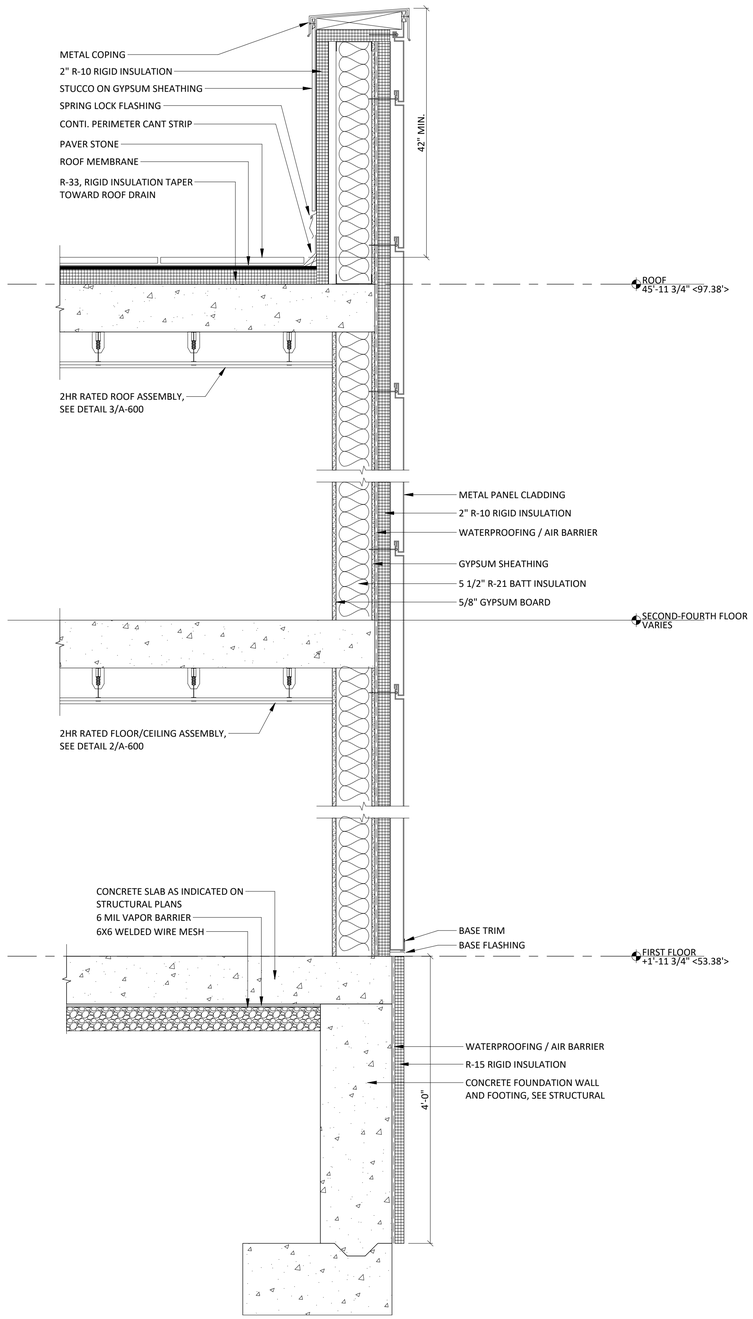
SHEET TITLE 14 OF 21

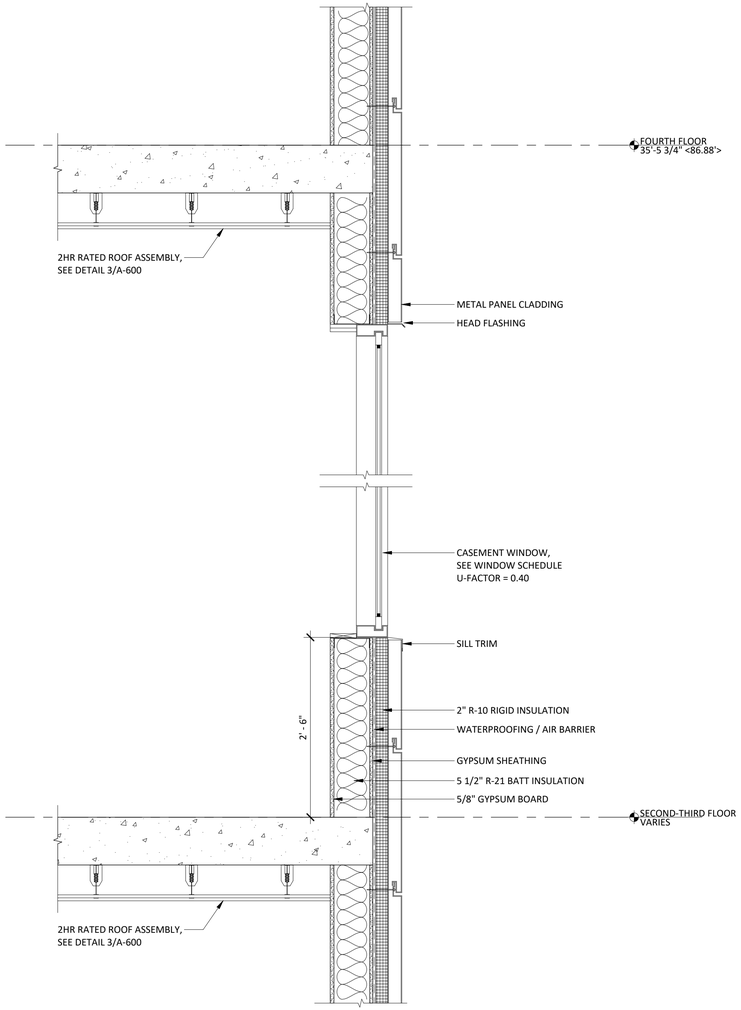
BUILDING
CROSS SECTION

SHEET NUMBER

A-401.00

© 2023 DJLU ARCHITECT All Rights Reserved





1 WALL SECTION DETAIL
1" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

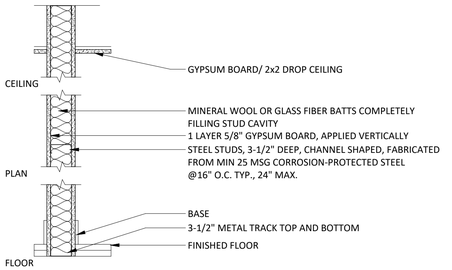
SHEET TITLE 15 OF 21

WALL SECTION DETAIL

SHEET NUMBER

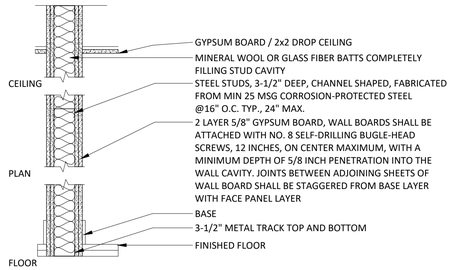
A-500.00

© 2023 DJLU ARCHITECT All Rights Reserved

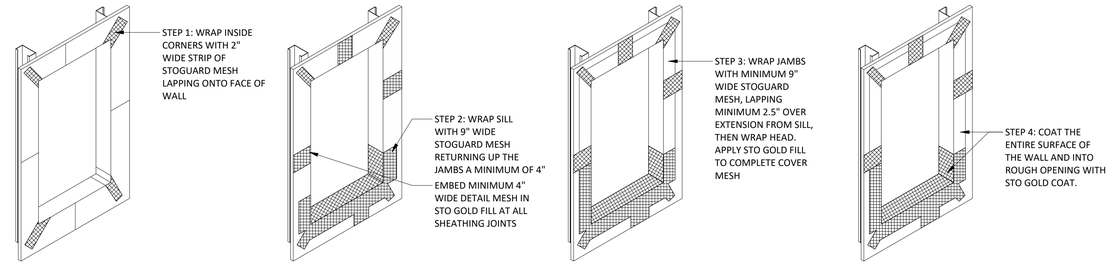


1 INTERIOR STUD WALL
1 HR FIRE RATED
UL DESIGN NO. U419

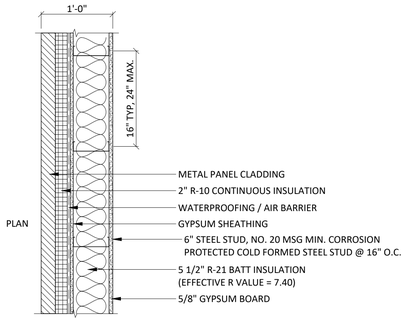
NOTE: MOISTURE-RESISTANT GOLD BOND XP GYPSUM BOARD WITH SCORE OF 10 PER ASTM D3273, TO BE USED IN AREAS WITH LIMITED WATER EXPOSURE TO HELP INHIBIT MOLD GROWTH:
- TOILET/SINK AREA



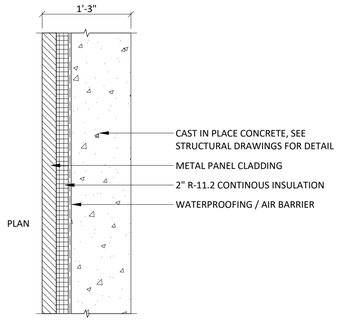
2 MASONRY EQUIVALENT WALL
2 HR FIRE RATED
UL DESIGN NO. U411
STC 56 / USG-840818



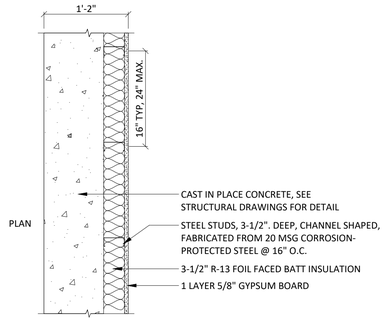
PREPARATION OF ROUGH OPENING WITH STO GOLD FILL AND STOGUARD MESH



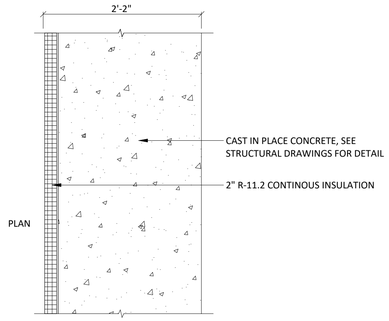
4 METAL STUD W/ METAL PANELS
1HR FIRE RATED



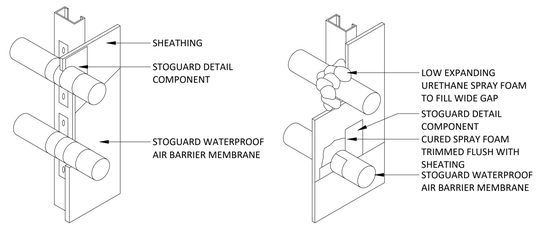
5 CONCRETE WALL W/ METAL PANELS
1HR FIRE RATED



6 CONCRETE WALL W/ FURRING
1HR FIRE RATED
6A: CONCRETE WALL ONLY



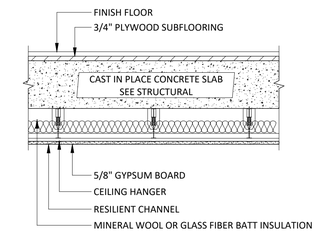
7 CONCRETE FOUNDATION WALL W/ INSULATION
4HR FIRE RATED



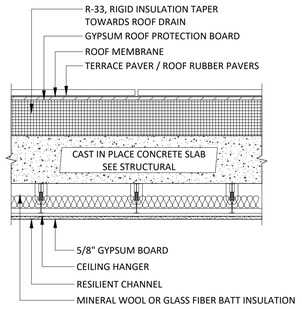
PENETRATIONS WITH GAP

PENETRATIONS WITH GAP > 1/4"
(CONSULT SPRAY FOAM MANUFACTURER FOR MAX. SIZE OF GAP FOR PRODUCT BEING USED)

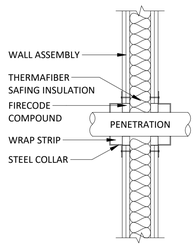
MECHANICAL PENETRATIONS



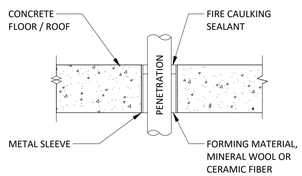
FLOOR / CEILING ASSEMBLY
2HR FIRE RATED
BC TABLE 720.1(2) ITEM 4-1.1
STC 50 & IIC 50 MIN.



ROOF / CEILING ASSEMBLY
2HR FIRE RATED
BC TABLE 720.1(2) ITEM 4-1.1



PENETRATION AT 2HR RATED WALL
UL SYSTEM NO. 510



PENETRATION AT CONCRETE FLOOR/ROOF
MEA # 236-87-M VOL.2

STAIR NOTES

PRIOR TO THE ERECTION OF STAIRS, STAIR FABRICATOR SHALL CHECK AND VERIFY STORY HEIGHT, DISTANCE FROM LANDING TO FINISH FLOOR AND MINIMUM REQUIRED HEAD CLEARANCES.

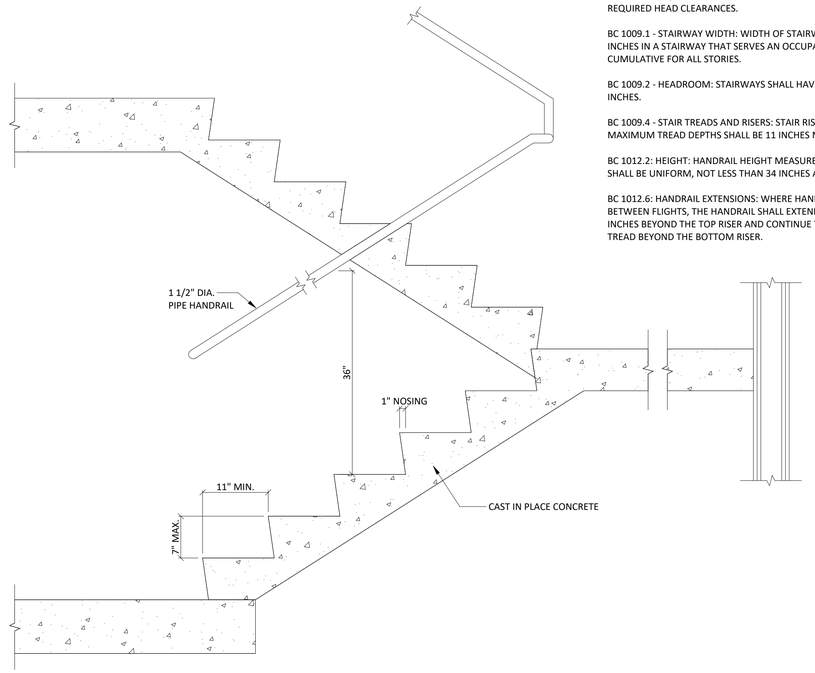
BC 1009.1 - STAIRWAY WIDTH: WIDTH OF STAIRWAY SHALL BE NOT LESS THAN 36 INCHES IN A STAIRWAY THAT SERVES AN OCCUPANT LOAD OF 50 OR LESS CUMULATIVE FOR ALL STORIES.

BC 1009.2 - HEADROOM: STAIRWAYS SHALL HAVE A MINIMUM HEADROOM OF 84 INCHES.

BC 1009.4 - STAIR TREADS AND RISERS: STAIR RISER HEIGHTS SHALL BE 7 INCHES MAXIMUM TREAD DEPTHS SHALL BE 11 INCHES MINIMUM.

BC 1012.2: HEIGHT: HANDRAIL HEIGHT MEASURED ABOVE STAIR TREAD NOSINGS, SHALL BE UNIFORM, NOT LESS THAN 34 INCHES AND NOT MORE THAN 38 INCHES.

BC 1012.6: HANDRAIL EXTENSIONS: WHERE HANDRAILS ARE NOT CONTINUOUS BETWEEN FLIGHTS, THE HANDRAIL SHALL EXTEND HORIZONTALLY AT LEAST 12 INCHES BEYOND THE TOP RISER AND CONTINUE TO SLOPE FOR THE DEPTH OF ONE TREAD BEYOND THE BOTTOM RISER.



1 WALL & FLOOR ASSEMBLIES
1" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 16 OF 21

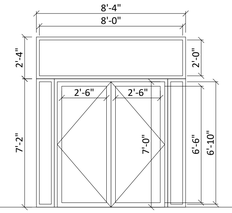
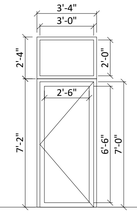
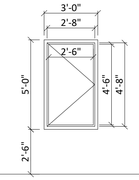
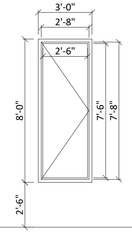
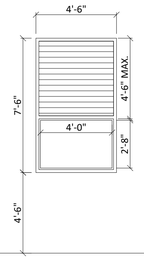
WALL & FLOOR DETAILS

SHEET NUMBER

A-600.00

© 2023 DJLU ARCHITECT All Rights Reserved

WINDOW SCHEDULE

TAG	W-1	W-2	W-3	W-4	W-5
ELEVATION					
FINISH FLOOR					STAIR A LOUVER AREA 4'-6" X 4'-6" = 20.25 SF STAIR B LOUVER AREA 4'-6" X 3'-0" = 13.50 SF
TYPE	GLASS DOOR W/ TRANSOM & SIDELIGHT	GLASS DOOR W/ TRANSOM	CASEMENT WINDOW	CASEMENT WINDOW	FIXED WINDOW W/ LOUVER
NATURAL LIGHT	57.61 SF	22.50 SF	11.25 SF	18.75 SF	10.66 SF
OPENABLE AREA	42.00 SF	21.00 SF	12.44 SF	20.44 SF	0 SF
U-FACTOR	0.77	0.77	0.40	0.40	0.30
SHGC	0.36	0.36	0.36	0.36	0.36
AIR LEAKAGE*	1.00	0.20	0.20	0.20	0.20

EXPANDABLE SPRAY-APPLIED POLYURETHANE FOAM SEALANT TO BE APPLIED AT WINDOW ROUGH OPENINGS TO CREATE CONTINUOUS AIR BARRIER.

*THE AIR LEAKAGE OF FENESTRATION ASSEMBLIES THAT ARE PART OF THE BUILDING ENVELOPE SHALL MEET THE FOLLOWING PROVISIONS WITH THE FOLLOWING APPLICABLE REFERENCE TEST BY AN ACCREDITED, INDEPENDENT TESTING LABORATORY AND LABELED BY THE MANUFACTURER: - WINDOWS, SLIDING DOORS AND SWINGING DOORS SHALL NOT EXCEED 0.2 CFM/SF TESTED PER AAMA/WDMA/CSA101/I.S.2/A440 OR NFRC 400. THE MAXIMUM RATE FOR WINDOWS, SLIDING AND SWINGING DOORS, AND SKYLIGHTS IS PERMITTED TO BE 0.3 CFM PER SQUARE FOOT OF FENESTRATION OR DOOR AREA WHEN TESTED IN ACCORDANCE WITH AAMA/WDMA/CSA101/I.S.2/A440 AT 6.24 PSF (300 PA).

**STAIRWAY AND SHAFT VENTS SHALL BE PROVIDED WITH CLASS I MOTORIZED DAMPERS. THE DAMPERS SHALL HAVE AN AIR LEAKAGE RATE NOT GREATER THAN 4 CFM/SF OF DAMPER SURFACE AREA AT 1.0 INCH WATER GAUGE AND SHALL BE LABELED BY AN APPROVED AGENCY WHEN TESTED IN ACCORDANCE WITH AMCA 500D FOR SUCH PURPOSE. STAIRWAY AND SHAFT VENT DAMPERS SHALL BE INSTALLED WITH AUTOMATIC CONTROLS CONFIGURED TO OPEN UPON THE ACTIVATION OF ANY FIRE ALARM INITIATING DEVICE OF THE BUILDING'S FIRE ALARM SYSTEM OR THE INTERRUPTION OF POWER TO THE DAMPER.

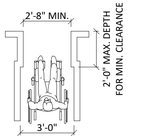
DOOR SCHEDULE

TAG	LOCATION	DOOR SIZE	DOOR MAT.	SWING	FRAME	FIRE RATING	SADDLE	REMARKS
1	CLASSROOM & RESTROOM	3'-0" X 7'-0"	H.M.	SINGLE	H.M.		MARBLE	SADDLE AT BATHROOMS
2	STAIRS	3'-0" X 7'-0"	H.M.	SINGLE	H.M.	1-1/2 HR	ALUM.	FPSC
3	CAFETERIA & LOBBY	2 X 3'-0" X 7'-0"	H.M.	DOUBLE	H.M.			
4	EXTERIOR DOOR	3'-0" X 7'-0"	H.M.	SINGLE	H.M.	1-1/2 HR	ALUM.	FPSC, U-FACTOR = 0.50

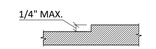
* ALL STAIR DOORS SHALL BE SMOKE PROOF, ASSEMBLY TO COMPLY WITH UL 1784.
ALL DOORS THROUGH THE BUILDING SHALL BE PROVIDED WITH DISABLE PERSON COMPLIANT DOOR HARDWARE AND DOOR SADDLES.

ADA DOOR APPROACH DIAGRAM

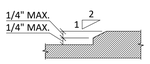
NOTE: 32" CLEARANCE MINIMUM IS ALLOWED ON THE ACCESSIBLE ROUTE ONLY AT DOOR WAYS



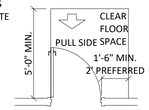
MIN. CLEAR WIDTH FOR SINGLE WHEELCHAIR



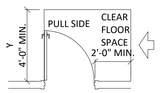
VERTICAL CHANGE IN LEVEL



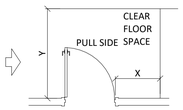
BEVELED CHANGE IN LEVEL



NOTE:
X = 12" IF DOOR HAS BOTH CLOSER AND LATCH

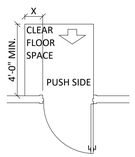


NOTE:
Y = 54" IF DOOR HAS CLOSER

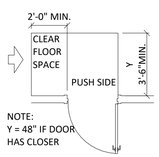


NOTE:
X = 36" MIN. IF Y = 60"
X = 42" MIN. IF Y = 54"

FRONT APPROACHES SWING DOOR

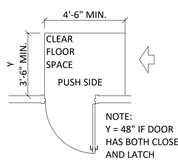


LATCH-SIDE APPROACHES SWING DOOR

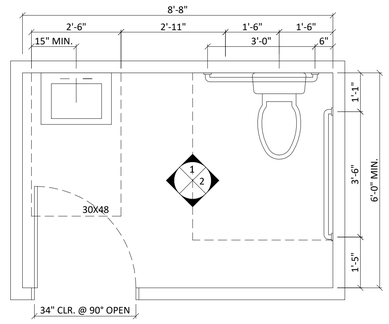


NOTE:
Y = 48" IF DOOR HAS CLOSER

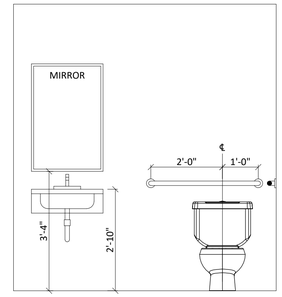
HINGE-SIDE APPROACHES SWING DOOR



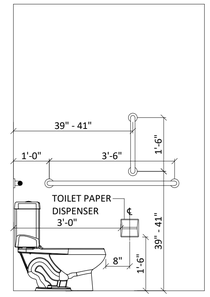
NOTE:
Y = 48" IF DOOR HAS BOTH CLOSER AND LATCH



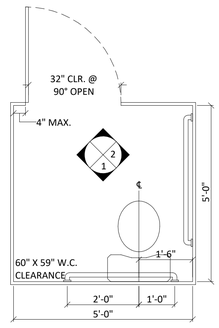
ADA RESTROOM



ELEVATION 1



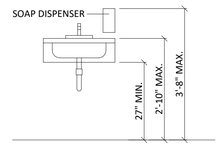
ELEVATION 2



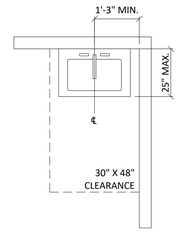
WHEELCHAIR ACCESSIBLE COMPARTMENT

ACCESSIBLE TOILET COMPARTMENT PARTITIONS SHALL PROVIDE A TOE CLEARANCE OF 12 INCHES MINIMUM ABOVE THE FLOOR.

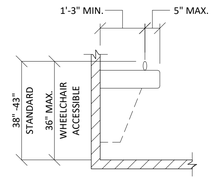
AS PER ANSI A117 606.6, WATER SUPPLY AND DRAINPIPES UNDER LAVATORIES AND SINKS SHALL BE INSULATED OR OTHERWISE CONFIGURED TO PROTECT AGAINST CONTACT.



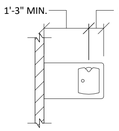
SINK ELEVATION



SINK PLAN



ELEVATION

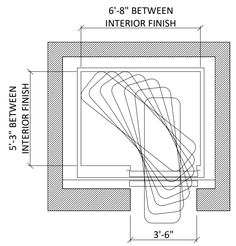


PLAN

DRINKING FOUNDTAIN SPOUT LOCATION



SYMBOL FOR EMERGENCY MEDICAL SERVICES



BC 3002.4.2: ELEVATOR TO ACCOMMODATE AMBULANCE STRETCHER

- SIDE (OFF CENTERED DOOR) LOCATIONS
- 42" SINGLE SLIDE DOOR
- 24" X 84" STRETCHER

*ELEVATOR IS IN COMPLIANCE WITH BB 2017-008 AND 3002.4.2. AT LEAST ONE ELEVATOR SUBJECT TO SECTION 3003.3 SHALL BE PROVIDED WITH AN ELEVATOR CAR OF SUCH A SIZE AND ARRANGEMENT TO ACCOMMODATE AN AMBULANCE STRETCHER 24" BY 84", WITH NOT LESS THAN 5" RADIUS CORNERS, IN THE HORIZONTAL, OPEN POSITION AND SHALL BE IDENTIFIED BY THE INTERNATIONAL SYMBOL FOR EMERGENCY MEDICAL SERVICES. THE SYMBOL SHALL NOT BE LESS THAN 3" HIGH AND SHALL BE PLACED ON BOTH JAMBS OF THE HOISTWAY ENTRANCES ON EACH FLOOR.

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

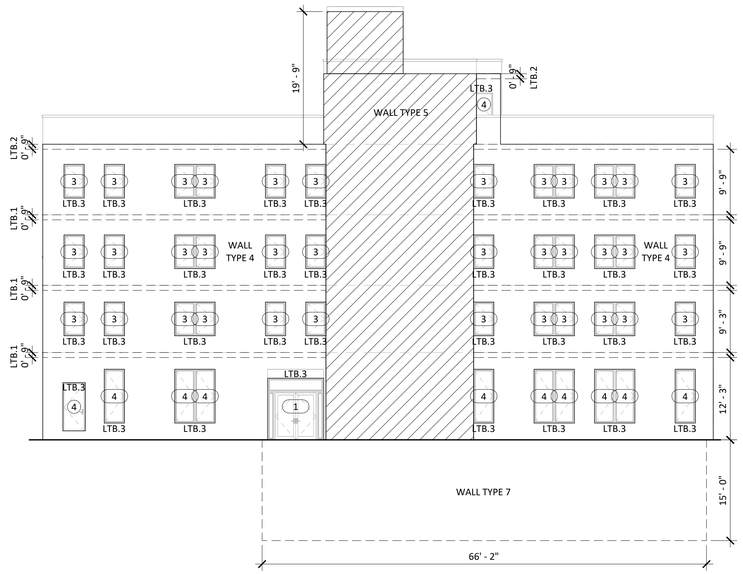
DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 17 OF 21
SCHEDULES, ADA DIAGRAMS & DETAILS

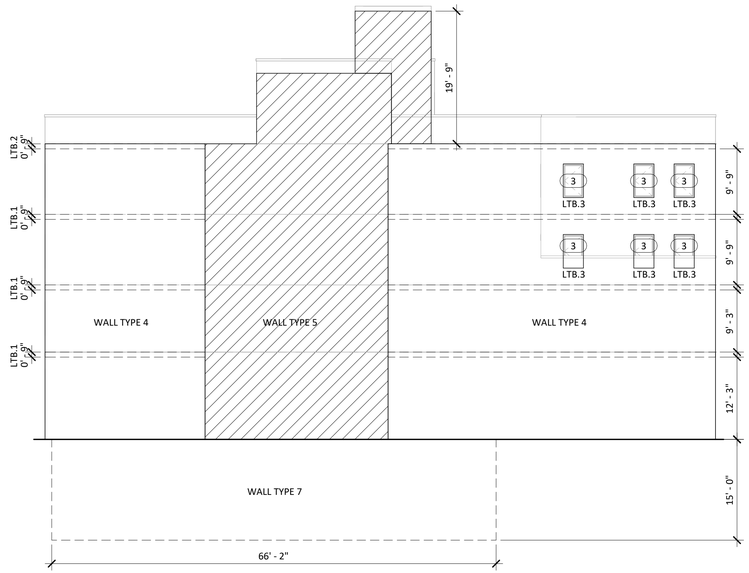
SHEET NUMBER
A-700.00

© 2023 DJLU ARCHITECT All Rights Reserved



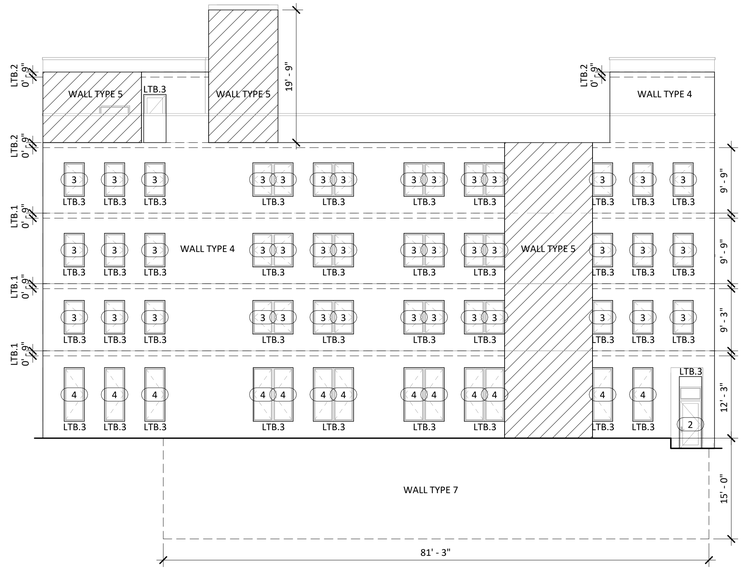
GROSS ABOVE-GRADE WALL TOTAL = 4,878 SF
- WALL TYPE 4 = 3,275 SF
- WALL TYPE 4 EOS = 239 SF
- WALL TYPE 5 = 1,316 SF
- OPAQUE DOOR 4 = 48 SF
GROSS BELOW-GRADE WALL TOTAL = 992 SF
- WALL TYPE 7 = 992 SF
FENESTRATION TOTAL = 760 SF
- W-1 X 1 (ENTRANCE) = 76 SF
- W-3 X 36 (OPERABLE) = 540 SF
- W-4 X 6 (OPERABLE) = 144 SF

2 THERMAL BOUNDARY ELEVATION 2
3/32" = 1'-0"



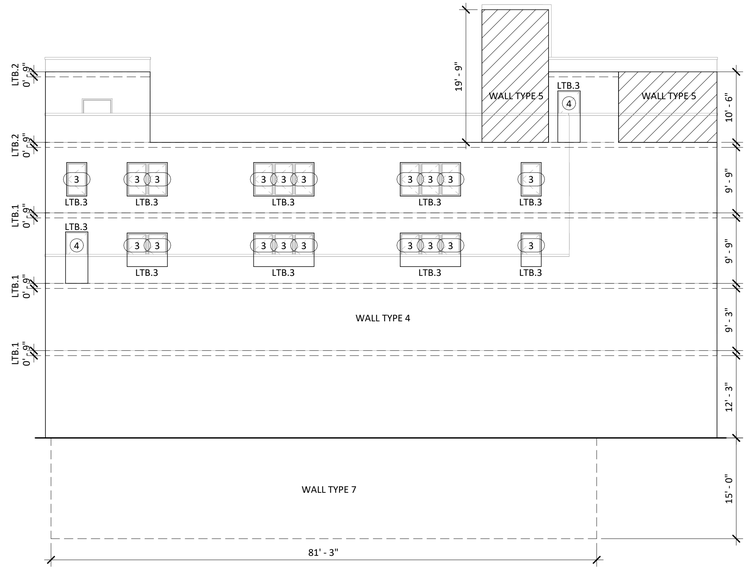
GROSS ABOVE-GRADE WALL TOTAL = 4,779 SF
- WALL TYPE 4 = 2,974 SF
- WALL TYPE 4 EOS = 220 SF
- WALL TYPE 5 = 1,585 SF
GROSS BELOW-GRADE WALL TOTAL = 992 SF
- WALL TYPE 7 = 992 SF
FENESTRATION TOTAL = 90 SF
- W-3 X 6 (OPERABLE) = 90 SF

4 THERMAL BOUNDARY ELEVATION 4
3/32" = 1'-0"



GROSS ABOVE-GRADE WALL TOTAL = 5,023 SF
- WALL TYPE 4 = 3,802 SF
- WALL TYPE 4 EOS = 282 SF
- WALL TYPE 5 = 939 SF
GROSS BELOW-GRADE WALL TOTAL = 1,210 SF
- WALL TYPE 7 = 1,210 SF
FENESTRATION TOTAL = 998 SF
- W-2 X 2 (ENTRANCE) = 56 SF
- W-3 X 42 (OPERABLE) = 630 SF
- W-4 X 13 (OPERABLE) = 312 SF

1 THERMAL BOUNDARY ELEVATION 1
3/32" = 1'-0"



GROSS ABOVE-GRADE WALL TOTAL = 5,022 SF
- WALL TYPE 4 = 4,297 SF
- WALL TYPE 4 EOS = 319 SF
- WALL TYPE 5 = 358 SF
GROSS BELOW-GRADE WALL TOTAL = 1,218 SF
- WALL TYPE 7 = 1,218 SF
- OPAQUE DOOR 4 = 48 SF
FENESTRATION TOTAL = 285 SF
- W-3 X 19 (OPERABLE) = 285 SF

3 THERMAL BOUNDARY ELEVATION 3
3/32" = 1'-0"

NYC ENERGY CODE STATEMENT
TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 NEW YORK CITY ENERGY CONSERVATION CODE.

ENERGY CODE PROGRESS INSPECTIONS

PROTECTION OF EXPOSED FOUNDATION INSULATION	IIA1
INSULATION PLACEMENT AND R-VALUES	IIA2
FENESTRATION AND DOOR U-FACTOR AND PRODUCT RATINGS	IIA3
FENESTRATION AIR LEAKAGE	IIA4
FENESTRATION AREAS	IIA5
AIR BARRIER VISUAL INSPECTION	IIA6
AIR BARRIER TESTING	IIA7
METERING	IIC1
INTERIOR LIGHTING POWER	IIC3
EXTERIOR LIGHTING POWER	IIC4
LIGHTING CONTROLS	IIC5
ELECTRIC MOTORS AND ELEVATORS	IIC6
MAINTENANCE INFORMATION	IID1

AIR LEAKAGE AND TESTING NOTES

C402.5.1.3 AIR BARRIER TESTING
NEW BUILDINGS AND ADDITIONS 10,000 SQUARE FEET AND GREATER, BUT LESS THAN 50,000 SQUARE FEET, AND LESS THAN OR EQUAL TO 75 FEET IN HEIGHT, MUST SHOW COMPLIANCE THROUGH TESTING IN ACCORDANCE WITH ASTM E779 OR OTHER APPROVED STANDARDS.

AIR LEAKAGE TESTING
AIR BARRIER LEAKAGE TESTING SHALL BE DONE ON UNITS CONTAINING TYPICAL AIR BARRIER ASSEMBLY TYPES IN CONFORMANCE WITH ASTME REQUIREMENTS FOR THE MATERIALS WITHIN THE UNITS

MANDATORY AIR LEAKAGE PROVISIONS:
1. AIR LEAKAGE: PROVIDE FLASHING, WINDOW DAMS, EXPANDABLE FOAM SEALANT, AND CAULKING AT ROUGH OPENING/WINDOW FRAME JOINTS TO CREATE A CONTINUOUS AIR BARRIER WITH SURROUNDING WALL SYSTEM.
2. AIR LEAKAGE: PROVIDE FLASHING, EXPANDABLE FOAM SEALANT, AND CAULKING AT ROUGH OPENING/DOOR FRAME JOINTS TO CREATE A CONTINUOUS AIR BARRIER WITH SURROUNDING WALL SYSTEM.
3. AIR LEAKAGE: PROVIDE FLASHING, EXPANDABLE FOAM SEALANT, AND CAULKING AT ROUGH OPENING/LIGHT FIXTURE FRAME JOINTS TO CREATE A CONTINUOUS AIR BARRIER WITH SURROUNDING WALL/CEILING SYSTEM.
4. SEE A-700 SHEETS FOR WINDOW ELEVATIONS AND SEALING DETAILS.

CLEAR FIELD THERMAL BRIDGES

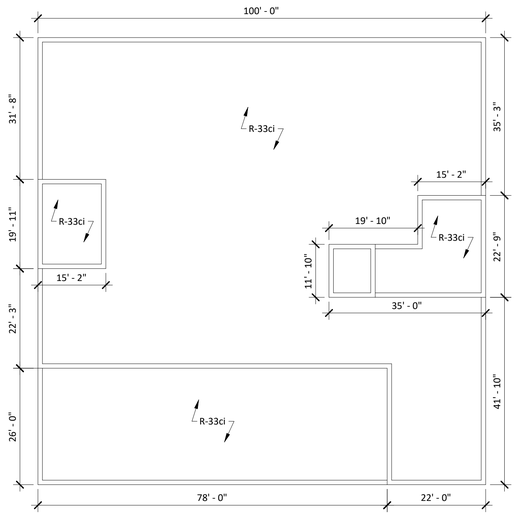
CFTB NO.	*ASSEMBLY/THERMAL BRIDGE*	*WALL TYPE*	*SECTION DETAIL SHEET*
CFTB.1	METAL FRAMED WALL, WITH METAL PANEL	WALL TYPE 4	1/A-600 & 1/A-500
CFTB.2	MASS WALL, WITH METAL PANEL	WALL TYPE 5	1/A-600 & 1/A-500
CFTB.3	CONCRETE ROOF, WITH R-33ci	N/A	1/A-600 & 1/A-500

LINEAR THERMAL BRIDGES

LTB NO.	*TYPE OF THERMAL BRIDGE*	*Ψ- VALUE*	*TOTAL LINEAR LENGTH*	*SECTION DETAIL SHEET*
LTB.1	FLOOR SLAB EDGE	0.44 (TABLE 402.6)	1,012'-0"	1/A-500 & EN-001
LTB.2	PARPAPET SLAB EDGE	0.42 (TABLE 402.6)	390'-11"	1/A-500 & EN-001
LTB.3	FENESTRATION PERIMETER	0.32 (TABLE 402.6)	2,276'-0"	1/A-500 & EN-001

ENVELOPE ASSEMBLIES
9" EDGE OF SLAB: R-10ci
WALL TYPE 4: R-21 + R-10ci
WALL TYPE 5: R-11.2ci
WALL TYPE 7: R-11.2ci

C402.4.1 FENESTRATION - MAXIMUM AREA (30%)
TOTAL GROSS WALL AREA:
4,878 + 4,297 + 5,023 + 4,779 = 18,977 SF
TOTAL FENESTRATION AREA:
760 + 285 + 998 + 45 = 2,088 SF
WINDOW TO WALL RATIO:
2,088 / 18,977 = 11%



GROSS ROOF AREA
100'-0" X 99'-10" = 9,983 SF

5 THERMAL BOUNDARY PLAN
1/16" = 1'-0"

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 18 OF 21
THERMAL BOUNDARY DIAGRAMS

SHEET NUMBER
EN-001.00

© 2023 DJLU ARCHITECT All Rights Reserved

COMcheck Software Version COMcheckWeb

Envelope Compliance Certificate

Project Information

Energy Code: 2020 New York City Energy Conservation Code
Project Title: 410 40th Street
Location: New York, New York
Climate Zone: 4a
Project Type: New Construction
Vertical Glazing / Wall Area: 9%

Construction Site:
410 40th Street
Brooklyn, New York 11232

Owner/Agent:
Lefkowitz
139 Lee Ave, Suite 60
Brooklyn, New York 11206
718-797-3395

Designer/Contractor:
DJLU Architect
5 West 37th Street, 6th Floor
New York, New York 10018
646.820.3558

Additional Efficiency Package(s)

Credits: 1.0 Required 1.0 Proposed
Reduced Lighting Power, 1.0 credit

Building Area	Floor Area
1-Community Facility (School/University) : Nonresidential	35871

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof: Insulation Entirely Above Deck, [Bldg. Use 1 - Community Facility]	9983	---	33.0	0.030	0.030
NORTH					
Elevation 1 - Wall Type 4: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	3802	21.0	10.0	0.051	0.061
W2: Glass (over 50% glazing): Metal Frame, Entrance Door, Perf. Specs.: Product ID TBD, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	56	---	---	0.770	0.770
W3: Metal Frame: Operable, Perf. Specs.: Product ID Crystal, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	630	---	---	0.400	0.400
W4: Metal Frame: Operable, Perf. Specs.: Product ID Crystal, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	312	---	---	0.400	0.400
Elevation 1 - Wall Type 4 EOS: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	3802	0.0	10.0	0.078	0.061
Elevation 1 - Wall Type 5: Solid Concrete, 10in. Thickness, Normal Density, Furring: None, [Bldg. Use 1 - Community Facility]	939	---	11.2	0.076	0.099
Elevation 1 - Wall Type 7: Solid Concrete, 12in. Thickness, Light Density, Furring: None, Wall Ht 15.0, Depth B.O. 15.0, [Bldg. Use 1 - Community Facility]	992	---	11.2	0.070	0.119
EAST					
Elevation 2 - Wall Type 4: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	3275	21.0	10.0	0.051	0.061
W1: Glass (over 50% glazing): Metal Frame, Entrance Door, Perf. Specs.: Product ID TBD, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	76	---	---	0.770	0.770
W3: Metal Frame: Operable, Perf. Specs.: Product ID Crystal, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	540	---	---	0.400	0.400
W4: Metal Frame: Operable, Perf. Specs.: Product ID Crystal, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	144	---	---	0.400	0.400
Door 4: Insulated Metal, Swinging, [Bldg. Use 1 - Community Facility]	48	---	---	0.500	0.500
Elevation 2 - Wall Type 4 EOS: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	239	0.0	10.0	0.078	0.061
Elevation 2 - Wall Type 5: Solid Concrete, 10in. Thickness, Normal Density, Furring: None, [Bldg. Use 1 - Community Facility]	1316	---	11.2	0.076	0.099
Elevation 2 - Wall Type 7: Solid Concrete, 12in. Thickness, Light Density, Furring: None, Wall Ht 15.0, Depth B.O. 15.0, [Bldg. Use 1 - Community Facility]	1210	---	11.2	0.070	0.119
SOUTH					
Elevation 3 - Wall Type 4: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	4297	21.0	10.0	0.051	0.061
W3: Metal Frame: Operable, Perf. Specs.: Product ID Crystal, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	285	---	---	0.400	0.400
Door 4: Insulated Metal, Swinging, [Bldg. Use 1 - Community Facility]	48	---	---	0.500	0.500
Elevation 3 - Wall Type 4 EOS: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	319	0.0	10.0	0.078	0.061
Elevation 3 - Wall Type 5: Solid Concrete, 10in. Thickness, Normal Density, Furring: None, [Bldg. Use 1 - Community Facility]	358	---	11.2	0.076	0.099
Elevation 3 - Wall Type 7: Solid Concrete, 12in. Thickness, Light Density, Furring: None, Wall Ht 15.0, Depth B.O. 15.0, [Bldg. Use 1 - Community Facility]	1218	---	11.2	0.070	0.119
WEST					
Elevation 4 - Wall Type 4: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	2974	21.0	10.0	0.051	0.061
W3: Metal Frame: Operable, Perf. Specs.: Product ID Crystal, SHGC 0.36, < 95' above-grade, [Bldg. Use 1 - Community Facility] (b)	90	---	---	0.400	0.400
Elevation 4 - Wall Type 4 EOS: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Community Facility]	220	0.0	10.0	0.078	0.061
Elevation 4 - Wall Type 5: Solid Concrete, 10in. Thickness, Normal Density, Furring: None, [Bldg. Use 1 - Community Facility]	1585	---	11.2	0.076	0.099
Elevation 4 - Wall Type 7: Solid Concrete, 12in. Thickness, Light Density, Furring: None, Wall Ht 15.0, Depth B.O. 15.0, [Bldg. Use 1 - Community Facility]	992	---	11.2	0.070	0.119

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.
(b) Fenestration product performance must be certified in accordance with NFRC and requires supporting documentation.

Envelope PASSES: Design 11% better than code

Envelope Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 2020 New York City Energy Conservation Code requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

COMcheck Software Version COMcheckWeb

Interior Lighting Compliance Certificate

Project Information

Energy Code: 2020 New York City Energy Conservation Code
Project Title: 410 40th Street
Project Type: New Construction

Construction Site:
410 40th Street
Brooklyn, New York 11232

Owner/Agent:
Lefkowitz
139 Lee Ave, Suite 60
Brooklyn, New York 11206
718-797-3395

Designer/Contractor:
DJLU Architect
5 West 37th Street, 6th Floor
New York, New York 10018
646.820.3558

Additional Efficiency Package(s)

Credits: 1.0 Required 1.0 Proposed
Reduced Lighting Power, 1.0 credit

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts
1-Common Space Types:Corridor/Transition >=8 ft wide	3703	0.52	1926
2-Common Space Types:Food Preparation	503	0.83	417
3-Common Space Types:Lobby - General	530	0.81	429
4-Common Space Types:Electrical/Mechanical	1777	0.35	622
5-Common Space Types:Office - Enclosed	2639	0.77	2032
6-Common Space Types:Storage	2920	0.39	1139
7-Common Space Types:Stairwell	3211	0.45	1445
8-Common Space Types:Dining Area - Cafeteria/Fast Food	1730	0.48	830
9-Common Space Types:Restrooms	1662	0.68	1130
10-Common Space Types:Classroom/Lecture/Training	18858	0.67	12635
		Total Allowed Watts =	22606

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
1-Common Space Types:Corridor/Transition >=8 ft wide				
1 - 2x2 Recessed Ceiling LED: LED Panel 36W:	1	44	36	1584
2-Common Space Types:Food Preparation				
1 - 2x2 Recessed Ceiling LED: LED Panel 36W:	1	8	36	288
3-Common Space Types:Lobby - General				
2 - Recessed Hi-Hat LED: LED Other Fixture Unit 16W:	1	10	16	160
4-Common Space Types:Electrical/Mechanical				
3 - Ceiling Mount Linear Fluorescent: Other: Electronic:	1	12	24	288
5-Common Space Types:Office - Enclosed				
1 - 2x2 Recessed Ceiling LED: LED Panel 36W:	1	36	36	1296
6-Common Space Types:Storage				

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
3 - Ceiling Mount Linear Fluorescent: Other: Electronic:	1	13	24	312
7-Common Space Types:Stairwell				
4 - Surface Mount LED Stairwell Strip: LED Other Fixture Unit 40W:	1	24	40	960
8-Common Space Types:Dining Area - Cafeteria/Fast Food				
1 - 2x2 Recessed Ceiling LED: LED Panel 36W:	1	15	36	540
9-Common Space Types:Restrooms				
1 - 2x2 Recessed Ceiling LED: LED Panel 36W:	1	23	36	828
10-Common Space Types:Classroom/Lecture/Training				
1 - 2x2 Recessed Ceiling LED: LED Panel 36W:	1	253	36	9108
		Total Proposed Watts =		15364

Interior Lighting PASSES: Design 32% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2020 New York City Energy Conservation Code requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

COMcheck Software Version COMcheckWeb

Exterior Lighting Compliance Certificate

Project Information

Energy Code: 2020 New York City Energy Conservation Code
Project Title: 410 40th Street
Project Type: New Construction
Exterior Lighting Zone 2 (Neighborhood business district (LZ2))

Construction Site:
410 40th Street
Brooklyn, New York 11232

Owner/Agent:
Lefkowitz
139 Lee Ave, Suite 60
Brooklyn, New York 11206
718-797-3395

Designer/Contractor:
DJLU Architect
5 West 37th Street, 6th Floor
New York, New York 10018
646.820.3558

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts /	D Tradable Wattage	E Allowed Watts (B X C)
Pedestrian and vehicular entrances and exits	18 ft of	12.6	Yes	227
			Total Tradable Watts (a) =	227
			Total Allowed Watts =	227
			Total Allowed Supplemental Watts (b) =	400

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 400 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
Pedestrian and vehicular entrances and exits (18 ft of door width): Tradable Wattage				
5 - Exterior Surface Mount LED: Other:	1	6	14	84
			Total Tradable Proposed Watts =	84

Exterior Lighting PASSES: Design 87% better than code

Exterior Lighting Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2020 New York City Energy Conservation Code requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

COMcheck Software Version COMcheckWeb

Inspection Checklist

Energy Code: 2020 New York City Energy Conservation Code

Requirements: 0.0% were addressed directly in the COMcheck software
Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR1][1]	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C103.2 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C103.2 [PR8][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.4.1 [PR11][1]	The skylight area <= 3 percent of the gross roof area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.4.1.1 [PR12][1]	Vertical Fenestration Area Allowance: A maximum of 40 percent of gross above-grade wall area is permitted to be vertical fenestration area provided >= 50 percent of the conditioned floor area is within a daylight zone, daylight responsive controls are installed, and glazing assemblies within the scope of NFRC 200 have visible transmittance >= 1.1 times SHGC.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 19 OF 21
ENERGY ANALYSIS COMCHECK

SHEET NUMBER
EN-002.00

© 2023 DJLU ARCHITECT All Rights Reserved

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C402.4.2 [PR14][1]	In enclosed spaces > 2,500 ft2 directly under a roof with ceiling heights >15 ft. and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the following requirements apply: (a) the daylight zone under skylights is >= half the floor area; (b) the skylight area to daylight zone is >= 3 percent with a skylight VT >= 0.40; or a minimum skylight effective aperture >= 1 percent.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.5.2 [PR36][1]	Electrical meters for tenant spaces in covered buildings. Each covered tenant space in a new building shall be equipped with a separate meter or sub-meter to measure the electrical consumption of such space when let or sublet. See section details and Section 28-311.2 of the Administrative Code. As new covered tenant spaces are created, they shall be equipped with meters or sub-meters as provided in this section	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.10 [PR38][1]	New parking garages and new parking lots powered by the energy services for a building, and with 10 or greater parking spaces, provide either: 1. Panel capacity and conduit for the future installation of minimum 208/240V 40-amp outlets for 5 percent of the total parking spaces and not less than two parking spaces; or 2. Minimum 208/240V 40-amp outlets for 5 percent of the total parking spaces and not less than two parking spaces.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.1 [PR17][1]	PTAC/PTHP penetration through thermal envelope - When penetrations from mechanical equipment listed in Table C403.2.3(3) exceeds 1 percent of the opaque above-grade wall area, the penetration area is represented as an envelope wall assembly of similar type having size equal to penetration area and proposed U-0.5.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C303.2 [FO2][2]	Below-grade wall insulation installed per manufacturer's instructions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.2.1 [FO6][1]	Exterior insulation protected against damage, sunlight, moisture, wind, landscaping and equipment maintenance activities.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.1.4 [FO1][2]	Installed below-grade wall insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*

Additional Comments/Assumptions:

Section # & Req.ID	Framing / Rough-In Inspection	Complies?	Comments/Assumptions
C303.1.3 [FR12][2]	Fenestration products rated in accordance with NFRC.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.1.3 [FR13][1]	Fenestration products are certified as to performance labels or certificates provided.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.4.3 [FR10][1]	Vertical fenestration SHGC value.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.4.3, C402.4.3.4 [FR8][1]	Installed vertical fenestration U-factor and SHGC consistent with label specifications and as reported in plans and COMcheck reports.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.5.1.3.1 [FR21][1]	Air barrier testing: Complies through testing in accordance with ASTM E779 or other approved standards. R-2 buildings may alternatively show compliance through testing in accordance with Section R402.4.1.3 of 2020 New York City Energy Conservation Code. See department rules and code section for conditional exceptions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.6 [PR18][1]	Applications for construction document approval includes thermal bridge documentation inlcuding: 1) Clear field thermal bridges, 2) Point thermal bridges, 3) Linear thermal bridges. See section language for details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.5.7 [FR17][3]	Vestibules are installed on all building entrances. Doors have self-closing devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.5.5, C403.2.4.3 [ME3][3]	Stair and elevator shaft vents have motorized dampers that automatically close. Reference section C403.7.7 for operational details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.7.7 [ME58][3]	Outdoor air and exhaust systems have motorized dampers that automatically shut when not in use and meet maximum leakage rates. Check gravity dampers where allowed. Reference language for operational details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.2.2 [EL22][1]	Spaces required to have light-reduction controls have a manual control that allows the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern >= 50 percent.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.1, C405.2.1.1 [EL18][1]	Occupancy sensors installed in classrooms/lecture/training rooms, conference/meeting/multipurpose rooms, copy/print rooms, corridor/transition areas, lounges/breakrooms, enclosed offices, open plan office areas, restrooms, storage rooms, locker rooms, warehouse storage areas, janitorial closets, corridors/transition areas, dining areas, and other spaces <= 300 sqft that are enclosed by floor-to-ceiling height partitions. Reference section language C405.2.1.2 for control function in warehouses and section C405.2.1.3 for open plan office spaces, cafeteria dining areas, and fast food dining areas .	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.1.2 [EL19][1]	Occupancy sensors control function in warehouses: In warehouses, the lighting in aisleways and open areas is controlled with occupant sensors that automatically reduce lighting power by 50% or more when the areas are unoccupied. The occupant sensors control lighting in each aisleway independently and do not control lighting beyond the aisleway being controlled by the sensor.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.1.3 [EL20][1]	Occupant sensor control function in open plan office areas: Occupant sensor controls in open office spaces >= 300 sq.ft. have controls 1) configured so that general lighting can be controlled separately in control zones with floor areas <= 600 sq.ft. within the space, 2) automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the space, 3) are configured so that general lighting power in each control zone is reduced by >= 80% of the full zone general lighting power within 20 minutes of all occupants leaving that control zone, and 4) are configured such that any daylight responsive control will activate space general lighting or control zone general lighting only when occupancy for the same area is detected.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.2, C405.2.2.1, C405.2.2.2 [EL21][2]	Each area not served by occupancy sensors (per C405.2.1) have time-switch controls and functions detailed in sections C405.2.2.1 and C405.2.2.2.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.3, C405.2.3.1, C405.2.3.2 [EL23][2]	Daylight zones provided with individual controls that control the lights independent of general area lighting within daylight zones in the following spaces: 1. Spaces with a total of more than 100 watts of general lighting within sidelit zones complying with Section C405.2.3.2. General lighting does not include lighting that is required to have specific application control in accordance with Section C405.2.4. 2. Spaces with a total of more than 100 watts of general lighting within toplit zones complying with Section C405.2.3.3. See code section C405.2.3.1 Daylight responsive control function and section	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.4 [EL26][1]	Separate lighting control devices for specific uses installed per approved lighting plans.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.4 [EL27][1]	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.6 [EL28][2]	Exterior lighting systems provided with controls that comply with Sections C405.2.6.1 through C405.2.6.5. Decorative lighting systems comply with Sections C405.2.6.1-2, and C405.2.6.4.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.6.1 [EL31][2]	Lights automatically turned off when daylight is present and satifies the lighting needs.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.1.1 [EL6][2]	Internally illuminated exit signs do not exceed 5 watts per face.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.6.2 [EL32][2]	Building facade and landscape lighting automatically shut off from not later than 1 hour after business closing to not earlier than 1 hour before business opening.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.6.3 [EL33][2]	Lighting that is not controlled in accordance with Section C405.2.6.2 controlled so that the total wattage of such lighting is automatically reduced by not less than 50 percent by selectively switching off or dimming luminaires at one of the following times: 1. From not later than midnight to not earlier than 6a.m. 2. From not later than one hour after business closing to not earlier than one hour before business opening. 3. During any time where activity has not been detected for 15 minutes or more.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

DJLU ARCHITECT

office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT

410 40TH STREET

ADDRESS

410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 20 OF 21

ENERGY ANALYSIS COMCHECK

SHEET NUMBER

EN-003.00

© 2023 DJLU ARCHITECT All Rights Reserved

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.6.4 [EL34][3]	Time-switch controls for exterior lighting comply with the following: 1. Have a clock capable of being programmed for not fewer than 7 days. 2. Capable of being set for seven different day types per week. 3. Incorporate an automatic holiday setback feature. 4. Have program backup capabilities that prevent the loss of program and time settings for a period of not less than 10 hours in the event that power is interrupted.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.6.5 [EL35][3]	Outdoor parking area luminaires mounted 24' or less above the ground controlled to automatically reduce the power of each luminaire by a minimum of 50 percent when no activity has been detected for at least 15 minutes. No more than 1500 W of lighting power shall be controlled together.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.6 [EL26][3]	Low-voltage dry-type distribution electric transformers meet the minimum efficiency requirements of Table C405.6.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.7 [EL27][3]	Electric motors meet the minimum efficiency requirements of Tables C405.7(1) through C405.7(4). Efficiency verified through certification under an approved certification program or the equipment efficiency ratings shall be provided by motor manufacturer (where certification programs do not exist).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.8.2, C405.8.2.1 [EL28][3]	Escalators and moving walks comply with ASME A17.1/CSA B44 and have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.9 [EL29][3]	Total voltage drop across the combination of feeders and branch circuits <= 5%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Insulation Inspection	Complies?	Comments/Assumptions
C303.1 [IN3][1]	Roof insulation installed per manufacturer's instructions. Blown or poured loose-fill insulation is installed only where the roof slope is <=3 in 12.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.2.1 [IN20][3]	Insulation installed on a suspended ceiling having ceiling tiles is not being specified for roof/ceiling assemblies. Continuous insulation board installed in 2 or more layers with edge joints offset between layers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.1 [IN10][3]	Building envelope insulation is labeled with R-value or insulation certificate providing R-value and other relevant data.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.2 [IN7][1]	Above-grade wall insulation installed per manufacturer's instructions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.2.1 [IN14][3]	Exterior insulation is protected from damage with a protective material. Verification for exposed foundation insulation may need to occur during Foundation Inspection.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C105 [IN6][1]	Installed above-grade wall insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.2.6 [IN18][3]	Radiant panels and associated components, designed for heat transfer from the panel surfaces to the occupants or indoor space are insulated with a minimum of R-3.5.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C105 [IN2][1]	Installed roof insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports. For some ceiling systems, verification may need to occur during Framing Inspection.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.5.1.1 [IN1][1]	All sources of air leakage in the building thermal envelope are sealed, caulked, gasketed, weather stripped or wrapped with moisture vapor-permeable wrapping material to minimize air leakage.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17][3]	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.5 [FI55][1]	Building envelope contains a continuous air barrier that has been tested and deemed to limit air leakage <= 0.40 cfm/ft2.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.5.6 [FI37][1]	Weatherseals installed on all loading dock cargo door openings and provide direct contact along the top and sides of vehicles parked in the doorway.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C402.5.9 [FI54][3]	The building thermal envelope shall be tested in accordance with ASTM E779 at a pressure differential of 0.3 inch water gauge or an equivalent method approved by the code official and shall be deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope is not greater than 0.40 cfm/ft2. The building shall also comply with Sections C402.5.5, C402.5.6, and C402.5.7. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.3.1 [FI18][1]	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Interior Lighting fixture schedule for values.*
C405.4.1 [FI13][1]	Exterior lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Exterior Lighting fixture schedule for values.*
C408.1.1 [FI57][1]	Building operations and maintenance documents will be provided to the owner. Documents will cover manufacturers' information, specifications, programming procedures and means of illustrating to owner how building, equipment and systems are intended to be installed, maintained, and operated.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C408.4, C408.4.1, C408.4.2, C408.4.3 [FI58][3]	Air barrier commissioning. Registered or approved agent provides evidence of air barrier commissioning including: 1) Construction documents that include documentation of the continuous air barrier components included in the design and a field inspection checklist that includes all requirements necessary for maintaining air barrier continuity and durability in accordance with Section C402.5.1; 2) Reports from field inspections during project construction showing compliance with continuous air barrier requirements. Air barrier continuity shall be determined by testing or inspecting each type of unique air barrier joint or seam in the building envelope for continuity and defects; 3) A final commissioning report indicating compliance with the continuous air barrier requirements shall be provided to the building owner and, upon request, to the code official.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.3 [FI33][3]	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

RCNY §5000-01 TABLE II - PROGRESS INSPECTIONS FOR ENERGY CODE COMPLIANCE - COMMERCIAL BUILDINGS				
	INSPECTION/TEST	PERIODIC (MINIMUM)	REFERENCE STANDARD OR OTHER	ECC OR OTHER CITATION
IIA	ENVELOPE INSPECTIONS			
IIA1	**PROTECTION OF EXPOSED FOUNDATION INSULATION:** INSULATION MUST BE VISUALLY INSPECTED TO VERIFY PROPER PROTECTION WHERE APPLIED TO THE EXTERIOR OF BASEMENT OR CELLAR WALLS, CRAWL-SPACE WALLS AND/OR THE PERIMETER OF SLAB-ON-GRADE FLOORS.	AS REQUIRED DURING FOUNDATION WORK AND PRIOR TO BACKFILL	APPROVED CONSTRUCTION DOCUMENTS, ASTM C272	303.2.1; ASHRAE 90.1 - 5.8.1, 5.9
IIA2	**INSULATION PLACEMENT AND R-VALUES:** INSTALLED INSULATION FOR EACH COMPONENT OF THE CONDITIONED SPACE ENVELOPE AND AT JUNCTIONS BETWEEN COMPONENTS, INCLUDING THERMAL BRIDGES AND HEATED SLAB INSULATION, MUST BE VISUALLY INSPECTED TO ENSURE THAT THE R-VALUES ARE MARKED, THAT SUCH R-VALUES CONFORM TO THE R-VALUES IDENTIFIED IN THE CONSTRUCTION DOCUMENTS AND THAT THE INSULATION IS PROPERLY INSTALLED. CERTIFICATIONS FOR UNMARKED INSULATION ALSO BE VISUALLY INSPECTED.	AS REQUIRED TO VERIFY CONTINUOUS ENCLOSURE WHILE WALLS, CEILINGS AND FLOORS ARE OPEN	APPROVED CONSTRUCTION DOCUMENTS	303.1, 303.2, 402.1, 402.2, 402.6, 406; ASHRAE 90.1 - 5.5, 5.6, 5.8, 5.9, 11 OR APPENDIX G & I
IIA3	**FENESTRATION AND DOOR U-FACTOR AND PRODUCT RATINGS:** U-FACTORS, SHGC AND VT VALUES OF INSTALLED FENESTRATION MUST BE VISUALLY INSPECTED FOR CONFORMANCE WITH THE U-FACTORS, SHGC AND VT VALUES IDENTIFIED IN THE CONSTRUCTION DRAWINGS BY VERIFYING THE MANUFACTURER'S NFRC LABELS OR, WHERE NOT LABELED, USING THE RATINGS IN ECC TABLES C303.1.3(1), (2) AND (3).	AS REQUIRED DURING INSTALLATION	APPROVED CONSTRUCTION DOCUMENTS; NFRC 100, NFRC 200, NFRC 300, ANSI/ DASMA 105, ASTM E972	303.1, 303.1.3, 402.1.4, 402.4, 406; ASHRAE 90.1 - 5.4.2, 5.5, 5.6, 5.8.2, 5.9, 11 OR APPENDIX G & I
IIA4	**FENESTRATION AIR LEAKAGE:** WINDOWS AND DOOR ASSEMBLIES, EXCEPT SITE-BUILT WINDOWS AND/OR DOORS, MUST BE VISUALLY INSPECTED TO VERIFY THAT INSTALLED ASSEMBLIES ARE LISTED AND LABELED BY THE MANUFACTURER TO THE REFERENCED STANDARD. FOR CURTAIN WALL, STOREFRONT GLAZING, COMMERCIAL ENTRANCE DOORS AND REVOLVING DOORS, THE TESTING REPORTS MUST BE REVIEWED TO VERIFY THAT THE INSTALLED ASSEMBLY COMPLIES WITH THE STANDARD CITED IN THE APPROVED PLANS. WEATHERSEALS AT LOADING DOCKS MUST BE VISUALLY VERIFIED.	AS REQUIRED DURING INSTALLATION; PRIOR TO FINAL CONSTRUCTION INSPECTION	NFRC 400, AAMA/ WDMA/ CSA 101/I.S.2/A440; ASTM E283; ANSI/DASMA 105	402.5.2, 402.5.6; ASHRAE 90.1 - 5.4.3.2, 5.4.3.3, 5.8.2, 5.9
IIA5	**FENESTRATION AREAS:** DIMENSIONS OF WINDOWS, DOORS AND SKYLIGHTS SHALL BE VERIFIED BY VISUAL INSPECTION.	PRIOR TO FINAL CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS	402.4, ASHRAE 90.1 - 5.4, 5.5.4, 5.6, 5.9, 11 OR APPENDIX G
IIA6	**AIR BARRIER VISUAL INSPECTION:** OPENINGS AND PENETRATIONS IN THE BUILDING ENVELOPE, INCLUDING SITE-BUILT FENESTRATION AND DOORS, MUST BE VISUALLY INSPECTED TO VERIFY THAT A CONTINUOUS AIR BARRIER AROUND THE ENVELOPE FORMS AN AIR-TIGHT ENCLOSURE. THE PROGRESS INSPECTOR MUST VISUALLY INSPECT TO VERIFY THAT MATERIALS AND/OR ASSEMBLIES HAVE BEEN TESTED AND MEET THE REQUIREMENTS OF THE RESPECTIVE STANDARDS, OR MUST OBSERVE THE TESTING OF THE BUILDING AND/OR ASSEMBLIES AND VERIFY THAT THE BUILDING AND/OR ASSEMBLIES MEET THE REQUIREMENTS OF THE STANDARD, IN ACCORDANCE WITH THE STANDARD(S) CITED IN THE APPROVED PLANS.	AS REQUIRED DURING CONSTRUCTION	APPROVED CONSTRUCTION DOCUMENTS; ASTM E2178, ASTM E2357, ASTM E1677, ASTM E779, ASTM E283	402.5; ASHRAE 90.1 - 5.4.3.1, 5.4.3.5, 5.9
IIA7	**AIR BARRIER TESTING:** TESTING MUST BE PERFORMED IN ACCORDANCE WITH SECTION ECC C402.5.1.3.1 OR ASHRAE 90.1 SECTION 5.4.3.1.3, AND SHALL BE ACCEPTED IF THE BUILDING MEETS THE REQUIREMENTS DETAILED IN SUCH SECTION. TEST RESULTS MUST BE RETAINED IN ACCORDANCE WITH THE PROVISIONS OF TITLE 28 OF THE ADMINISTRATIVE CODE. TESTING MUST BE PREFORMED BY A THIRD-PARTY INDEPENDENT OF THE CONTRACTOR AND ACCEPTABLE TO THE DEPARTMENT.	AS REQUIRED DURING CONSTRUCTION, OR PRIOR TO FINAL CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS; ASTM E779, ANSI/BOMA Z65.1, ASTM E3158, RESNET/ICC 380	402.5, 402.5.1.3, 406; ASHRAE 90.1 - 5.4.3.1.3, 5.9, APPENDIX I
IIC	ELECTRICAL POWER AND LIGHTING SYSTEMS			
IIC1	**METERING:** THE PRESENCE AND OPERATION OF ALL REQUIRED METERS FOR MONITORING TOTAL ELECTRICAL ENERGY USAGE AND/OR TOTAL FUEL USE, SYSTEM ENERGY USAGE, TENANT ENERGY USAGE, OR ELECTRICAL ENERGY USAGE IN THE BUILDING, IN INDIVIDUAL DWELLING UNITS, OR IN TENANT SPACES MUST BE VERIFIED BY VISUAL INSPECTION.	PRIOR TO FINAL ELECTRICAL AND CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS	405.5, 405.11, 4.5.12; ASHRAE 90.1 - 8.4.3, 8.4.5, 8.4.6, 10.4.5
IIC3	**INTERIOR LIGHTING POWER:** INSTALLED LIGHTING MUST BE VERIFIED FOR COMPLIANCE WITH THE LIGHTING POWER ALLOWANCE BY VISUAL INSPECTION OF FIXTURES, LAMPS, BALLASTS AND TRANSFORMERS.	PRIOR TO FINAL ELECTRICAL AND CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS	405.3, 406; ASHRAE 90.1 - 9.1, 9.2, 9.5, 9.6, 9.7; 1RCNY § 101-07(c)(3)(v)(C)4, APPENDIX I
IIC4	**EXTERIOR LIGHTING POWER:** INSTALLED LIGHTING MUST BE VERIFIED FOR COMPLIANCE WITH SOURCE EFFICACY AND/OR THE LIGHTING POWER ALLOWANCE BY VISUAL INSPECTION OF FIXTURES, LAMPS, BALLASTS AND RELEVANT TRANSFORMERS.	PRIOR TO FINAL ELECTRICAL AND CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS	405.4; ASHRAE 90.1 - 9.4.2, 1RCNY §101-07(c)(3)(v)(C)4
IIC5	**LIGHTING CONTROLS**: EACH TYPE OF REQUIRED LIGHTING CONTROLS, INCLUDING: OCCUPANT SENSORS, MANUAL INTERIOR LIGHTING CONTROLS, LIGHT-REDUCTION CONTROLS, AUTOMATIC LIGHTING SHUT-OFF, DAYLIGHT ZONE CONTROLS, SLEEPING UNIT CONTROLS, EXTERIOR LIGHTING CONTROLS, EGRESS ILLUMINATION CONTROLS. MUST BE VERIFIED BY VISUAL INSPECTION AND TESTED FOR FUNCTIONALITY AND PROPER OPERATION.	PRIOR TO FINAL ELECTRICAL AND CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS, INCLUDING CONTROL SYSTEM NARRATIVES	405.2, 406; ASHRAE 90.1 - 9.4.1, 9.4.3, 9.7, APPENDIX I
IIC6	**ELECTRIC MOTORS AND ELEVATORS:** WHERE REQUIRED BY THE CONSTRUCTION DOCUMENTS FOR ENERGY CODE COMPLIANCE, MOTOR LISTING OR LABELS MUST BE VISUALLY INSPECTED TO VERIFY THAT THEY COMPLY WITH THE RESPECTIVE ENERGY REQUIREMENTS IN THE CONSTRUCTION DOCUMENTS. ELEVATORS AND ESCALATORS MUST BE INSPECTED FOR COMPLIANCE WITH REGENERATIVE DRIVE REQUIREMENTS.	PRIOR TO FINAL ELECTRICAL AND CONSTRUCTION INSPECTION	APPROVED CONSTRUCTION DOCUMENTS	405.7, 405.8, 405.9; ASHRAE 90.1 - 8.4.4, 10.4, 10.8
IID	OTHER			
IID1	**MAINTENANCE INFORMATION:** MAINTENANCE MANUALS FOR MECHANICAL, SERVICE HOT WATER AND ELECTRICAL EQUIPMENT AND SYSTEMS REQUIRING PREVENTIVE MAINTENANCE MUST BE REVIEWED FOR APPLICABILITY TO INSTALLED EQUIPMENT AND SYSTEMS BEFORE SUCH MANUALS ARE PROVIDED TO THE OWNER. LABELS REQUIRED FOR SUCH EQUIPMENT OR SYSTEMS SHALL BE INSPECTED FOR ACCURACY AND COMPLETENESS.	PRIOR TO SIGN OFF OR ISSUANCE OF FINAL CERTIFICATE OF OCCUPANCY	APPROVED CONSTRUCTION DOCUMENTS, INCLUDING ELECTRICAL DRAWINGS WHERE APPLICABLE; ASHRAE GUIDELINE 4	408.1.1, 408.2.5.2, 408.3.2; ASHRAE 90.1 - 4.2.2.3, 6.7.2.2, 6.7.2.3.5.2, 8.7.2, 9.7.2.2, 9.4.3.2.2

DJLU ARCHITECT
office@djluarchitect.com 646.820.3558
5 W 37th Street, 6th floor, New York, NY 10018

PROJECT
410 40TH STREET

ADDRESS
410 40TH STREET
BROOKLYN, NY 11232

CONSULTANT

ISSUE / REVISION RECORD

DATE	DESCRIPTION

SEAL & SIGNATURE

SHEET TITLE 21 OF 21
ENERGY ANALYSIS COMCHECK

SHEET NUMBER
EN-004.00

© 2023 DJLU ARCHITECT All Rights Reserved