

**131-10 TO 131-18 AVERY AVENUE
&
131-24 TO 131-32 AVERY AVENUE
QUEENS, NEW YORK**

Remedial Action Work Plan

**NYC VCP Project Number: 15CVCP137Q
OER Project Number: 15EHAN193Q**

Prepared for:

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REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C&D	Construction and Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYS DEC	New York State Department of Environmental Conservation
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCRR	New York Codes Rules and Regulations
NYS DEC	New York State Department of Environmental Conservation

NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PCBs	Professional Engineer Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

I, Ariel Czemerinski, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the 131-10 to 131-18 Avery Avenue Site and 131-24 to 131-32 Avery Avenue Site, site number 15CVCP137Q. I certify to the following:

- I have reviewed this document and the Stipulation List, to which my signature and seal are affixed.
- Engineering Controls developed for this remedial action were designed by me or a person under my direct supervision and designed to achieve the goals established in this Remedial Action Work Plan for this site.
- The Engineering Controls to be constructed during this remedial action are accurately reflected in the text and drawings of the Remedial Action Work Plan and are of sufficient detail to enable proper construction.
- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Name

NYS PE License Number

Signature

Date

PE Stamp

I, William Silveri, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 131-10 to 131-18 Avery Avenue Site and 131-24 to 131-32 Avery Avenue Site, site number 15CVCP137Q. I certify to the following:

- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

QEP Name

QEP Signature

Date

EXECUTIVE SUMMARY

Avery Group LLC & Wilson Realty Management LLC are working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 21,640-square foot property located 131-10 to 131-18 Avery Avenue (“Site A”) and 131-24 to 131-32 Avery Avenue (“Site B”) in Queens, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Background

The Sites are located at 131-10 to 131-18 Avery Avenue (Site A) and 131-24 to 131-32 Avery Avenue (Site B) in the Flushing section in Queens, New York and are identified as Block 5076 and Lots 61, 65, 69 and 75 on the New York City Tax Map. Figure 1 shows the Site location. The four tax lots in total consist of 21,640-square feet and are bounded by Avery Avenue to the north, a 1-story commercial building to the east, a 1-story commercial building to the south, and 131st Street to the west. Site A is comprised of Lots 61 and 65; Site B is comprised of Lots 69 and 75. A map of the site boundary is shown in Figure 2. Currently, the Sites are unoccupied but were most recently used as four separate commercial retail stores and contain four 1-story structures. Only the building on Lot 61, with the building address of 131-10 Avenue, has a basement; the other three buildings do not have a basement.

Summary of Redevelopment Plan

The proposed future use of the both Site A and Site B will consist of one 6-story mixed commercial and possibly residential use building with a full basement. Figure 3 shows the proposed commercial uses of the Site. The total gross square footage of Site A portion will be 51,936 square-feet. The basement level of Site A will be used for parking, mechanical equipment rooms, utility and meter rooms, and accessory storage for commercial occupants. The total gross square footage of Site B will be 34,621 square-feet. The basement level of Site B will be utilized for commercial uses, mechanical equipment rooms, and utility and meter rooms. For both Site A

and Site B, the first floor will be used for commercial/retail uses and a community facility lobby, and floors 2 through 6 will be used for community facility uses. For the construction of new basement, soils beneath Site B and the easternmost Lot 61 of Site A, with the current address of 131-18 Avery, will be excavated to approximately 15 feet below grade surface (bgs). No excavation is planned for Lot 61 of Site A since it already has a full basement..

Since the existing building on Lot 61 already has a basement, no excavation is required. Therefore, an estimated 7,212 cubic yards (10,820 tons) of soil will be removed from the Site during excavation. Layout of the proposed site development is presented in Figure 3. The current zoning designation is C2-6A, denoting it as a commercial district which is predominantly residential in character. The proposed use is consistent with existing zoning for the property.

Summary of Surrounding Property

The Sites are located within a primarily mixed use residential, commercial, and manufacturing area of Queens, New York. The Sites are bounded by a commercial retail store across Avery Avenue to the north, a 1-story commercial building currently enrolled in the NYS DEC Brownfield Cleanup Program to the south, a 1-story commercial building to the east, and 131st Street to the west.

According to the OER Searchable Property Environmental E-Database (SPEED), there are no sensitive receptors (such as schools, hospitals and day-care facilities) within a 500-foot radius of the Sites.

Figure 2 shows the surrounding land usage.

Summary of Past Site Uses and Areas of Concern

Based upon the review the two Phase I Environmental Site Assessment (ESA) Reports prepared by National Environmental Services, Inc. (NES) dated August 23, 2013, the Site history was established. The Site consists of four (4) tax lots with a total square footage of 21,640 square feet that are currently vacant, but was most recently used as four separate commercial retail stores and contains four 1-story structures. Historical Sanborn Maps show the Site as undeveloped land prior to 1982. Between 1982 and the present, the Site is shown as developed

with the existing structures. Past owners include a discount store, a furniture store, and other commercial businesses.

The AOCs identified for this Site include:

1. A localized presence of trichloroethylene (TCE) and tetrachloroethylene (PCE) in soil in the western portion of the Site B (center of Lot 69).
2. The presence of TCE and PCE in groundwater and soil vapor throughout Site A and Site B.
3. The presence of polychlorinated biphenyls (PCBs) in the shallow soil (zero to 2 feet) throughout Site A and Site B.

Figure 4 shows the areas of concern for soils.

Summary of Work Performed under the Remedial Investigation

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed seventeen (17) soil borings across the entire project Site, and collected thirty-five (35) soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed five (5) groundwater monitoring wells throughout the Site to establish groundwater flow and collected five (5) groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed six (6) soil vapor probes around Site perimeter and collected six (6) samples for chemical analysis.

Summary of Findings of Remedial Investigation

1. Elevation of the property is approximately 15 feet.
2. Depth to groundwater ranges from 19.51 to 19.91 feet at the Site.
3. Groundwater flow is generally from northwest to southeast beneath the Site.

4. Bedrock was not encountered during this investigation.
5. The stratigraphy of the Site, from the surface down, consists of 4 feet of urban fill consisting of fine to medium sand with asphalt and ash underlain by 14 feet of native sand.
6. Soil/fill samples results were compared to NYSDEC Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill samples collected during the RI showed concentrations of several VOCs including acetone, a common laboratory contaminant, (max of 0.57 mg/kg), cis-1,2-dichloroethylene (max of 40 mg/kg), tetrachloroethylene (max of 5.7 mg/kg), trans-1,2-dichloroethylene (max of 4.1 mg/kg), trichloroethylene (max of 17 mg/kg), and vinyl chloride (max of 0.15 mg/kg) exceeding Unrestricted Use SCOs in shallow soil samples. These exceedances occurred mainly in the soil samples taken to delineate the extent of impacted soils at the center of Lot 69. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected including benzo(a)anthracene (max of 1.2 mg/kg), benzo(k)fluoranthene (max of 0.89 mg/kg), chrysene (max of 1.97 mg/kg), dibenzo(a,h)anthracene (0.39 mg/kg), and indeno(1,2,3-cd)pyrene (max of 0.71 mg/kg) exceeding Unrestricted Use SCOs in two samples. Of these, benz(a)anthracene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded Restricted Residential Use SCOs. Two pesticides, 4,4'-DDE (max of 0.079 mg/kg) and 4,4'-DDT (max of 0.21 mg/kg) exceeded Unrestricted Use SCOs. Total PCBs exceeded Restricted Residential Use SCOs in seven shallow soil samples with a max concentration of 54.7 mg/kg. Several metals including arsenic (max of 13.8 mg/kg), chromium hexavalent (max of 1.88 mg/kg), chromium trivalent (max of 31.9 mg/kg), copper (max of 669 mg/kg), lead (max of 412 mg/kg), mercury (max of 1.76 mg/kg), nickel (max of 45.3 mg/kg), selenium (max of 6.68 mg/kg), and zinc (max of 270 mg/kg) exceeded Unrestricted Use SCOs. Of these metals, copper, lead, and mercury also exceeded Restricted Residential Use in two shallow samples.
7. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected

during the investigations showed no pesticides in any sample. Four VOCs, 1,1-Dichloroethane (max of 8 µg/L), cis-1,2-Dichloroethylene (max of 8.4 µg/L), tetrachloroethylene (max of 190 µg/L), and trichloroethylene (max of 27 µg/L) were detected above their respective GQS. Trace concentrations of SVOCs were detected, but none exceeded their GQS. Total PCBs (0.24 µg/L) exceeded GQS in one sample. Several metals were identified in groundwater but only manganese (max of 2,460 µg/L), selenium (max of 31 µg/L), and sodium (max of 147,000 µg/L) exceeded their respective GQS.

8. Soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples collected during the RI showed moderate levels of petroleum-related and high levels of chlorinated VOCs. Total concentrations of petroleum-related VOCs (BTEX) ranged from 9.5 µg/m³ to 68.26 µg/m³. Chlorinated VOCs tetrachloroethylene (PCE) was detected in all soil vapor samples ranging from 500 to 18,305 µg/m³, trichloroethylene (TCE) was detected in all samples with a maximum concentration of 26,320 µg/m³, and 1,1,1-trichloroethane (TCA) was detected in two soil vapor samples at a maximum concentration of 33 µg/m³. Carbon tetrachloride was not detected in any sample. Concentrations for PCE and TCE were above the monitoring level ranges established within the State DOH soil vapor guidance matrix. Several chlorinated VOCs were detected, with cis-1,2-Dichloroethylene (max of 17,438.1 ug/m³) and trans-1,2-Dichloroethylene (max of 2,060.87 ug/m³) found at elevated concentrations.

Summary of the Remedial Action

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
3. Establishment of Track 4 Site-Specific Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. PCBs hotspot delineation by installation of additional five soil borings to delineate vertically and horizontally a PCB-contaminated, hazardous hot-spot area around soil boring SB-8 (concentrations of PCBs greater than 50 parts per million) in the shallow soils beneath the building at 131-24 Avery Avenue. Since this Site has PCBs greater than 50 ppm in soil, EPA TSCA group must be notified at least 30 days before this self-implementing remedy.
6. Additional Site characterization by installation of three soil borings, two groundwater monitoring wells and three sub-slab vapor implants, and collection and analysis of representative soil, groundwater, sub-slab vapor and indoor air samples to characterize subsurface conditions at the portion of the Site A with the building address of 131-10 Avery Avenue and to evaluate the risk of vapor intrusion and groundwater contamination. This investigation will be conducted prior to start of construction on Site B.
7. Pre-Design sampling at eight locations in order to design an in-situ, groundwater remediation system for treatment of chlorinated solvent-related groundwater contamination at the Site.
8. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).

9. A remedial design document will be prepared and submitted to OER and NYSDEC prior to performance of groundwater treatment and PCB removal actions and for groundwater monitoring program.
10. Installation of the interlocking sheet piles around the north (fronting Avery Avenue), south (to be done by south-adjacent property owner for development of its Site), east, and west excavation perimeter driven vertically to into groundwater table to maintain a barrier to minimize the migration of groundwater onto the Site from surrounding offsite sources of contamination and migration of onsite contamination in groundwater to off-Site.
11. Excavation of VOC hotspot source areas to depths ranging from four feet below grade to development depth, the water table or practical and feasible depth below the water table if necessary. For development, Site B and Lot 61 of Site A will be excavated to a depth of approximately 15 feet below ground surface (bgs) and will achieve the removal of the known VOC hotspot area. Based on the findings additional investigations, the proposed remedy will be modified to address VOC hotspot areas found in Lot 61 of Site A where no excavation is planned as well as other areas of the Site. This remedy will achieve Protection of Groundwater SCOs for all VOCs which exceed GW standards, to the extent feasible.
12. Excavation and removal of PCB hotspot area.
13. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs Site B and Lot 61 of Site A will be excavated to a depth of approximately 15 feet below grade for development purposes. No excavation is planned for the portion of the Site A occupying Lot 61 since the existing on-site building already has a full basement. Based on the findings of additional investigations, the proposed remedy will be modified to address impacted soils in Lot 61 of Site A.
14. Treatment of residual groundwater contamination via injections of a groundwater remediation product to promote chemical reduction of chlorinated solvent-related groundwater contamination at the Site. Following the completion of excavation activities, the groundwater remediation product consisting of an electron donor

(3DMe®) will be applied within the Treatment Zone that had been delineated during the prior Pre-Design sampling. The groundwater remediation product will be injected using direct-push method. After building construction, additional reapplications of the groundwater remediation product, if warranted, will occur via reapplication points that will be installed as part of the new building, basement slab construction.

15. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
16. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
17. Removal of underground storage tanks (USTs) if encountered and closure of petroleum spills (Spill number of existing spill or if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
18. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Transport of PCB impacted soil in accordance with any applicable hazardous waste and TSCA regulations. Appropriate segregation of excavated media on-Site.
19. Collection and analysis of end-point soil samples in accordance with DER 10 (1 bottom sample per 900 square feet and one side wall sample every 30 linear feet) to determine the performance of the remedy with respect to attainment of SCOs. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
20. If feasible, a sub-slab depressurization system will be installed beneath the building basement floor slab and the existing basement floor slab.

21. Installation of a vapor barrier system beneath the building slab as well as behind foundation sidewalls of the proposed building below grade. The vapor barrier system will consist of a Grace Preprufe® 300R and 160R vapor barrier beneath the new building slab and footings as well as behind the foundation sidewalls of the proposed building up to grade.
22. Construction and maintenance of an engineered composite cover consisting of 6” concrete building slab on top of subgrade materials to prevent human exposure to residual soil/fill remaining under the Site.
23. Construction and operation of a cellar parking garage with high volume air exchange in conformance with NYC Building Code at Site A of the Site.
24. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
25. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
26. Post remedial quarterly groundwater monitoring for two years to determine the performance of the remedy with respect to attainment of groundwater quality standards. Five on-Site and three off-Site groundwater monitoring wells will be installed, sampled and analyzed and the results will be evaluated by NYSDEC/OER to determine the need for continued groundwater monitoring or well decommissioning.
27. Submission of an approvable Site Management Plan (SMP) in the Remedial Action Plan (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
28. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.

29. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

NYC VOLUNTARY CLEANUP PROGRAM

131-10 to 131-18 Avery Avenue and 131-24 to 131-32 Avery Avenue,
Queens, NY

NYC VCP SITE NUMBER: 15CVCP137Q

Affiliation	Name	Phone	Email address
OER Project Manager	Sarah Pong	(212) 442-8342	SPong@dep.nyc.gov
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Property Owner	Avery Group LLC & Wilson Realty Management LLC	(516) 698-6717	ctao08@gmail.com
Document Repository	Queens Library – Flushing Branch, 41-17 Main Street, Flushing, New York 11355	(718) 661-1200	
Online Document Repository	http://www.nyc.gov/html/oer/html/repository/RQueens.shtml		

COMMUNITY PROTECTION STATEMENT

The NYC Office of Environmental Remediation (OER) provides governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies, shows the location of identified contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities and also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

Remedial Investigation and Cleanup Plan Under the oversight of the NYC OER, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

Identification of Sensitive Land Uses Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

Qualitative Human Health Exposure Assessment An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

Health and Safety Plan This cleanup plan includes a Construction Health and Safety Plan (CHASP) that is designed to protect community residents and on-Site workers. The elements of this RAWP are in compliance with safety requirements of the United States Occupational Safety and Health Administration (OSHA). This RAWP includes many protective elements including those discussed below.

Site Safety Coordinator This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of the Community Protection Statement.

Worker Training Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

Community Air Monitoring Plan Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a ‘Contingency Plan’).

Odor, Dust and Noise Control This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and include steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

Quality Assurance This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

Stormwater Management To limit the potential for soil erosion and discharge, this cleanup plan has provisions for stormwater management. The main elements of the stormwater management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

Hours of Operation The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation will conform to requirements of Department of Buildings.

Signage While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Voluntary Cleanup Program, provides project contact names and numbers, and a link to the document repository where project documents can be viewed.

Complaint Management The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager, the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

Utility Mark-outs To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

Soil and Liquid Disposal All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations and required permits will be obtained.

Soil Chemical Testing and Screening All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

Stockpile Management Soil stockpiles will be kept covered with tarps to prevent dust, odors and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed to protect storm water catch basins and other discharge points.

Trucks and Covers Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with all laws and regulations.

Imported Material All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on-Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

Equipment Decontamination All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

Housekeeping Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

Truck Routing Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the

property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

Final Report The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for public review online. A link to the online document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document

Long-Term Site Management To provide long-term protection after the cleanup is needed, the property owner will be required to comply with an ongoing Site Management Plan (if Track 1 is not achieved) that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are established through a city environmental designation registered with the Department of Buildings. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

Avery Group LLC & Wilson Realty Management LLC are working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program and in the “E” Designation Program to investigate and remediate a 21,640 square foot property located at 131-10 to 131-18 Avery Avenue (“Site A”) and 131-24 to 131-32 Avery Avenue (“Site B”) in the Flushing section of Queens, New York. A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND BACKGROUND

The Sites are located at 131-10 to 131-18 Avery Avenue (Site A) and 131-24 to 131-32 Avery Avenue (Site B) in the Flushing section in Queens, New York and are identified as Block 5076 and Lots 61, 65, 69 and 75 on the New York City Tax Map. Figure 1 shows the Site location. The four tax lots in total consist of 21,640-square feet and are bounded by Avery Avenue to the north, a 1-story commercial building to the east, a 1-story commercial building to the south, and 131st Street to the west. Site A is comprised of Lots 61 and 65; Site is comprised of Lots 69 and 75. A map of the site boundary is shown in Figure 2. Currently, the Sites are unoccupied but were most recently used as four separate commercial retail stores and contain four 1-story structures. Only the building on Lot 61, with the building address of 131-10 Avery Avenue, has a basement; the other three buildings do not have a basement.

1.2 REDEVELOPMENT PLAN

The proposed future use of both Site A and Site B will consist of one 6-story mixed commercial and possibly residential use building with a full basement. Figure 3 shows the proposed commercial uses of the Site. The total gross square footage of Site A portion of the Site will be 51,936 square-feet. The basement level of Site A will be used for parking. The total gross square footage of Site B will be 34,621 square-feet. The basement level of Site B will be utilized for commercial uses, mechanical equipment rooms, and utility and meter rooms. For both Site A and Site B, the first floor will be used for commercial/retail uses and a community facility lobby, and floors 2 through 6 will be used for community facility uses. For the construction of new basements, soils beneath Site B and the easternmost Lot 61 of Site A, with the current address of 131-18 Avery, will be excavated to approximately 15 feet below grade surface (bgs). No excavation is planned for Lot 61 of Site A since it already has a full basement. Since the existing building on Lot 61 already has a basement, no excavation is required. Therefore, an estimated 7,212 cubic yards (10,820 tons) of soil will be removed from the Site during excavation. Layout of the proposed site development is presented in Figure 3. The current zoning designation is C2-6A, denoting it as a commercial district which is predominantly residential in character. The proposed use is consistent with existing zoning for the property.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Sites are located within a primarily mixed use residential, commercial, and manufacturing area of Queens, New York. The Sites are bounded by a commercial retail store across Avery Avenue to the north, a 1-story commercial building currently enrolled in the NYS DEC Brownfield Cleanup Program to the south, a 1-story commercial building to the east, and 131st Street to the west.

According to the OER Searchable Property Environmental E-Database (SPEED), there are no sensitive receptors (such as schools, hospitals and day-care facilities) within a 500-foot radius of the Sites.

Figure 2 shows the surrounding land usage.

1.4 SUMMARY OF PAST USES AND AREAS OF CONCERN

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 131-10 to 131-32 Avery Avenue*”, dated February, 2015 (RIR).

Based upon the review the two Phase I Environmental Site Assessment (ESA) Reports prepared by National Environmental Services, Inc. (NES) dated August 23, 2013, the Site history was established. The Site consists of four (4) tax lots with a total square footage of 21,640 square feet that are currently vacant, but was most recently used as four separate commercial retail stores and contains four 1-story structures. Historical Sanborn Maps show the Site as undeveloped land prior to 1982. Between 1982 and the present, the Site is shown as developed with the existing structures. Past owners include a discount store, a furniture store, and other commercial businesses.

The AOCs identified for this Site include:

1. A localized presence of trichloroethylene (TCE) and tetrachloroethylene (PCE) in soil in the western portion of the Site B (center of Lot 69).
2. The presence of TCE and PCE in groundwater and soil vapor throughout Site A and Site B.
3. The presence of polychlorinated biphenyls (PCBs) in the shallow soil (zero to 2 feet) throughout Site A and Site B.

Figure 4 shows the areas of concern for soils.

1.5 SUMMARY OF WORK PERFORMED UNDER THE REMEDIAL INVESTIGATION

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);

2. Installed seventeen (17) soil borings across the entire project Site, and collected thirty-five (35) soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed five (5) groundwater monitoring wells throughout the Site to establish groundwater flow and collected five (5) groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed six (6) soil vapor probes around Site perimeter and collected six (6) samples for chemical analysis.

1.6 SUMMARY OF ENVIRONMENTAL FINDINGS

A remedial investigation was performed and the results are documented in a companion document called “Remedial Investigation Report, 131-10 to 131-18 Avery Avenue & 131-24 to 131-32 Avery Avenue”, dated February 2015 (RIR).

1. Elevation of the property is approximately 15 feet.
2. Depth to groundwater ranges from 19.51 to 19.91 feet at the Site.
3. Groundwater flow is generally from northwest to southeast beneath the Site.
4. Bedrock was not encountered during this investigation.
5. The stratigraphy of the Site, from the surface down, consists of 4 feet of urban fill consisting of fine to medium sand with asphalt and ash underlain by 14 feet of native sand.
6. Soil/fill samples results were compared to NYSDEC Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill samples collected during the RI showed concentrations of several VOCs including acetone, a common laboratory contaminant, (max of 0.57 mg/kg), cis-1,2-dichloroethylene (max of 40 mg/kg), tetrachloroethylene (max of 5.7 mg/kg), trans-1,2-dichloroethylene (max of 4.1 mg/kg), trichloroethylene (max of 17 mg/kg), and vinyl chloride (max of 0.15 mg/kg)

exceeding Unrestricted Use SCOs in shallow soil samples. These exceedances occurred mainly in the soil samples taken to delineate the extent of impacted soils at the center of Lot 69. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected including benzo(a)anthracene (max of 1.2 mg/kg), benzo(k)fluoranthene (max of 0.89 mg/kg), chrysene (max of 1.97 mg/kg), dibenzo(a,h)anthracene (0.39 mg/kg), and indeno(1,2,3-cd)pyrene (max of 0.71 mg/kg) exceeding Unrestricted Use SCOs in two samples. Of these, benz(a)anthracene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded Restricted Residential Use SCOs. Two pesticides, 4,4'-DDE (max of 0.079 mg/kg) and 4,4'-DDT (max of 0.21 mg/kg) exceeded Unrestricted Use SCOs. Total PCBs exceeded Restricted Residential Use SCOs in seven shallow soil samples with a max concentration of 54.7 mg/kg. Several metals including arsenic (max of 13.8 mg/kg), chromium hexavalent (max of 1.88 mg/kg), chromium trivalent (max of 31.9 mg/kg), copper (max of 669 mg/kg), lead (max of 412 mg/kg), mercury (max of 1.76 mg/kg), nickel (max of 45.3 mg/kg), selenium (max of 6.68 mg/kg), and zinc (max of 270 mg/kg) exceeded Unrestricted Use SCOs. Of these metals, copper, lead, and mercury also exceeded Restricted Residential Use in two shallow samples.

7. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the investigations showed no pesticides in any sample. Four VOCs, 1,1-Dichloroethane (max of 8 µg/L), cis-1,2-Dichloroethylene (max of 8.4 µg/L), tetrachloroethylene (max of 190 µg/L), and trichloroethylene (max of 27 µg/L) were detected above their respective GQS. Trace concentrations of SVOCs were detected, but none exceeded their GQS. Total PCBs (0.24 µg/L) exceeded GQS in one sample. Several metals were identified in groundwater but only manganese (max of 2,460 µg/L), selenium (max of 31 µg/L), and sodium (max of 147,000 µg/L) exceeded their respective GQS.
8. Soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor

Intrusion dated October 2006. Soil vapor samples collected during the RI showed moderate levels of petroleum-related and high levels of chlorinated VOCs. Total concentrations of petroleum-related VOCs (BTEX) ranged from 9.5 $\mu\text{g}/\text{m}^3$ to 68.26 $\mu\text{g}/\text{m}^3$. Chlorinated VOCs tetrachloroethylene (PCE) was detected in all soil vapor samples ranging from 500 to 18,305.03 $\mu\text{g}/\text{m}^3$, trichloroethylene (TCE) was detected in all samples with a maximum concentration of 26,320.97 $\mu\text{g}/\text{m}^3$, and 1,1,1-trichloroethane (TCA) was detected in two soil vapor samples at a maximum concentration of 33 $\mu\text{g}/\text{m}^3$. Carbon tetrachloride was not detected in any sample. Concentrations for PCE and TCE were above the monitoring level ranges established within the State DOH soil vapor guidance matrix. Several chlorinated VOCs were detected, with cis-1,2-Dichloroethylene (max of 17,438.1 ug/m^3) and trans-1,2-Dichloroethylene (max of 2,060.87 ug/m^3) found at elevated concentrations.

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this site.

2.0 REMEDIAL ACTION OBJECTIVES

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

Groundwater

- Remove contaminant sources causing impact to groundwater.
- Restore groundwater quality to pre-release conditions, to the extent practicable.
- Monitor groundwater improvement in response to contaminant source removal and/or treatment.
- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.
- Prevent off-site migration of contaminated groundwater above applicable groundwater standards.

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.
-

Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process under is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). Remedial alternatives are then developed and evaluated based on the following ten criteria:

- Protection of human health and the environment;
- Compliance with 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;
- Land use; and
- Sustainability.

As required, a Track 1 Unrestricted Use scenario is evaluated for the remedial action. The following is a detailed description of the alternatives analyzed to address impacted media at the Site:

Alternative 1:

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout Site A and Site B, and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. Based on the proposed redevelopment plans, it is expected that this alternative would require excavation to a depth of approximately 15 feet beneath both Sites except for Lot 61 of Site A. Based on the results of the Remedial

Investigation, Alternative 1 would require additional excavation to a depth of approximately to 17 feet beneath northeast and central west portions of Site B. If soil/fill containing analytes at concentrations above Unrestricted Use SCOs is still present at the base of the excavation after removal of all soil required to meet Track 1 Unrestricted Use SCOs, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs.

- Injection of electron donor at the base of an excavation following soil excavation for treatment of chlorinate solvent-related groundwater contamination. The carbon source will be injected using direct-push method. If necessary, additional injections of the electron donor will occur through permanent injection points installed in the new and existing basement floor slab.
- No Engineering or Institutional Controls are required for a Track 1 cleanup; however a vapor barrier system would be installed beneath the new basement slab and behind new foundation sidewalls as a part of development to prevent any potential future exposures from off-Site soil vapor. Additionally, a ventilated parking garage will be installed in the cellar of both buildings, as part of new development.
- Placement of a final cover over the entire Site A and Site B as part of construction.

Alternative 2:

- Establishment of Site-Specific (Track 4) SCOs (listed in Section 4.2).
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-Specific SCOs have been achieved with post-excavation endpoint sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by excavating across the entire Site A and Site B to a depth of approximately 2 feet. However, as part of construction soils across the entirety of both Sites will be excavated to a depth of approximately 15 feet except for Lot 61 of Site A. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation, additional excavation will be performed to meet Track 4 Site-Specific SCOs.
- Injection of electron donor at the base of an excavation following soil excavation for treatment of chlorinated solvent-related groundwater contamination. The carbon source

will be injected using direct-push method. If necessary, additional injections of the electron donor will occur through permanent injection points installed in the new and existing basement floor slab.

- Placement of a composite cover system over the entire Sites to prevent exposure to remaining soil/fill.
- If feasible, a sub-slab depressurization system will be installed beneath the building basement floor slab and the existing basement floor slab.
- Installation of a vapor barrier system beneath the new building slabs and along foundation sidewalls to prevent potential exposures from soil vapor.
- Construction of a ventilated parking garage as part of construction at both Sites.
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval.
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. The SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP.
- The properties will continue to be registered with an E-Designation at the NYC Buildings Department.

3.1 THRESHOLD CRITERIA

Protection of Public Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

Alternative 1 would be protective of human health and the environment by removing all soil/fill exceeding Track 1 Unrestricted Use SCOs and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contamination leaching into groundwater. Alternative 1 also would be protective of environment by treatment of contaminated groundwater to pre-release conditions to the extent practicable.

Alternative 2 would achieve comparable protections of human health and the environment by excavation and removal of most of the historic fill at the Sites and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCOs, as well as by placement of Institutional and Engineering controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan and continuing the E-designation on the property would ensure that the composite cover system remains intact and protective of public health. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater. Alternative 2 also would be protective of environment by treatment of contaminated groundwater to pre-release conditions to the extent practicable.

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan (CHASP), an approved Soil/Materials Management Plan (SMMP) and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors into the new buildings would be prevented by installing a vapor barrier and ventilated parking garage as part of construction.

3.2 BALANCING CRITERIA

Compliance with Standards, Criteria and Guidance (SCGs)

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Protection of Groundwater SCOs and for groundwater through treatment of contaminated groundwater to pre-release conditions to the extent practicable. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system below the new building's basement slab and continuing the vapor barrier around foundation walls, as part of development. In addition, the cellars of the buildings will contain a parking garage with high volume air exchange that conforms to the NYC Building Code.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCOs and for groundwater through treatment of contaminated groundwater to pre-release conditions to the extent practicable. Compliance with SCGs for soil vapor would also be achieved by installing vapor barrier system below the new building's basement slab and continuing the vapor barrier around foundation walls. A Site Management Plan would ensure that these controls remained protective for the long term. In addition, the cellars of the buildings will contain a parking garage with high volume air exchange that conforms to the NYC Building Code.

Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) that comply with the applicable SCGs shall be implemented during Site redevelopment under this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-term effectiveness and impacts

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their short term effects on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of onsite workers.

Both Alternatives 1 and 2 have similar short-term effectiveness during their respective implementations, as each requires excavation of historic fill material and contaminated soils. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short-term impacts could potentially be higher for Alternative 1 since excavation of greater amounts of historical fill material would take place. However, focused attention to means and methods during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 432, 25-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

The potential adverse impacts to the community, workers and the environment would be minimized through implementation of control plans including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) would be protected from on-Site contaminants by wearing personal protective equipment consistent with the documented risks within the respective work zones.

Long-term effectiveness and permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Sites after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of Engineering Controls/Institutional Controls (ECs/ICs) that may be used to manage contaminant

residuals that remain at the Sites and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of ECs.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill above Track 1 Unrestricted Use SCOs and by treatment of contaminated groundwater to pre-release conditions to the extent practicable. Removal of on-Site contaminant sources will prevent future groundwater contamination.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs and by treatment of contaminated groundwater to pre-release conditions to the extent practicable; installing a composite cover system across the Site, maintaining use restrictions, establishing a SMP to ensure long-term management of ICs and ECs, and maintaining registration as an E-designated property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended, assuring that protections designed into the remedy continue to provide the required level of protection.

Both alternatives would result in removal of soil contamination exceeding their respective SCOs, providing the highest level, most effective and permanent remedy over the long-term with respect to a remedy for contaminated soil, which will eliminate any migration to groundwater. Potential sources of soil vapor and groundwater contamination will also be eliminated as part of the remedy.

Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce

the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 Unrestricted Use SCOs and by treatment of contaminated groundwater to pre-release conditions to the extent practicable.

Alternative 2 would remove most of the historic fill at the Site, and all remaining on-Site soil/fill beneath the new buildings will meet Track 4 Site-Specific SCOs and would treat contaminated groundwater to pre-release conditions to the extent practicable.

Alternative 1 would eliminate a greater total mass of contaminants on Site. The removal of soil to 15 feet for the new development in both scenarios would lessen the differences in contaminant mass removal between these two alternatives.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

The techniques, materials and equipment to implement both remedial Alternatives 1 and 2 are readily available and have been proven effective in remediating the contaminants present on each Site. They use standard equipment and technologies that are well established in the industry. The reliability of each remedy is also high. There are no special difficulties associated with any of the activities proposed.

Cost effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Since historic fill at the Sites was found to extend to a depth of up to 4 feet below grade during the RI, and the new buildings require excavation of the entirety of both Sites to a depth of 15 ft, the costs associated with both Alternative 1 and Alternative 2 will likely be the comparable. Costs associated with Alternative 1 could potentially be higher than Alternative 2 if soil with analytes above Track 1 Unrestricted Use SCOs is encountered below the excavation depth required for development. Additional costs would include installation of additional shoring/underpinning, disposal of additional soil, and import of clean soil for backfill. However, long-term costs for Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2. Costs for treatment of contaminated groundwater to pre-release conditions to the extent practicable will likely be comparable for both Alternative 1 and Alternative 2.

The remedial plan would couple the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan will also consider the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during cleanup and redevelopment of the Sites.

Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

. This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 2. Observations here will be supplemented by public comment received on the RAWP. Under both alternatives, the overall goals of the remedial program, to protect public health and the environment and eliminate potential contaminant exposures, have been broadly supported by citizens in NYC communities.

Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and

historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The current, intended, and reasonably anticipated future land use of the Sites and their surroundings are compatible with the selected remedy of soil remediation. The proposed future use of the Sites includes two 6-story commercial/community facility use buildings. Following remediation, the Site will meet either Track 1 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are protective of public health and the environment for its planned commercial use.

The proposed use is compliant with the property's zoning and is consistent with recent development patterns. The area surrounding the sites is urban and consists of predominantly mixed residential and commercial buildings in zoning districts designated for commercial and residential uses. The development would remediate a contaminated lot and replace the current underutilized and vacant buildings with two modern commercial/community use buildings. The proposed development would clean up the property and make it safer, create new employment opportunities, and other economic benefits from land revitalization.

Temporary short-term project impacts are being mitigated through site management controls and truck traffic controls during remediation activities. Following remediation, the Sites will meet either Track 1 Unrestricted Use SCOs or Track 4 Site-Specific SCOs, both of which are protective of public health and the environmental for its planned use.

The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is

located in an urban area with limited proximity to fish or wildlife. Both alternatives would prevent any potential exposure pathways of contaminant migration affecting fish or wildlife. The remedial action is also protective of groundwater natural resources. Municipal water supply wells are not present in this part of City; therefore, groundwater from the Site cannot affect municipal water supply wells or recharge areas. Site A partially lies within in a Federal Emergency Management Agency (FEMA)-designated flood plain, and Site B lies within a flood plain but outside FEMA designated areas. Both alternatives are equally protective of natural resources and cultural resources.

Improvements in the current environmental condition of the property achieved by both alternatives considered in this plan are consistent with the City's goals for cleanup of contaminated land.

Sustainability of the Remedial Action

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in *PlaNYC: A Greener, Greater New York*. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

While Alternative 2 would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. The New York City Clean Soil Bank program is available for reuse of any clean native soils under either alternative. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. A complete list of green remedial

activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix 3.

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

The preferred remedial action alternative is Alternative 2, the Track 4 remedial action. The preferred remedial action achieves protection of public health and the environment for the intended use of the property. The preferred remedial action will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
3. Establishment of Track 4 Site-Specific Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. PCBs hotspot delineation by installation of additional five soil borings to delineate vertically and horizontally a PCB-contaminated, hazardous hot-spot area around soil boring SB-8 (concentrations of PCBs greater than 50 parts per million) in the shallow soils beneath the building at 131-24 Avery Avenue. Since this Site has PCBs greater than 50 ppm in soil, EPA TSCA group must be notified at least 30 days before this self-implementing remedy.
6. Additional Site characterization by installation of three soil borings, two groundwater monitoring wells and three sub-slab vapor implants, and collection and analysis of representative soil, groundwater, sub-slab vapor and indoor air samples to characterize subsurface conditions at the portion of the Site A with the building address of 131-10

Avery Avenue and to evaluate the risk of vapor intrusion and groundwater contamination. This investigation will be conducted prior to start of construction on Site B.

7. Pre-Design sampling at eight locations in order to design an in-situ, groundwater remediation system for treatment of chlorinated solvent-related groundwater contamination at the Site.
8. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
9. A remedial design document will be prepared and submitted to OER and NYSDEC prior to performance of groundwater treatment and PCB removal actions and for groundwater monitoring program.
10. Installation of the interlocking sheet piles around the north (fronting Avery Avenue), south (to be done by south-adjacent property for development of its Site, east and west excavation perimeter driven vertically to into groundwater table to maintain a barrier to minimize the migration of groundwater onto the Site from surrounding offsite sources of contamination and migration of onsite contamination in groundwater to off-Site.
11. Excavation of VOC hotspot source areas to depths ranging from four feet below grade to development depth, the water table or practical and feasible depth below the water table if necessary. For development, Site B and Lot 61 of Site A will be excavated to a depth of approximately 15 feet below ground surface (bgs) and will achieve the removal of the known VOC hotspot area. Based on the findings of additional investigations, the proposed remedy will be modified to address VOC hotspot areas found in Lot 61 of Site A where no excavation is planned as well as other areas of the Site. This remedy will achieve Protection of Groundwater SCOs for all VOCs which exceed GW standards, to the extent feasible.
12. Excavation and removal of PCB hotspot area.

13. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. Since Site B and Lot 61 of Site A will be excavated to a depth of approximately 15 feet below grade for development purposes. No excavation is planned for the portion of the Site A occupying Lot 61 since the existing on-site building already has a full basement. Based on the findings of additional investigations, the proposed remedy will be modified to address impacted soils in Lot 61 of Site A.
14. Treatment of residual groundwater contamination via injections of a groundwater remediation product to promote chemical reduction of chlorinated solvent-related groundwater contamination at the Site. Following the completion of excavation activities, the groundwater remediation product consisting of an electron donor (3DMe®) will be applied within the Treatment Zone that had been delineated during the prior Pre-Design sampling. The groundwater remediation product will be injected using direct-push method. After building construction, additional reapplications of the groundwater remediation product, if warranted, will occur via reapplication points that will be installed as part of the new building, basement slab construction.
15. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
16. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
17. Removal of underground storage tanks (USTs) if encountered and closure of petroleum spills (Spill number of existing spill or if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
18. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Transport of PCB impacted soil in accordance with any applicable hazardous waste and TSCA regulations. Appropriate segregation of excavated media

on-Site.

19. Collection and analysis of end-point soil samples in accordance with DER 10 (1 bottom sample per 900 square feet and one side wall sample every 30 linear feet) to determine the performance of the remedy with respect to attainment of SCOs.
20. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
21. If feasible, a sub-slab depressurization system will be installed beneath the building basement floor slab and the existing basement floor slab.
22. Installation of a vapor barrier system beneath the building slab as well as behind foundation sidewalls of the proposed building below grade. The vapor barrier system will consist of a Grace Preprufe® 300R and 160R vapor barrier beneath the new building slab and footings as well as behind the foundation sidewalls of the proposed building up to grade.
23. Construction and maintenance of an engineered composite cover consisting of 6” concrete building slab on top of subgrade materials to prevent human exposure to residual soil/fill remaining under the Site.
24. Construction and operation of a cellar parking garage with high volume air exchange in conformance with NYC Building Code at Site A of the Site.
25. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
26. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
27. Post remedial quarterly groundwater monitoring for two years to determine the performance of the remedy with respect to attainment of groundwater quality standards. Five on-Site and three off-Site groundwater monitoring wells will be installed, sampled and analyzed and the results will be evaluated by NYSDEC/OER to determine the need

for continued groundwater monitoring or well decommissioning.

28. Submission of an approvable Site Management Plan (SMP) in the Remedial Action Plan (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
29. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
30. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

Track 4 Site- Specific SCOs are proposed for this project. The following are Site-Specific Track 4 SCOs:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	250 ppm
VOCs	Groundwater protection standards
PCBs	1.5 ppm
Lead	800 ppm
Mercury	1.5 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 4. The location of planned excavations is shown in Figure 5.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Soil/Fill Removal Quantities

Lot 65 of Site A and Lots 69 and 75 of Site B will be excavated to a depth of approximately 15 feet below grade. The total quantity of soil/fill expected to be excavated and disposed off-Site is approximately 10,800 tons.

For each disposal facility to be used in the remedial action, a letter from the developer/QEP to the receiving facility requesting approval for disposal and a letter back to the developer/QEP providing approval for disposal will be submitted to OER prior to any transport and disposal of soil at a facility. Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

End-point Sampling

End-point samples will be analyzed for compounds and elements as described below utilizing the following methodology:

Soil analytical methods will include:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs performing end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values.

Confirmation End-point Sampling Removal actions for development purposes under this plan will be performed in conjunction with confirmation end-point soil sampling. Five (5) confirmation end-point samples will be collected from the base of the excavation at locations to

be determined by OER. To evaluate attainment of Track 4 Site-specific SCOs, analytes will include those for which SCOs have been developed, including total SVOCs, PCBs, and metals (including copper, lead, and mercury) according to analytical methods described above. Figure 6 shows the end-point soil sampling locations.

Hotspot End-point Sampling End-point samples will be collected from the sidewalls and base of excavation at two hotspot locations identified in the Remedial Investigation, according to the procedure listed below. As shown on Figure 4, these hotspot areas are located at the portion of the Site with the building address of 131-24 Avery Avenue, and correspond to prior boring locations SB-9 through SB-12 for a hotspot area of VOC-contaminated soils and prior boring location SB-8 for a hotspot area of PCB-contaminated soils. For the VOC hotspot area, sidewall and bottom samples will be analyzed for VOCs according to analytical methods described above. For the PCB hotspot area, sidewall and bottom samples will be analyzed for PCBs according to analytical methods described above.

For any hotspots are identified during this remedial program, including any hotspots identified during the remedial action, hotspot removal actions will be performed to ensure that hot-spots are fully removed and end-point samples will be collected at the following frequency

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
 - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
 - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.

4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation end-point sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

Quality Assurance/Quality Control

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

One blind duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. One trip blank will be submitted to the laboratory with each shipment of soil samples. Trip blanks will not be used for samples to be analyzed for metals, SVOCs or pesticides.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or “cold-paks” to maintain a temperature of 4°C.

Dedicated disposable sampling materials will be used for the collection endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable

equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash withalconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

Import of Soils

Soil import is not planned on this project. If required, import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 4. Imported soil will meet the lower of:

- Track 2 Restricted Residential Use SCO's, and
- Groundwater Protection Standards in Part 375-6.8.

Reuse of Onsite Soils

Soil reuse is not planned on this project.

4.3 ADDITIONAL INVESTIGATIONS

Additional investigations will be conducted as part of the RAWP to achieve the following objectives:

- Characterize subsurface conditions beneath the existing building with the address of 131-10 Avery Avenue where no previous testing could be performed, and evaluate the risk of vapor intrusion (Supplemental Remedial Investigation),

- Delineate the lateral and vertical extent of a hazardous hot-spot area for Polychlorinated Biphenyls (PCBs) found in shallow soils (Hazardous Hot-Spot Area Delineation), and
- Perform Pre-Design sampling to design an in-situ groundwater remediation system for treatment of chlorinated solvent-related groundwater contamination (Pre-Design Investigation).
- PCBs hotspot delineation by installation of additional five soil borings to delineate vertically and horizontally a PCB-contaminated, hazardous hot-spot area around soil boring SB-8 (concentrations of PCBs greater than 50 parts per million) in the shallow soils beneath the building at 131-24 Avery Avenue. Since this Site has PCBs greater than 50 ppm in soil, EPA TSCA group must be notified at least 30 days before this self-implementing remedy.
- Additional Site characterization by installation of three soil borings, two groundwater monitoring wells and three sub-slab vapor implants, and collection and analysis of representative soil, groundwater, sub-slab vapor and indoor air samples to characterize subsurface conditions at the portion of the Site A with the building address of 131-10 Avery Avenue and to evaluate the risk of vapor intrusion and groundwater contamination. This investigation will be conducted prior to start of construction on Site B.
- Pre-Design sampling at eight locations in order to design an in-situ, groundwater remediation system for treatment of chlorinated solvent-related groundwater contamination at the Site.
- Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
- A remedial design document will be prepared and submitted to OER and NYSDEC prior to performance of groundwater treatment and PCB removal actions and for groundwater monitoring program.

The scope and methodology for the additional investigations are described more fully in the subsections below.

Supplemental Remedial Investigation (131-10 Avery Avenue)

The building with the address of 131-10 Avery Avenue has a full basement and occupies an approximate 8,670 square-foot area. No previous testing was performed at this location of the Site due to limited site access and concerns for damage to the existing water barrier beneath the basement floor slab. A Supplemental Remedial Investigation (RI) will be performed as part of the RAWP to characterize subsurface conditions beneath this portion of the Site and to evaluate the risk of vapor intrusion. With these objectives in mind, the following testing will be performed below the basement of the building:

1. Installation of three soil borings to the groundwater, which is estimated to be no deeper than four feet below the bottom of the basement floor slab,
2. Conversion of two of the three soil borings to groundwater monitoring wells, and
3. Collection of three sub-slab vapor, one indoor air, and one outdoor air samples.

A direct-push drilling unit will be utilized for installation of soil borings and/or groundwater monitoring wells. The soil borings will be completed to the groundwater table, which is expected to be no deeper than four feet below the bottom of the basement floor slab (the “Boring Termination Depth”). The evaluation of soil quality at each boring will follow the protocol of the RI and will include continuous screening of soil to the boring termination depth, collection of a minimum of one soil sample from each boring for laboratory analysis, and analysis of the soil samples for TCL VOCs, TCL SVOCs, PCBs and pesticides, and TAL metals. Additional soil samples also will be collected from any depth exhibiting evidence of field contamination.

Groundwater quality will be evaluated by converting two of the three soil borings to permanent groundwater monitoring wells. The groundwater monitoring wells will be constructed of 2-inch, inner diameter Schedule 40 PVC, with a 15-foot slotted PVC screen. The screen will be installed at least 10 feet below and 4-5 feet above the groundwater table. A solid 2-inch PVC riser will extend from the top of the screen to the surface. A sand pack will be placed around the well screens to an elevation of one foot above the screen. A two-foot bentonite will be placed

atop the sand/gravel pack. Cement slurry will be placed around the PVC riser from the bentonite seal to grade. Given the unknown depth of groundwater below the basement floor slab, the aforementioned design for the groundwater monitoring wells is subject to change.

A total of three sub-slab vapor samples, one indoor air, and one outdoor air sample will be collected. Methodologies for the sub-slab vapor and indoor and outdoor air sampling will conform to the NYS DOH Final Guidance on Soil Vapor Intrusion, October 2006. The sub-slab vapor implants will be installed with a portable drill and drill bit. The sub-slab soil vapor probe(s) will be installed to a depth of 2 inches beneath the existing building slab. Sub-slab soil vapor sampling will occur for the duration of 4 hours. Indoor and outdoor air sampling will occur for the duration of 8 hours. Evaluation of the vapor intrusion may be cancelled based on the groundwater depth beneath the building.

Samples will be collected in appropriate sized Summa canisters that have been certified clean by the laboratory and samples will be analyzed by using USEPA Method TO-15. Flow rate for both purging and sampling will not exceed 0.2 L/min. Following sub-slab vapor installation, one to three implant volumes shall be purged prior to the collection of any soil-gas samples. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, sub-slab vapor purge volumes, volume of the sub-slab vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

As part of the vapor intrusion evaluation, a tracer gas will be used in accordance with NYSDOH protocols to serve as a quality assurance/quality control (QA/QC) device to verify the integrity of the soil vapor probe seal. A container (box, plastic pail, etc.) will serve to keep the tracer gas in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer gas prior to sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration. At the conclusion of the sampling round, tracer monitoring will be performed a second time to confirm the integrity of the probe seals.

Figure 7 shows the locations of proposed soil, groundwater, and sub-slab vapor and indoor air sampling in the basement of the building at 131-10 Avery Avenue.

Hazardous Hotspot Area Delineation

Results of the RI showed a hazardous PCB hotspot area in the shallow soils at Site B. This hotspot area coincided with prior soil boring SB-8 installed beneath the floor slab of the building with the address of 131-24 Avery Avenue. Concentrations of PCBs in the shallow soils (0-2 feet bgs) were 54.7 ppm at this boring location.

A direct-push drilling unit will be utilized for the installation of five soil borings to delineate the lateral and vertical extent of PCB hazardous soils at former boring SB-8. Proposed boring SB-19 will be installed in the immediate vicinity of former boring SB-8 to delineate the vertical extent of the PCB contamination at this location. Proposed delineation borings SB-20 through SB-23 will be located approximately 10 feet away from former boring SB-8 and will be installed to a depth of eight feet bgs (“Boring Termination Depth”). Representative soil samples from each delineation boring will be collected every two feet and analyzed for PCBs. Figure 8 shows the location of the delineation borings for the PCB hazardous hot-spot area.

Groundwater Delineation (Pre-Design Investigation)

Results of the RI showed chlorinated solvent-related groundwater contamination at the Site. As explained further in the following section, the proposed groundwater remediation will consist of applying a remediation product to the groundwater in order to enhance the reductive dechlorination process of the chlorinated solvent-related groundwater contamination.

To support remedial design efforts, Pre-Design Investigation will occur at eight direct-push borings installed across the Site. The overall objective of the Pre-Design Investigation will be to delineate the area requiring treatment (the “Treatment Zone”) and to obtain other necessary data that could affect the performance of the Remediation Product.

A direct-push drilling unit will be utilized to install the Pre-Design direct-push borings to a depth of 40 feet bgs (“Boring Termination Depth”), which is 20 feet below the top of the groundwater table. From the groundwater table to the boring termination depth, groundwater sampling will occur every 5 feet (total of five sampling intervals). The groundwater samples will

be collected utilizing a Geoprobe[®] Screen Point 15 sampler or equivalent, which has a 41.5-inch screened intake, at the sampling depth interval. Groundwater sampling will follow low-flow groundwater sampling techniques in accordance with EPA Region 1 Low-Flow Street Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (EQASOP-GW 001 Revision 3 dated July 30 1996, revised January 19, 2010), except that drawdown will not be measured due to the narrow diameter of the sampler.

Relevant geochemical parameters of the groundwater quality will be determined utilizing appropriate field instrumentation and will include measurements of dissolved oxygen (DO), pH, and Oxidation-Reduction Potential (ORP). Representative groundwater samples from each sampling depth will be collected and submitted for analysis for TCL VOCs, sulfate and iron. From some of the Pre-Design direct-push borings, representative soil samples also will be collected at various depths and analyzed for VOCs, sulfate and iron. Figure 9 shows the Pre-Design sampling locations.

4.4 GROUNDWATER REMEDIATION

Enhanced in-situ chemical reduction is the groundwater remediation approach selected for treatment of chlorinated solvent-related groundwater contamination at the Site. The remediation product to promote chemical reduction is 3-D Microemulsion[®] manufactured by Regenesis. The manufacturer has confirmed that this remediation product would be appropriate for the treatment of groundwater contamination found at the Site.

Based on information from the manufacturer, 3-D Microemulsion[®] is an injectable electron donor that promotes anaerobic biodegradation of chlorinated compounds by the enhanced reductive dechlorination (ERD) process. The product has been engineered to propagate widely within the subsurface and produce a staged release of electron donor components over four years. Prior to application at the Site, laboratory bench test or on-site pilot testing may be conducted to further refine design parameters.

The application of the 3-D Microemulsion[®] will be applied to the groundwater by direct-push borings. Since this application is considered to be a Class V Well under the EPA Underground Inject Control (UIC) program, a UIC permit will be obtained prior to use of the Remediation Product at the Site.

Figure 10 shows a preliminary layout of the proposed injection points of 3-D Microemulsion[®] and is based on approximate 15-foot spacing between injection points. The proposed depth of the injections is to a depth of five feet below the groundwater table. The actual number, spacing, and depth of the injections will be based on the findings of the Pre-Design Investigation.

Evaluation of the remedial performance will be accomplished by post-remediation groundwater sampling to be completed in accordance with a Site Management Plan (SMP). The following section presents a summary of the anticipated scope of post-remediation groundwater sampling.

If warranted by the results of post-remediation groundwater sampling (see Section 4.5), additional applications of the 3-D Microemulsion[®] will occur at a network of permanent groundwater reapplication points installed prior to installation of the new building floor slab. Based on information from Regenesys, the reapplication points will be constructed of two-inch diameter PVC, with a 0.02 inch slot screen that extends over the depth of the groundwater requiring treatment. The reapplication points will be placed at both upgradient and downgradient of post-remediation groundwater monitoring wells. Figure 11 shows the locations of the post-development reapplication points.

4.5 POST-REMEDATION GROUNDWATER SAMPLING

In accordance with an SMP, to be prepared after successful implementation of the RAWP, post-remediation groundwater sampling will be conducted to evaluate the performance of the groundwater remedy. The post-remediation groundwater sampling will include five (5) on-site groundwater monitoring wells and three (3) off-site groundwater monitoring wells utilized for the evaluation of a south-adjacent property located at 131-05 and 131-15 Fowler Avenue, which is currently enrolled in the New York State Brownfield Cleanup Program (Site ID C241161). Figure 12 shows the post-remediation groundwater sampling locations for the Site and consists of existing groundwater monitoring wells MW-2, MW-3, and MW-4 and new groundwater monitoring wells MW-1 and MW-5. As shown on Figure 9, MW-2 and MW-3 will serve as an upgradient groundwater wells. Monitoring wells MW1, MW-4, and MW-5 will serve as downgradient groundwater wells.

New groundwater monitoring wells MW-1 and MW-5 will be constructed of a 15-foot, 20-slot PVC screen and will be installed at least ten feet into the groundwater table. These wells will be developed on the day of their installation using dedicated tubing and pump. If warranted by the findings of Pre-Design sampling, additional groundwater monitoring wells at deeper intervals (“nested groundwater monitoring wells”) will be installed.

It is anticipated that post-remediation groundwater sampling will be collected quarterly for two years (eight quarters). The sampling of the off-site groundwater monitoring wells will be performed by others. The on-site groundwater wells will be sampled using low-flow techniques. Representative groundwater samples will be submitted to a New York State Department of Health certified laboratory for TCL VOCs by EPA method 8260.

Post-remediation groundwater monitoring wells at the Site will continue until permission to discontinue is granted in writing by regulatory agencies. After termination of the groundwater monitoring program, the groundwater monitoring wells will be decommissioned in accordance with applicable guidance/regulations.

4.6 ENGINEERING CONTROLS

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the site. The Site has three primary Engineering Control Systems. These are:

- Composite cover system consisting of 6” concrete building slab; and
- Vapor barrier system.
- Sub-grade ventilated garage

Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of:

- A 6” thick concrete building slab beneath the areas of proposed building.

Figure 13 shows the typical design for each remedial cover type used on this Site and the location of each cover type built at the Site.

The composite cover system will be a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soils and Materials Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the Remedial Action Report.

Vapor Barrier System

Migration of soil vapor from on-Site or off-Site sources into the building will be mitigated with a combination of building slab and vapor barrier. The vapor barrier will consist of W.R. Grace & Co. model Preprufe® 300R and 160R. The vapor barrier will be installed prior to pouring the basement's new concrete slab. The vapor barrier will extend throughout the area occupied by the footprints of the new buildings and up the foundation sidewalls to grade in accordance with manufacturer specifications. Penetrations will be grouted if the penetration is not stable, and the membrane will be fitted tight to the penetration. If the membrane is not within 12 mm of the penetration, Preprufe® tape (a self-adhesive 200 mm wide strip) will be used to cover the gap. Bituthene® Liquid Membrane will be applied around the penetrations using a fillet to provide a water tight seal between the Preprufe® membrane and Preprufe® tape. If seams are encountered, Preprufe® tape will be applied. Vertical and horizontal overlaps will be 3 inches. Where applicable, overlap of horizontal and vertical membranes at corners will be 4 inches. Mechanical fastening of overlaps will be in accordance with the manufacturer installation diagram and specifications. The installation of the VBS will be described in the RAR. The Remedial Action Report will include photographs of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturers certificate of warranty.

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The extent of the

proposed vapor barrier membrane is provided in Figure 14. The vapor barrier will not extend beneath the building currently occupying 131-10 Avery Avenue as basement slab of this building will not be disturbed as part of the new development. Product specification sheets are provided in Appendix 6. The Remedial Action Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturers certificate of warranty.

The vapor barrier system is a permanent engineering control and will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying vapor barrier system is disturbed after the remedial action is complete. Maintenance of these systems will be described in the Site Management Plan in the RAR.

Ventilated Garage

A sub-grade ventilated garage with high volume air exchange will be installed and operated in conformance with NYC Building Code.

4.7 INSTITUTIONAL CONTROLS

A series of Institutional Controls (ICs) are required under this remedial action to assure permanent protection of public health by elimination of exposure to residual materials. These ICs define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a Site Management Plan included in the final Remedial Action Report (RAR). Institutional Controls would be:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the SMP which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;

- Submittal of a SMP in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, inspection, and certification of ECs and ICs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3);
- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP; and
- The Site will be used for potentially residential and commercial use and will not be used for a higher level of use without prior approval by OER.

4.8 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the DCR and the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) operation and maintenance of EC's; (3) inspection and certification of EC's.

Site management activities and EC/IC certification will be scheduled by OER on a periodic basis to be established in the RAR and the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 30 of the year following the reporting period.

4.9 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Data and information reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk under current and future conditions by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Contaminant Sources

Urban fill was found throughout the Site from grade to approximately 4 feet. High levels of PCBs were also detected in the shallow soil through Site A and B from 0-2 feet below grade. Additionally, a localized presence of trichloroethylene (TCE) and tetrachloroethylene (PCE) was detected in soil in the western portion of Site B (center of Lot 69) at a depth of 4-6 feet below

grade. TCE and PCE were also detected in groundwater and soil vapor throughout both Site A and B. Based on the results of the RIR, the contaminants of concern are:

Soil:

- Total PCBs exceeded their Restricted Residential SCOs in seven shallow (0-2 ft bgs) soil borings;
- PAHs (including benzo(a)anthracene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) exceeded their Restricted Residential SCOs in two soil borings; and
- Metals (including lead, copper, and mercury) exceeded their Restricted Residential SCOs in two soil borings

Groundwater:

- VOCs including TCE; PCE; cis-1,2-dichloroethylene; and 1,1-dichloroethane exceeded their respective GQS in groundwater;
- Three dissolved metals including manganese, selenium, and sodium were detected above their respective GQS.

Soil Vapor:

- Chlorinated VOCs including TCE and PCE were detected above the mitigation threshold range established by the NYSDOH Final Guidance on Soil Vapor Intrusion

Nature, Extent, Fate and Transport of Contaminants

VOCs, specifically trichloroethylene (TCE) and tetrachloroethylene (PCE), were detected in soil samples at concentrations exceeding their NYSDEC Part 375-6.8 Restricted Residential Use SCOs in a localized presence in the western portion of Site B (the center of Lot 69). SVOCs (PAHs) and metals were detected at concentrations exceeding their Restricted Residential SCOs and are indicative of urban fill. PCBs were found only in shallow (0-2 feet bgs) soil samples exceeding their Restricted Residential SCOs. TCE and PCE were detected in groundwater above their respective GQS. Chlorinated VOCs, particularly TCE and PCE, were also detected in soil

vapor at elevated levels exceeding the mitigation range established by the NYSDOH Soil Vapor Intrusion Guidance document.

Receptor Populations

On-Site Receptors: Because the site is current vacant, the current on-Site receptors are limited to site representatives and visitors granted access to the property. During construction, potential on-Site receptors will include construction works, site representatives, and visitors. Under proposed future conditions, potential on-Site receptors will include future tenants, workers, and visitors.

Off-Site Receptors: Potential off-site receptors within a 500 foot radius of the Site include: adult and child residents; commercial and construction workers; pedestrians; trespassers; and passerby based on the following land uses within 500 feet of the Site:

1. Commercial Businesses – existing and future
2. Residential Buildings – existing and future
3. Building Construction/ Renovation – existing and future
4. Pedestrians, Trespassers, Cyclists – existing and future
5. Schools – existing and future

Potential Routes of Exposure

Three potential primary routes exist by which chemicals can enter the body: ingestion, inhalation, and dermal absorption. Exposure can occur based on the following potential media:

- Ingestion of groundwater or fill/ soil;
- Inhalation of vapors or particulates; and
- Dermal absorption of groundwater or fill/ soil.

Potential Exposure Points

Current Conditions: The site is currently capped with a concrete floor slab. Therefore, there are no potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill. Groundwater, while marginally contaminated with TCE and PCE, is not exposed at the site, and

because the site is served by the public water supply, groundwater is not used at the site for potable supply and there are no potential for exposure. The site is currently vacant, but there is a potential for soil vapor to accumulate beneath the current buildings on site.

Construction/ Remediation Activities: During the remedial action, on-Site workers will come into direct contact with surface and subsurface soils, and groundwater, as a result of on-Site construction and excavation activities. Due to the depth of groundwater, contact with groundwater is expected. On-Site construction workers potentially could ingest, inhale or have dermal contact with any exposed impacted soil, and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan, dust controls, and through the implementation of the Community Air-Monitoring Program and a Construction Health and Safety Plan.

Proposed Future Conditions: Under future remediated conditions, all soils in excess of Track 4 SCOs will be removed for development purposes. The site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and engineering controls (vapor barrier) will prevent any exposure to potential for inhalation via soil vapor intrusion. As a part of the development, there will be a cellar-level ventilated parking garage at both Site A and Site B meeting NYC Department of Building code. The site is served by the public water supply, and groundwater is not used at the site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

Overall Human Health Exposure Assessment

There is a potential complete exposure pathway for the current site soil vapor conditions. There are potential complete exposure pathways that require mitigation during implementation of the remedy. There are no complete exposure pathways under the future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes two commercial structures, an impervious site-wide composite cover system, and a sub-surface vapor barrier system for the buildings. As a part of construction, Site A and B will both have a basement level ventilated parking garage in compliance with NYC Department of Buildings code. Based on this analysis, the complete on-site exposure pathways appear to be

present during current conditions and during construction/remediation phase. Under current conditions, the on-Site exposure pathway exists only for those given access to the Site or trespassers. During the remedial construction, on-Site and off-Site exposures to contaminated dust from historical fill material will be address through dust controls and through the implementation of a Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways from the historical fill, as all soil above Track 4 Site-Specific SCOs will have been removed as a part of development, and a vapor barrier system and composite cover system will be installed at the site. In addition to the vapor barrier system installed the future development, both Site A and B will both have ventilated parking garage in compliance with NYC Department of Buildings code, which will mitigate any future potential vapor intrusion. The composite cover system and use restrictions will prevent contact with residual soil or groundwater and continued protection after the remedial action will be achieved by the implementation of site management including periodic inspection and certification of the performance of remedial controls. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source.

Environmental Media & Exposure Route	Human Exposure Assessment for Proposed Remedial Action
Direct contact with surface and subsurface soils	<ul style="list-style-type: none"> • There is no direct contact with soil because the site will be completely covered with an engineered composite cover. Future contact with soil will be prevented by the implementation of a Site Management Plan and Soil and Materials Management Plan for any future ground intrusive work
Ingestion of groundwater	<ul style="list-style-type: none"> • The area is served by an upstate water supply and groundwater is not being used

	for potable water supply. Groundwater use for potable supply onsite is prohibited by municipal law.
Direct contact with groundwater	<ul style="list-style-type: none"> • There is no direct contact with groundwater because the site will be completely covered with an engineered composite cover. Future contact with groundwater will be prevented by the implementation of a Site Management Plan and Soil and Materials Management Plan for any future ground intrusive work
Direct contact with soil vapor	<ul style="list-style-type: none"> • Contact with soil vapor will be prevented with a soil vapor barrier and a high volume air exchange required by the Building Code for ventilation of the sub-grade parking garage.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Ezgi Karayel (Project Manager) and William Silveri (Sr. Project Manager). The Professional Engineer (PE) and Qualified Environmental Professional (QEP) for this project are Reza Sharif and William Silveri, PG, CHMM, respectively.

For the vapor barrier system installation, Reza Sharif, PE will provide oversight. For the other components of the RAWP, William Silveri, the QEP, will provide oversight.

5.2 SITE SECURITY

Site access will be controlled by a NYC DOB approved construction fence. For the work areas of limited size, barrier tape will be sufficient to delineate and restrict access.

5.3 WORK HOURS

The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. The hours of operation will be conveyed to OER during the pre-construction meeting.

5.4 CONSTRUCTION HEALTH AND SAFETY PLAN

The Health and Safety Plan is included in Appendix 5. The Site Safety Coordinator will be determined prior to construction and reported to OER once determined. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the CHASP. That document will define the specific project contacts for use in case of emergency.

5.5 COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park,

or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- 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 feet 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 feet, 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 shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/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 $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for OER personnel to review.

5.6 AGENCY APPROVALS

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

5.7 SITE PREPARATION

Pre-Construction Meeting

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Mark-Out Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

Dewatering

Dewatering is not anticipated during remediation and construction.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

Stabilized Construction Entrance

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

Truck Inspection Station

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the NYC VCP 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. 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.

Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and

generators will be removed from holes, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the

discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) and will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the OER project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.8 TRAFFIC CONTROL

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is will be reported to OER once determined.

5.9 DEMOBILIZATION

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (e.g., soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

5.10 REPORTING AND RECORD KEEPING

Daily Reports

Daily reports providing a general summary of activities for each day of *active remedial work* will be emailed to the OER Project Manager by the end of the following day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary

mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

Record Keeping and Photo Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

5.11 COMPLAINT MANAGEMENT

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

All changes to the RAWP will be reported to the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
- Determination that the remedial action with the deviation(s) is protective of public health and the environment.

6.0 REMEDIAL ACTION REPORT

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- Text description with thorough detail of all engineering and institutional controls;
- As-built drawings for all constructed remedial elements;
- Manifests for all soil or fill disposal;
- Photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results (including all soil test results from the remedial investigation for soil that will remain on site) and all soil/fill waste characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Full accounting of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material;
- Account of the origin and required chemical quality testing for material imported onto the Site;
- Continue registration of the property with an E-Designation by the NYC Department of Buildings;

- The RAWP and Remedial Investigation Report will be included as appendices to the RAR; and
- Reports and supporting material will be submitted in digital form.

Remedial Action Report Certification

The following certification will appear in front of the Executive Summary of the Remedial Action Report. The certification will include the following statements:

I, Ariel Czemerinski, P.E., am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the 131-10 to 131-18 Avery Avenue Site and 131-24 to 131-32 Avery Avenue Site, site number 15CVCP000Q. I certify to the following:

- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated [date] and Stipulations in a letter dated [date] were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

PE License Number

Signature

Date

PE Stamp

I, William Silveri, am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 131-10 to 131-18 Avery Avenue Site and 131-24 to 131-32 Avery Avenue Site, site number 15CVCP000Q. I certify to the following:

- The OER-approved Remedial Action Work Plan dated [date] and Stipulations in a letter dated [date] were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

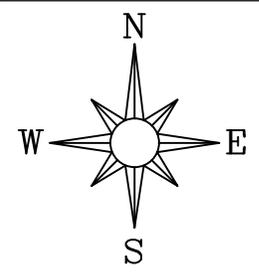
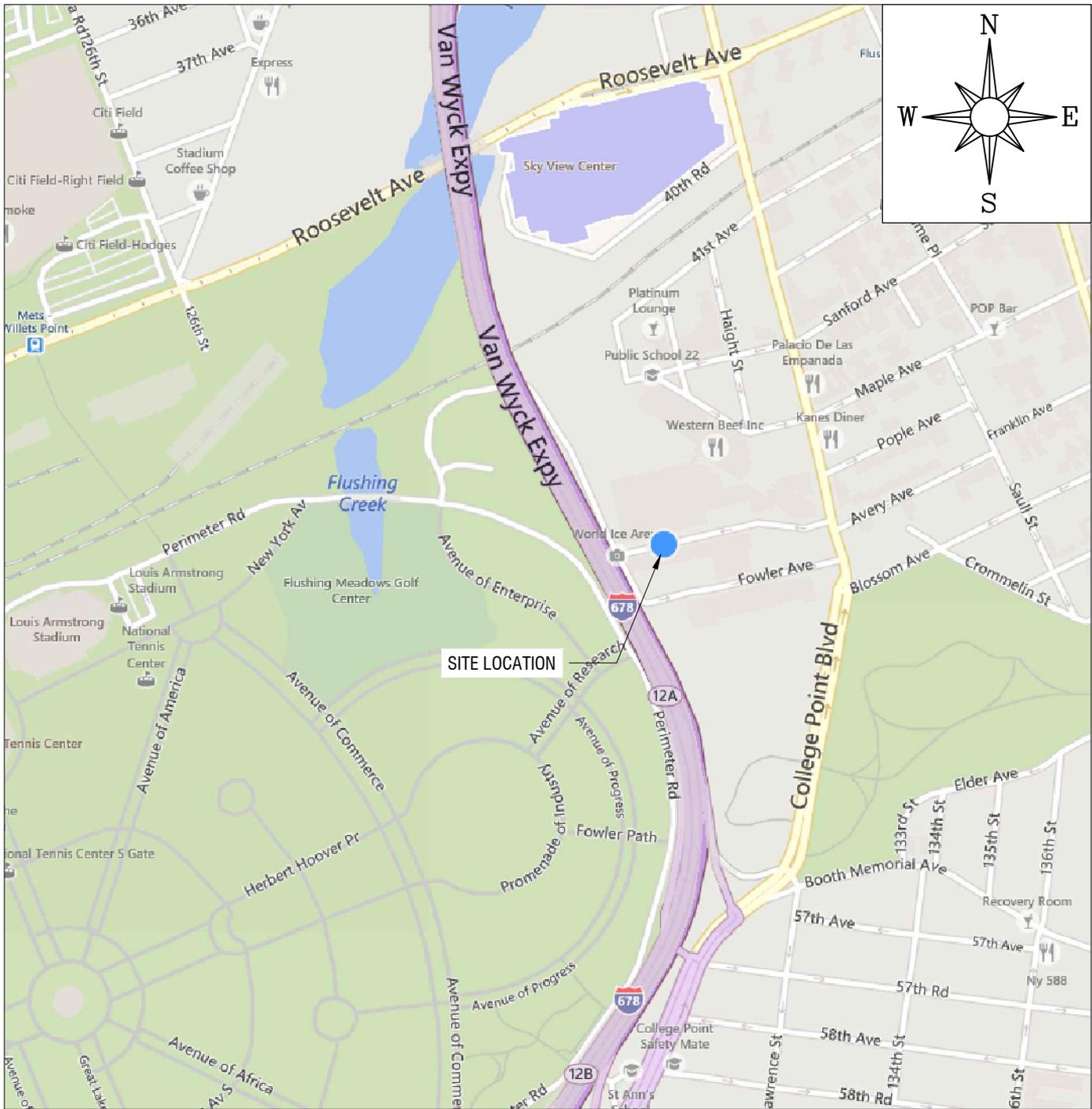
Date

7.0 SCHEDULE

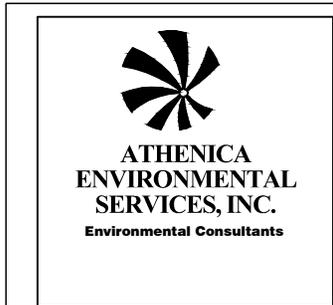
The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 3 to 4 month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	1	1
Remedial Excavation	2	16
Demobilization	18	2
Submit Remedial Action Report	20	4

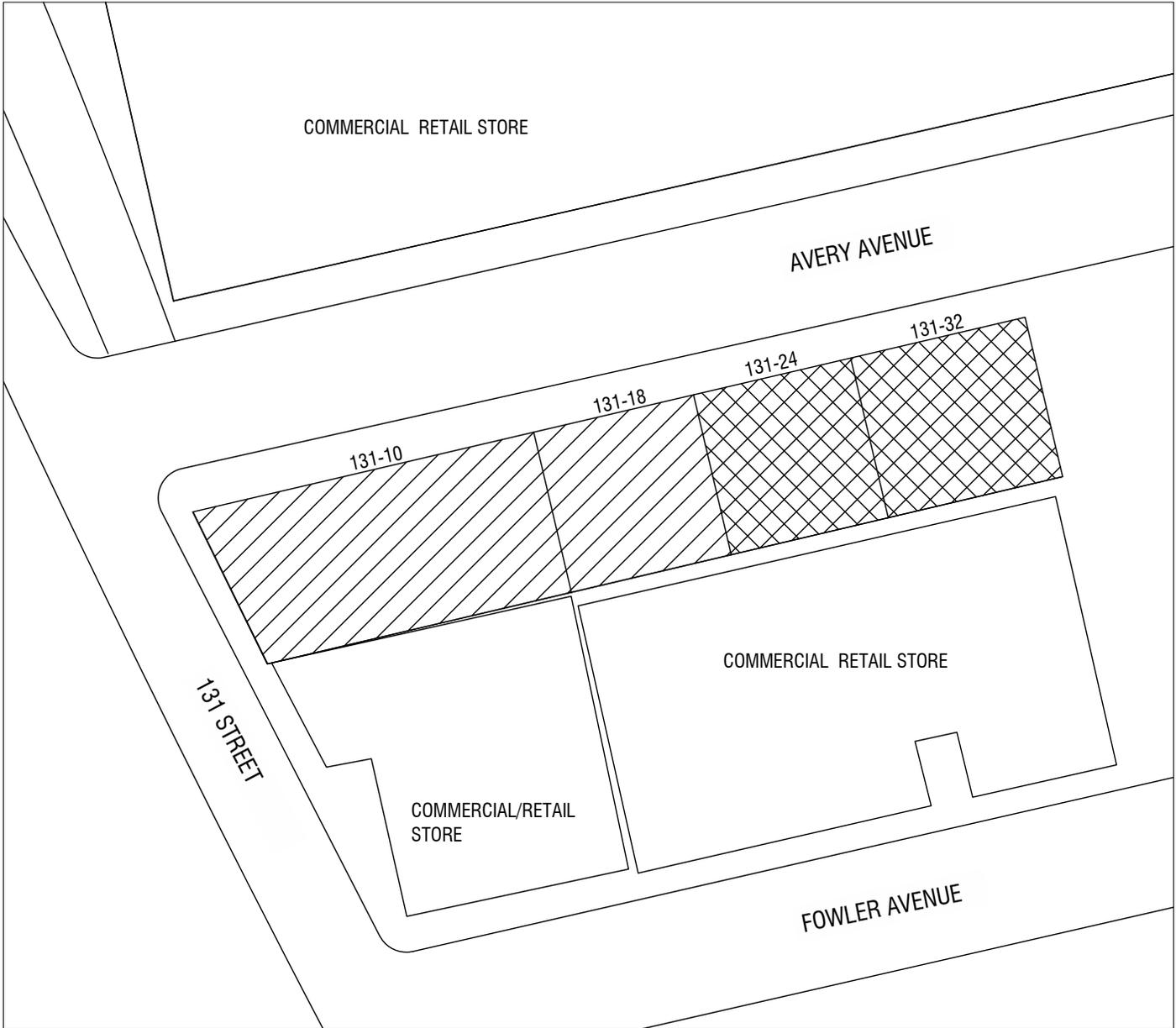
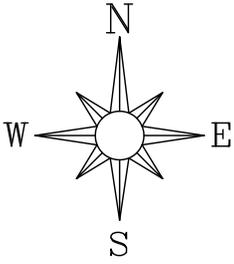
FIGURES



Scale:  500 ft



Drawn by: ALEJANDRO MOREJON	Site Plan: 131-18 to 131-24 AVERY AVENUE FLUSHING, NY 11355
Checked by: ETHAN RAINEY	
Drawing Scale: AS NOTED	
Project No: 14-132-0587	Figure: FIGURE 1 Title: SITE LOCATION MAP
Date: May 29, 2014	

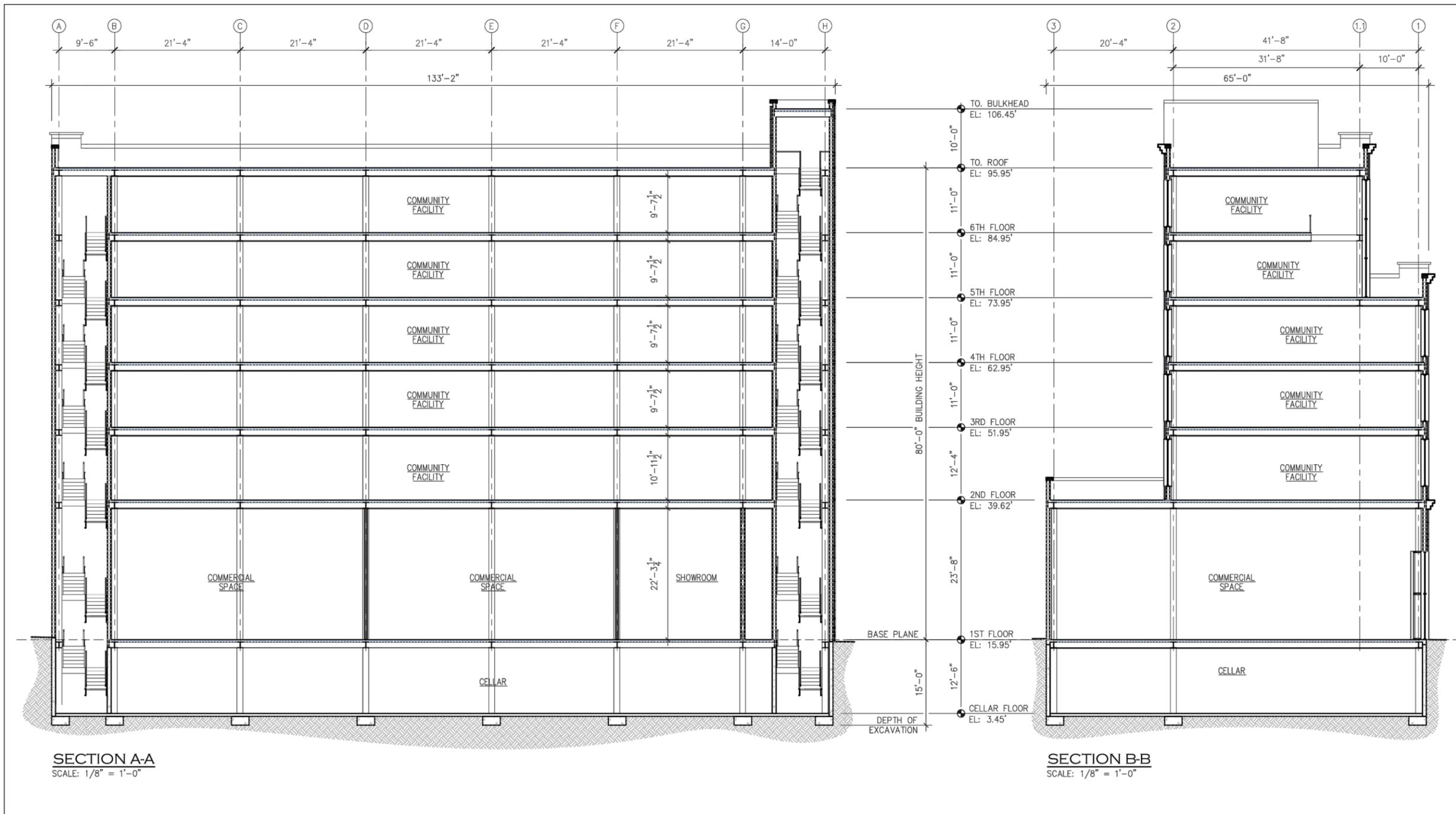


Legend:

	SITE A (131-10 & 131-18 AVERY AVENUE)
	SITE B (131-24 & 131-32 AVERY AVENUE)



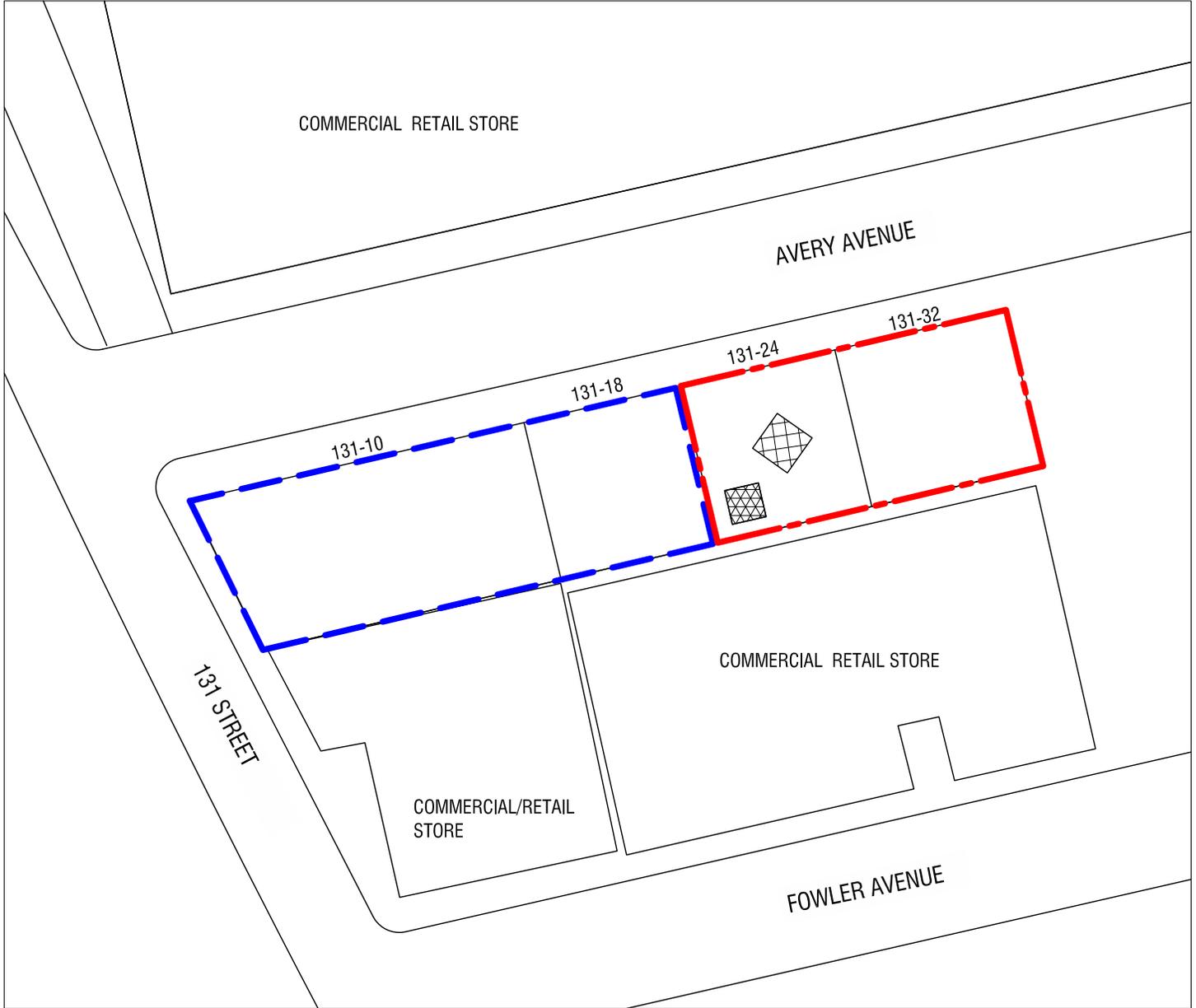
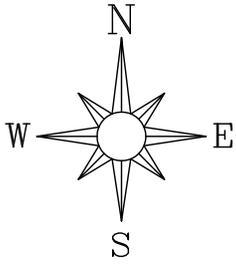
Site map:	131-10 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	2
Title:	SITE BOUNDARY MAP
Date:	JANUARY 12, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	ETHAN RAINEY
Drawing Scale:	AS NOTED
Project No.:	14-133-1270



PROPOSED REDEVELOPMENT PLAN FOR 131-24 AVERY AVENUE (SITE B)



Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	3
Title:	PROPOSED DEVELOPMENT PLAN
Date:	MARCH 06, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270

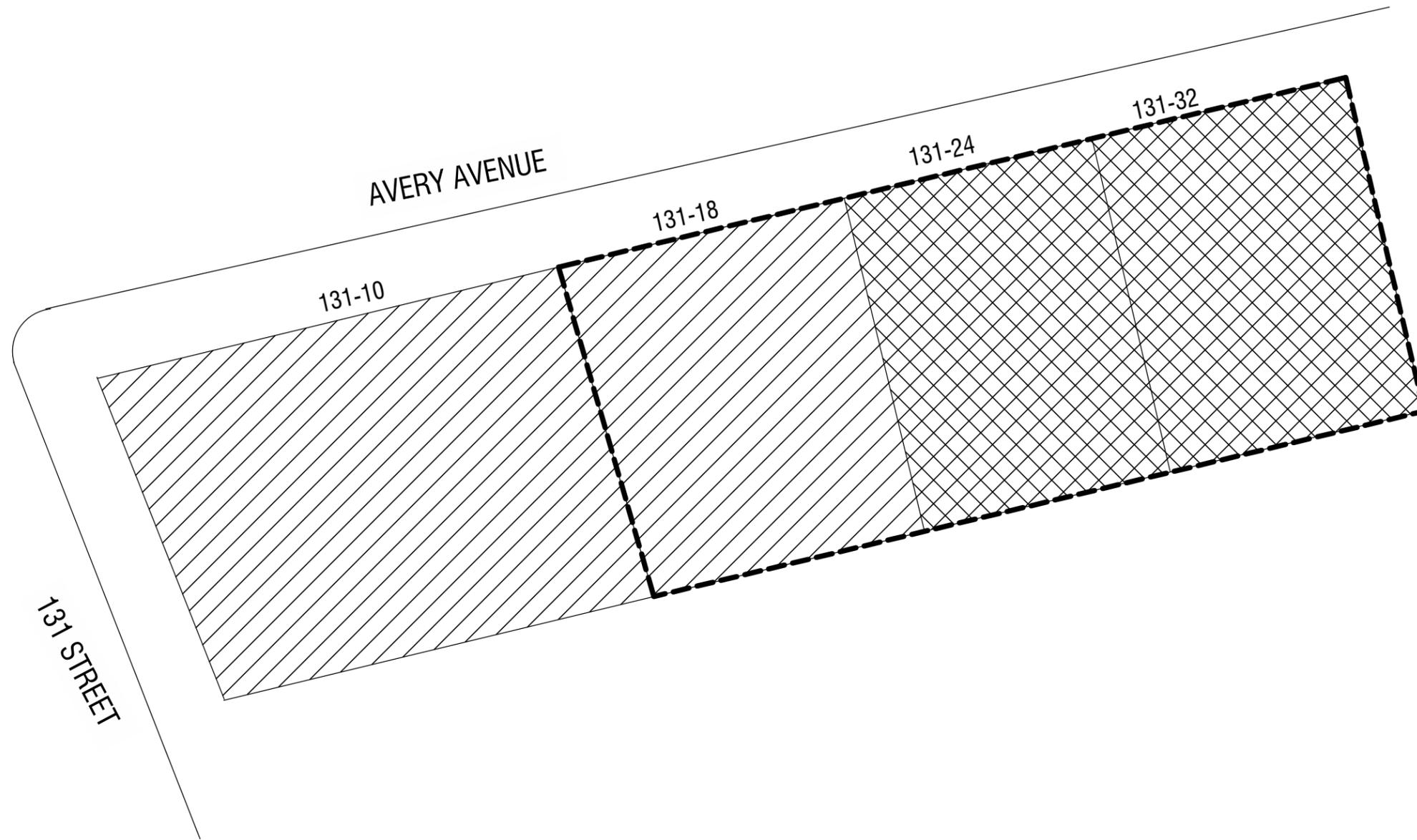
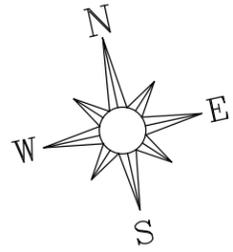


Legend:

	SITE A (131-10 & 131-18 AVERY AVENUE)
	SITE B (131-24 & 131-32 AVERY AVENUE)
	LOCALIZED PCB HAZARDOUS HOT-SPOT AREA IN SOIL TO 2 FEET BGS
	LOCALIZED PCE AND TCE CONTAMINATION IN SOIL TO 6 FEET BGS



Site map:	131-10 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	4
Title:	AREAS OF CONCERN FOR SOIL
Date:	MARCH 6, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	AS NOTED
Project No.:	14-133-1270 & 14-133-1269



Legend:



PROPOSED AREA OF EXCAVATION
TO 15 FEET BELOW GRADE



SITE A (131-10 & 131-18 AVERY AVENUE)

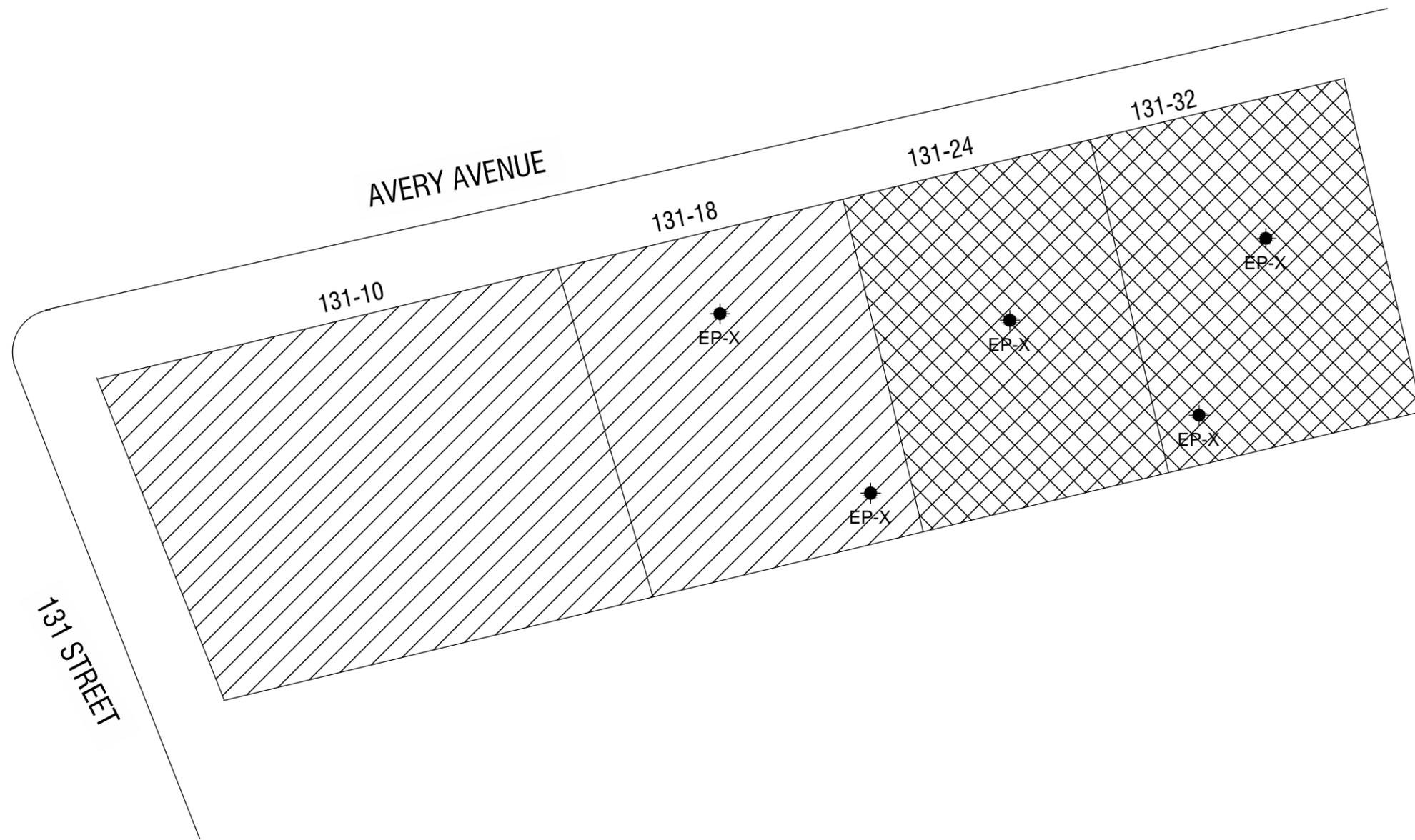
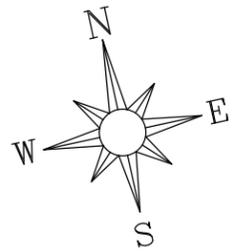


SITE B (131-24 & 131-32 AVERY AVENUE)



**ATHENICA
ENVIRONMENTAL
SERVICES, INC.**
Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	5
Title:	SITE EXCAVATION DIAGRAM
Date:	MARCH 23, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270



Legend:

 END POINT SAMPLING
LOCATION AND
DESIGNATION NUMBER

 SITE A (131-10 & 131-18 AVERY AVENUE)

 SITE B (131-24 & 131-32 AVERY AVENUE)



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SERVICES, INC.**
Environmental Consultants

Site map: 131-18 to 131-32 AVERY AVENUE
FLUSHING, NY 11355

Figure: 6
Title: END-POINT SAMPLE LOCATIONS

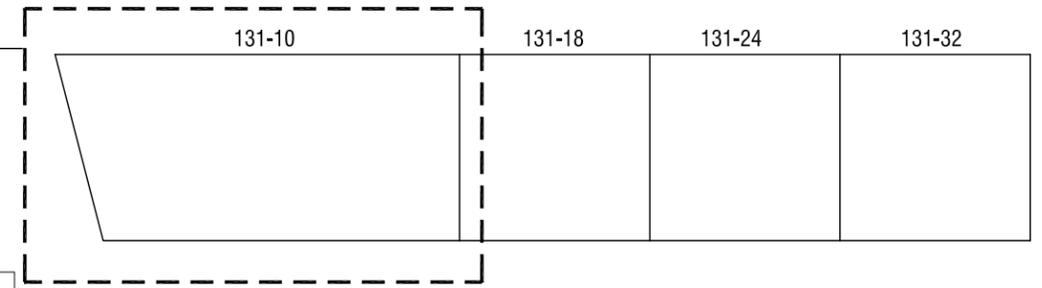
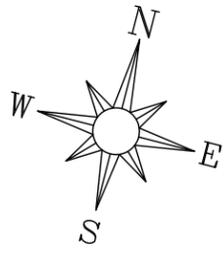
Date: MARCH 23, 2015

Drawn by: MICHAEL MANDAC

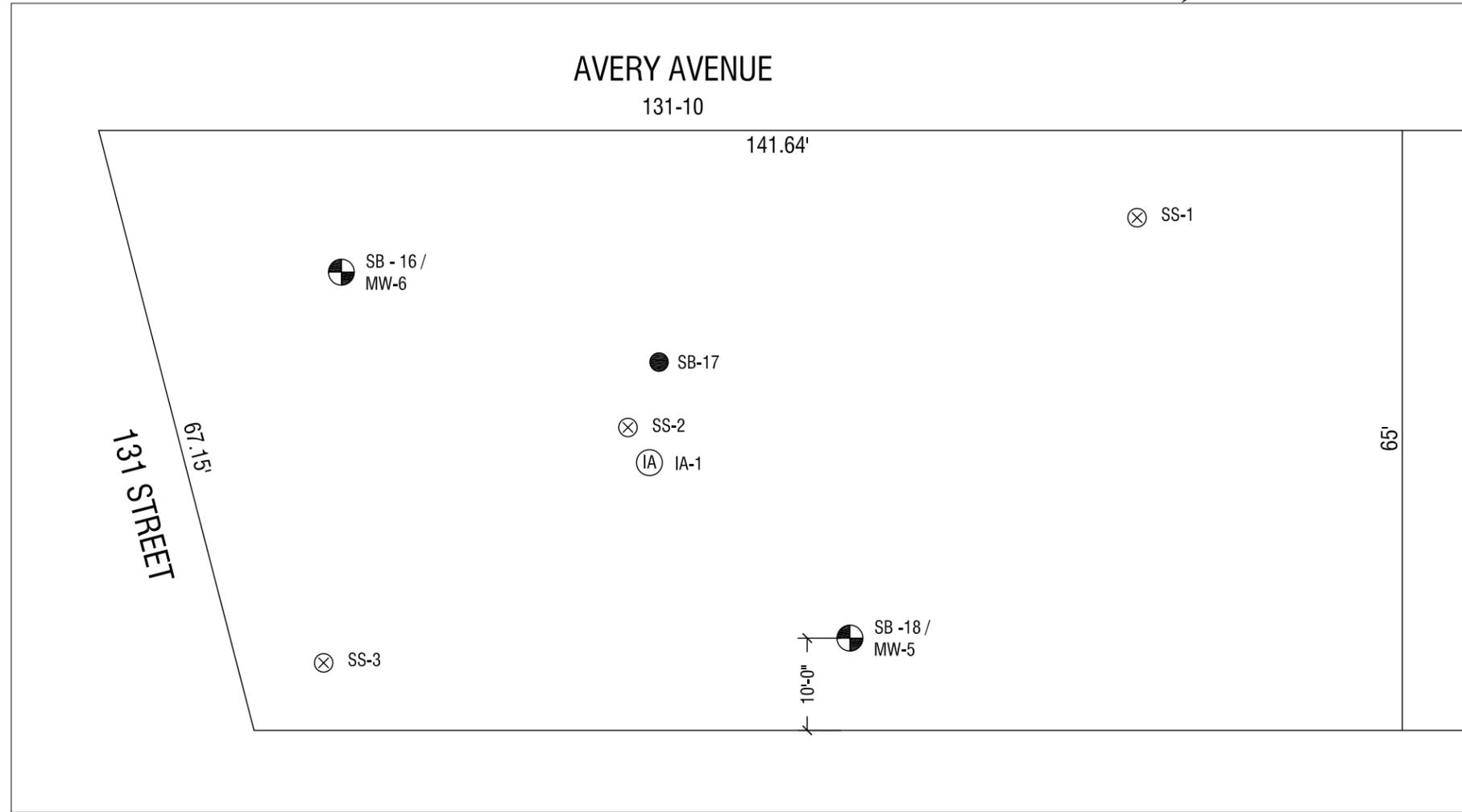
Checked by: EZGI KARAYEL

Drawing Scale: N.T.S.

Project No.: 14-133-1269 & 14-133-1270



INDEX MAP



NOTES:

1. TESTING WILL BE PERFORMED WITHIN ACCESSIBLE AREAS OF THE BASEMENT OF THE EXISTING BUILDING.
2. TESTING LOCATIONS ARE SUBJECT TO CHANGE BASED ON SITE CONDITIONS.

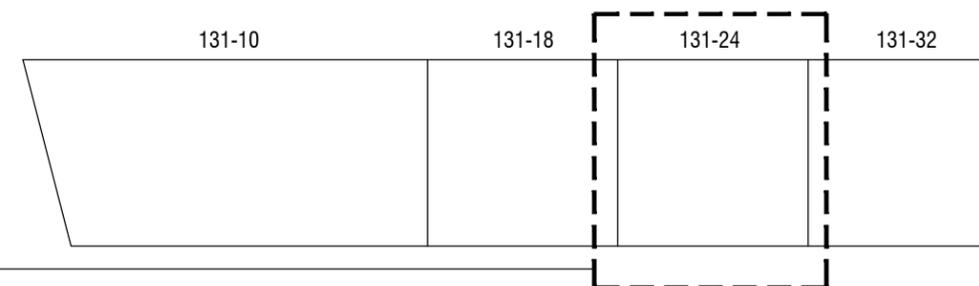
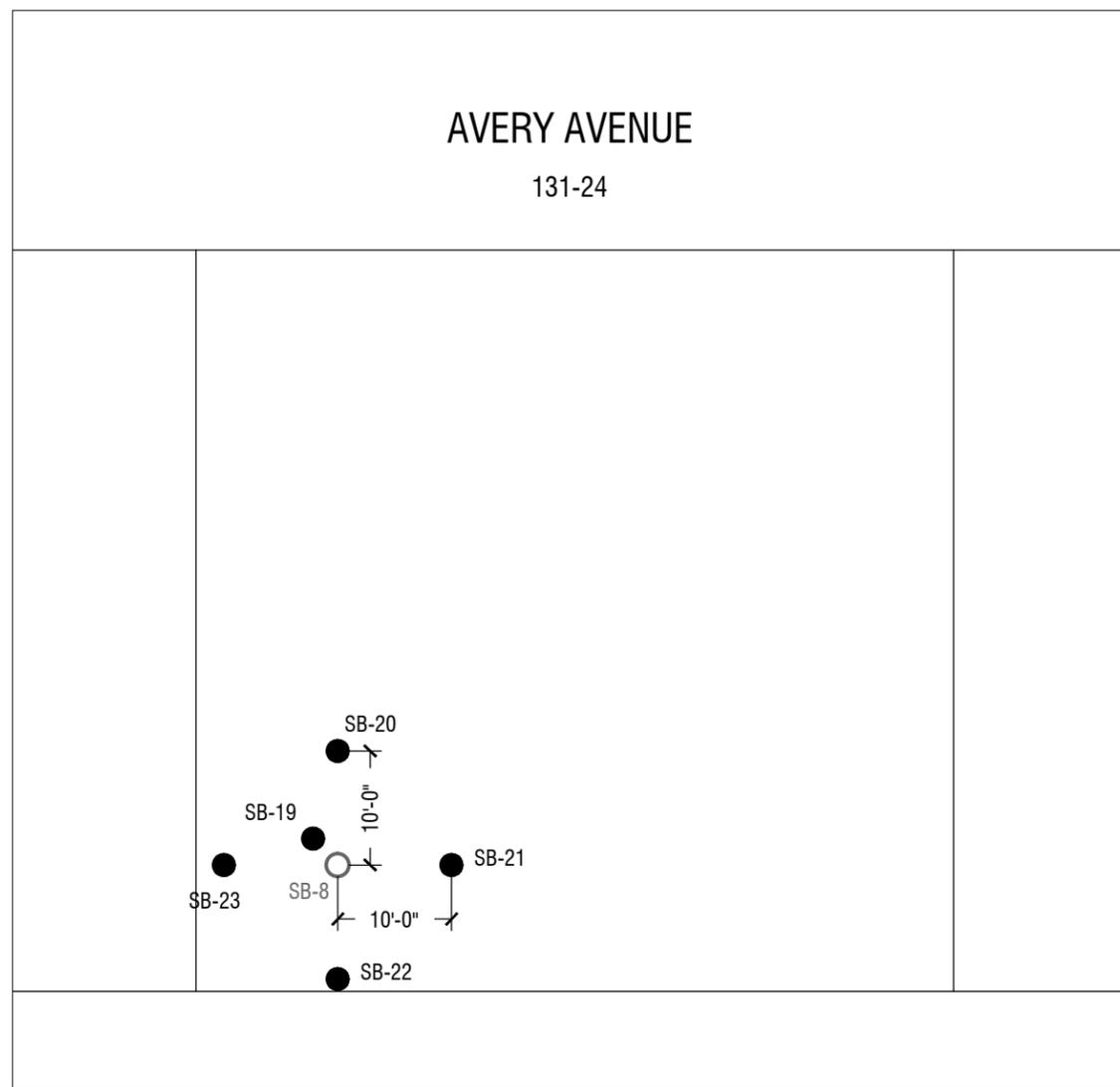
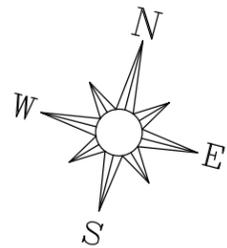
Legend:

- SB-X PROPOSED SOIL BORING LOCATION AND DESIGNATION NUMBER
- (IA) IA-X PROPOSED INDOOR AIR SAMPLING LOCATION AND DESIGNATION NUMBER
- ◐ SB-X /MW-X PROPOSED SOIL BORING / MONITORING WELL LOCATION AND DESIGNATION NUMBER
- ⊗ SS-X PROPOSED SUB-SLAB VAPOR TESTING LOCATION AND DESIGNATION NUMBER

Bar Scale:



Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure: Title:	7 SUPPLEMENTAL REMEDIAL INVESTIGATION FOR 131-10 AVERY AVENUE
Date:	APRIL 14, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	1/16" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



INDEX MAP

NOTES:

1. CONCENTRATION OF PCBs IN THE SHALLOW SOIL SAMPLES (0 - 2 FEET BGS) AT BORING SB-8 WERE FOUND TO BE GREATER THAN 50 PPM.
2. PROPOSED DIRECT-PUSH BORINGS SB-19 THRU SB-23 WILL BE INSTALLED TO 4 FEET BBFS

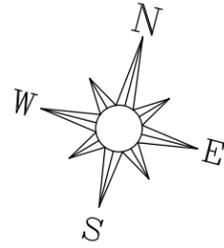
Legend:

- SB-X PROPOSED DELINEATION SOIL BORING LOCATION AND DESIGNATION NUMBER
- SB-8 PRIOR SOIL BORING LOCATION AND DESIGNATION NUMBER
- PPM PARTS PER MILLION
- PCBs POLYCHLORINATED BIPHENYLS
- BBFS BELOW BOTTOM OF SLAB

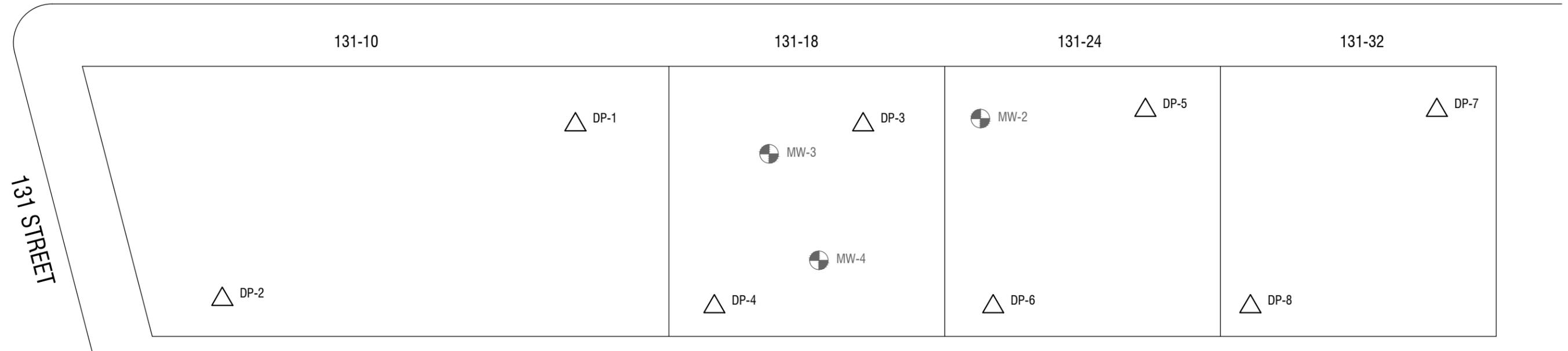
Bar Scale:



Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	8 PROPOSED DELINEATION OF SOIL BORINGS FOR PCB-CONTAMINATED HOT SPOT AREA
Date:	APRIL 08, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	1/16" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



AVERY AVENUE



NOTES:

1. PROPOSED DIRECT-PUSH BORINGS WILL BE INSTALLED TO SUPPORT REMEDIAL DESIGN FOR TREATMENT OF CHLORINATED SOLVENT-RELATED GROUNDWATER CONTAMINATION.
2. DIRECT-PUSH BORINGS WILL BE INSTALLED TO A DEPTH OF 40 FEET BELOW GROUND SURFACE, WHICH IS APPROXIMATELY 20 FEET BELOW THE TOP OF GROUNDWATER.

Legend:

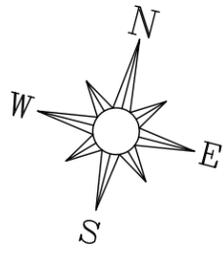
- MW-X EXISTING GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION NUMBER
- DP-X PROPOSED DIRECT-PUSH SOIL AND GROUNDWATER SAMPLING LOCATION TO SUPPORT REMEDIAL DESIGN FOR TREATMENT OF GROUNDWATER CONTAMINATION

Bar Scale:

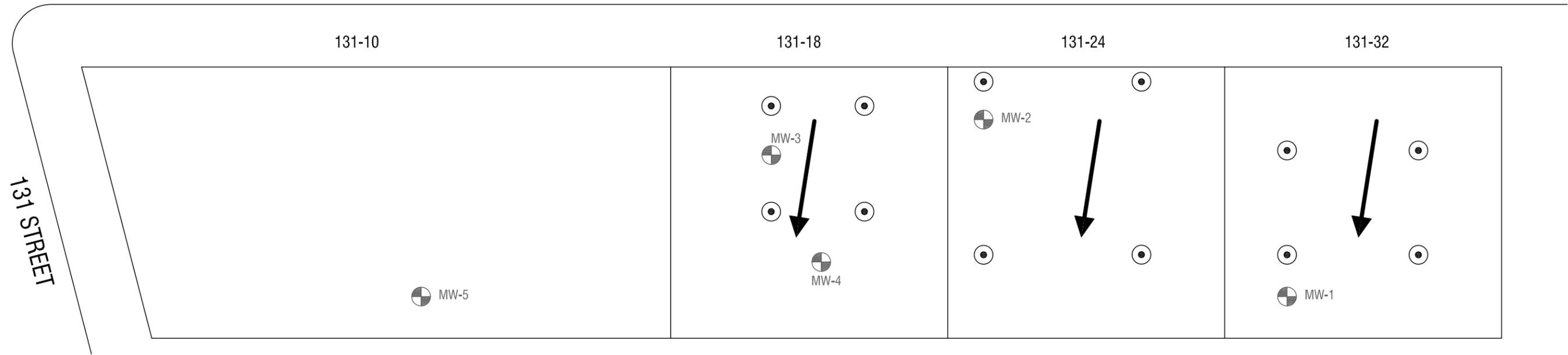


**ATHENICA
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Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	9
Title:	PROPOSED PRE-DESIGN SAMPLING
Date:	APRIL 08, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	5/128" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



EVERY AVENUE



NOTES:

1. THE POST-DEVELOPMENT REAPPLICATION POINTS WILL BE INSTALLED PRIOR TO THE INSTALLATION OF THE NEW BUILDING BASEMENT FLOOR SLAB.
2. NUMBER , LOCATION, AND DEPTH OF REAPPLICATION POINTS ARE SUBJECT TO CHANGE BASED ON RESULTS OF PRE-DESIGN SAMPLING.

Legend:

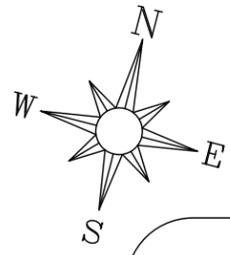
- MW-X POST-REMEDIATION GROUNDWATER MONITORING WELL AND DESIGNATION NUMBER
- GROUNDWATER FLOW DIRECTION
- RP-X POST-DEVELOPMENT REAPPLICATION POINT

Bar Scale:



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 Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure Title:	11 POST-DEVELOPMENT REAPPLICATION POINTS
Date:	APRIL 14, 2015
Drawn by:	ALEJANDRO MOREJON CORTINA
Checked by:	WILLIAM SILVERI
Drawing Scale:	5/128" = 1'-0"
Project No.:	14-133-1269 & 14-133-1270



VERY AVENUE

131-10

131-18

131-24

131-32

131 STREET

MW-5

MW-3

MW-4

MW-2

MW-1

SOUTH ADJACENT PROPERTY

NOTES:

1. ON-SITE POST-REMEDATION GROUNDWATER MONITORING WELLS MW-1, MW-2, MW-3, MW-4 AND MW-6 WILL BE SAMPLED AS PART OF THE RAWP FOR THE SITE.
2. OFF-SITE POST-REMEDATION MONITORING WELLS ON SOUTH-ADJACENT PROPERTY WILL BE SELECTED AT A FUTURE DATE AND WILL BE SAMPLED AS PART OF THE RAWP FOR THE SOUTH-ADJACENT PROPERTY.

Legend:



MW-X

POST-REMEDATION GROUNDWATER MONITORING WELL AND DESIGNATION NUMBER

Bar Scale:



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Site map: 131-18 to 131-32 AVERY AVENUE
FLUSHING, NY 11355

Figure: 12
Title: POST-REMEDATION GROUNDWATER SAMPLING

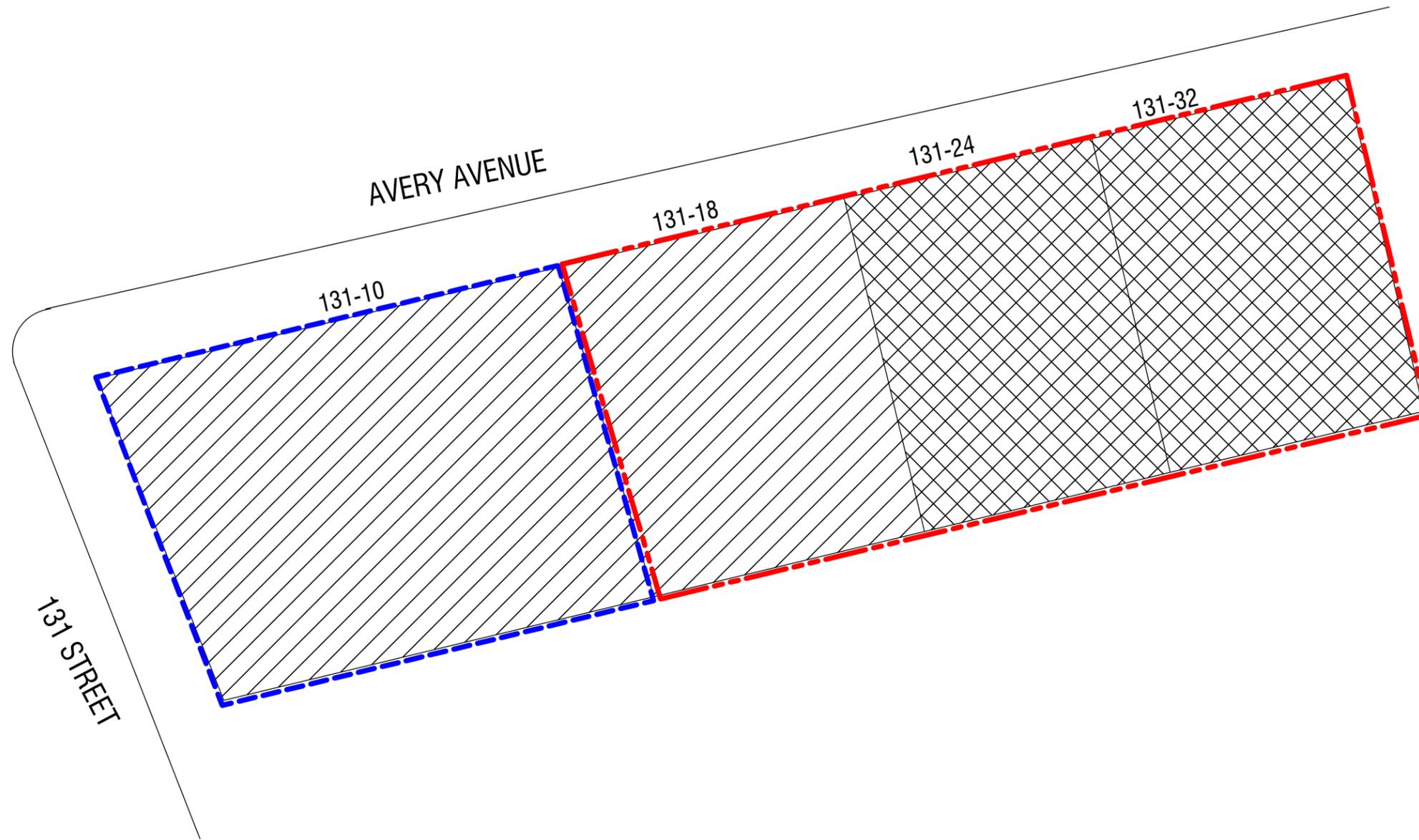
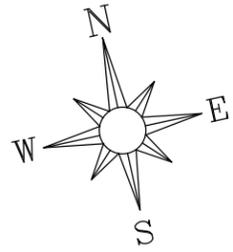
Date: APRIL 14, 2015

Drawn by: ALEJANDRO MOREJON CORTINA

Checked by: WILLIAM SILVERI

Drawing Scale: 5/128" = 1'-0"

Project No.: 14-133-1269 & 14-133-1270



Legend:



6" CONCRETE SLAB BENEATH THE ENTIRE FOOTPRINT OF THE PROPOSED BUILDINGS



SITE A (131-10 & 131-18 AVERY AVENUE)



EXISTING CONCRETE BASEMENT SLAB BENEATH THE ENTIRE FOOTPRINT OF THE EXISTING BUILDING

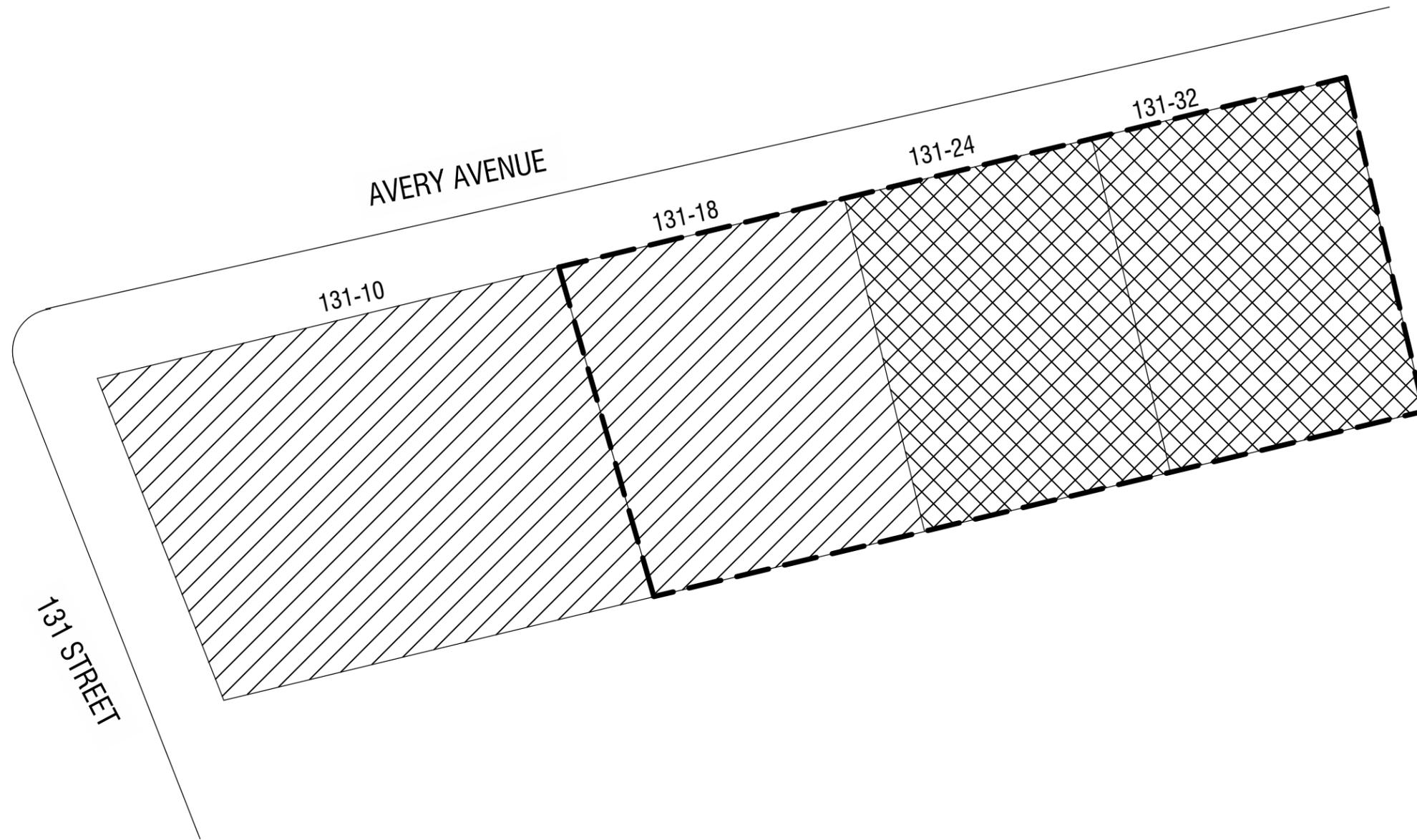
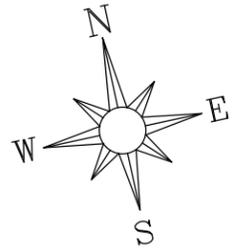


SITE B (131-24 & 131-32 AVERY AVENUE)



**ATHENICA
ENVIRONMENTAL
SERVICES, INC.**
Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	13
Title:	COMPOSITE COVER SYSTEM
Date:	APRIL 07, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270



Legend:



SITE A (131-10 & 131-18 AVERY AVENUE)



SITE B (131-24 & 131-32 AVERY AVENUE)



GRACE 300R VAPOR BARRIER SYSTEM
BENEATH THE ENTIRE 6" CONCRETE
SLAB OF THE BUILDING



**ATHENICA
ENVIRONMENTAL
SERVICES, INC.**
Environmental Consultants

Site map:	131-18 to 131-32 AVERY AVENUE FLUSHING, NY 11355
Figure:	14
Title:	VAPOR BARRIER DIAGRAM
Date:	APRIL 07, 2015
Drawn by:	MICHAEL MANDAC
Checked by:	EZGI KARAYEL
Drawing Scale:	N.T.S.
Project No.:	14-133-1269 & 14-133-1270

TABLES

Table 1
Soil Cleanup Objectives (SCOs)

Contaminant	CAS Number	NYSDEC Part 375-6 SCOs for Unrestricted Use (ppm)
Volatile Organic Compounds		
1,1,1-Trichloroethane	71-55-6	0.68
1,1-Dichloroethane	75-34-3	0.27
1,1-Dichloroethene	75-35-4	0.33
1,2-Dichlorobenzene	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.02
cis-1,2-Dichloroethene	156-59-2	0.25
trans-1,2-Dichloroethene	156-60-5	0.19
1,3-Dichlorobenzene	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1
Acetone	67-64-1	0.05
Benzene	71-43-2	0.06
Butylbenzene	104-51-8	12
Carbon tetrachloride	56-23-5	0.76
Chlorobenzene	108-90-7	1.1
Chloroform	67-66-3	0.37
Ethylbenzene	100-41-4	1
Hexachlorobenzene	118-74-1	0.33
Methyl ethyl ketone	78-93-3	0.12
Methyl tert-butyl ether	1634-04-4	0.93
Methylene chloride	75-09-2	0.05
n-Propylbenzene	103-65-1	3.9
sec-Butylbenzene	135-98-8	11
tert-Butylbenzene	98-06-6	5.9
Tetrachloroethene	127-18-4	1.3
Toluene	108-88-3	0.7
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene	95-63-6	3.6
1,3,5-Trimethylbenzene	108-67-8	8.4
Vinyl chloride	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26
Semivolatile Organic Compounds		
Acenaphthene	83-32-9	20
Acenaphthylene	208-96-8	100
Anthracene	120-12-7	100
Benz(a)anthracene	56-55-3	1
Benzo(a)pyrene	50-32-8	1
Benzo(b)fluoranthene	205-99-2	1
Benzo(g,h,i)perylene	191-24-2	100
Benzo(k)fluoranthene	207-08-9	0.8
Chrysene	218-01-9	1
Dibenz(a,h)anthracene	53-70-3	0.33
Fluoranthene	206-44-0	100
Fluorene	86-73-7	30
Ideno(1,2,3-cd)pyrene	193-39-5	0.5
m-Cresol	108-39-4	0.33
Naphthalene	91-20-3	12
o-Cresol	95-48-7	0.33
p-Cresol	106-44-5	0.33
Pentachlorophenol	87-86-5	0.8
Phenanthrene	85-01-8	100
Phenol	108-95-2	0.33
Pyrene	129-00-0	100

Table 1
Soil Cleanup Objectives (SCOs)

Contaminant	CAS Number	NYSDEC Part 375-6 SCOs for Unrestricted Use (ppm)
Pesticides/PCBs		
2,4,5-TP Acid (Silvex)	93-72-1	3.8
4,4'-DDE	72-55-9	0.0033
4,4'-DDT	50-29-9	0.0033
4,4'-DDD	72-54-8	0.0033
Aldrin	309-00-2	0.005
alpha-BHC	319-84-6	0.02
beta-BHC	319-85-7	0.036
Chlordane (alpha)	5103-71-9	0.094
delta-BHC	319-86-8	0.04
Dibenzofuran	132-64-9	7
Dieldrin	60-57-1	0.005
Endosulfan I	959-98-8	2.4
Endosulfan II	33213-65-9	2.4
Endosulfan sulfate	1031-07-8	2.4
Endrin	72-20-8	0.014
Heptachlor	76-44-8	0.042
Lindane	58-89-9	0.1
Polychlorinated biphenyls	1336-36-3	0.1
Metals		
Arsenic	7440-38-2	13
Barium	7440-39-3	350
Beryllium	7440-41-7	7.2
Cadmium	7440-43-9	2.5
Chromium hexavalent	18540-29-9	1
Chromium trivalent	16065-83-1	30
Copper	7440-50-8	50
Total Cyanide		27
Lead	7439-92-1	63
Manganese	7439-96-5	1600
Total Mercury		0.18
Nickel	7440-02-0	30
Selenium	7782-49-2	3.9
Silver	7440-22-4	2
Zinc	7440-66-6	109

APPENDICES

APPENDIX 1
PROPOSED DEVELOPMENT PLANS

131-10 TO 131-18 AVERY AVENUE
&
131-24 TO 131-32 AVERY AVENUE



PERFECTIVE NOTE:
RENDERING IS FOR ILLUSTRATION PURPOSES ONLY AND NOT
TO BE USED FOR CONSTRUCTION.

PROPOSED NEW:
MIXED USE BUILDING
131-10 AVERY AVE.
QUEENS, NY 11355

D R A W I N G L I S T

- | | | |
|--|-------------------------------------|---|
| 1. T-001.00 - TITLE SHEET | 5. A-003.00 - 2ND-3RD FLOOR PLANS | 9. A-007.00 - FRONT BUILDING ELEVATIONS |
| 2. Z-001.00 - ZONING INFO, PLOT PLAN & LEGENDS | 6. A-004.00 - 4TH FLOOR PLAN | 10. A-008.00 - BUILDING ELEVATIONS & SECTIONS |
| 3. A-001.00 - CELLAR/FOUNDATION FLOOR PLAN & DETAILS | 7. A-005.00 - 5TH-6TH FLOOR PLAN | 11. N-001.00 - GENERAL NOTES |
| 4. A-002.00 - 1ST FLOOR PLAN & DETAILS | 8. A-006.00 - ROOF & BULKHEAD PLANS | |

T.F. CUSANELLI & FILLETTI
ARCHITECTS, P.C.
143 TERRACE STREET
HAWORTH, N.J. 07641
201-364-9595
N.J. R.A. LIC # 07976, 16378



PROPOSED NEW:
COMMERCIAL & COMM. FAC. BUILDING
131-10 AVERY AVENUE
QUEENS, NY 11355

REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM:	DATE

DRAWN BY:	JOB NO.
JM	1433NJ
CHECKED BY:	DATE:
VF	09.23.14

DWG. TITLE :

TITLE SHEET

PAGE NUMBER
1 OF 11

BSCAN STICKER

T-001.00.

ZONING CALCULATIONS

PREMISE: 131-10 AVERY AVE. FLUSHING, NY MAP NO.: 10B
 BLOCK: 5076 ZONE(S): C2-6A
 LOT: 61, 65 LOT AREA: 12,984 S.F.

AREAS AND LOT COVERAGE

LOT COVERAGE						
		MAX SF. PERMITTED	PROPOSED SF.	PROPOSED F.A.R.		
TOTAL LOT AREA:	12984.07					
RES. LOT COVERAGE(%)	0.00	0.00	0.00	0.00		
	0.80	10387.26				
FLOOR AREA (F.A.R.)						
COMMUNITY FACILITY F.A.R.	4.00	51936.28	40842.92	3.15		
COMMERCIAL F.A.R.	2.00	25968.14	11093.08	0.85		
MAX BLDG. F.A.R. ALLOWED	4.00					
			TOTAL F.A.R.	4.00		
FLOOR AREA BREAKDOWN						
	ACT. AREA	DEDUCTIONS	COMMERCIAL	COMMUNITY FACILITY	TOTAL Z.F.A.	UNITS PER FLOOR
CELLAR	0.00	0.00	0.0	0.0	0.00	
1ST FLOOR	11587.00	0.00	11093.08	493.9	11587.00	0
2ND FLOOR	9377.00	0.00	0.0	9377.00	9377.00	0
3RD FLOOR	9377.00	0.00	0.0	9377.00	9377.00	0
4TH FLOOR	9377.00	0.00	0.0	9377.00	9377.00	0
5TH FLOOR	6109.00	0.00	0.0	6109.00	6109.00	0
6TH FLOOR	6109.00	0.00	0.0	6109.00	6109.00	0
	51936.00	0.00	11093.08	40842.92	51936.00	0
TOTAL ZONING FLOOR AREA	51936.00		51936.28			0.3
			MAX ALLOWABLE			AVAILABLE

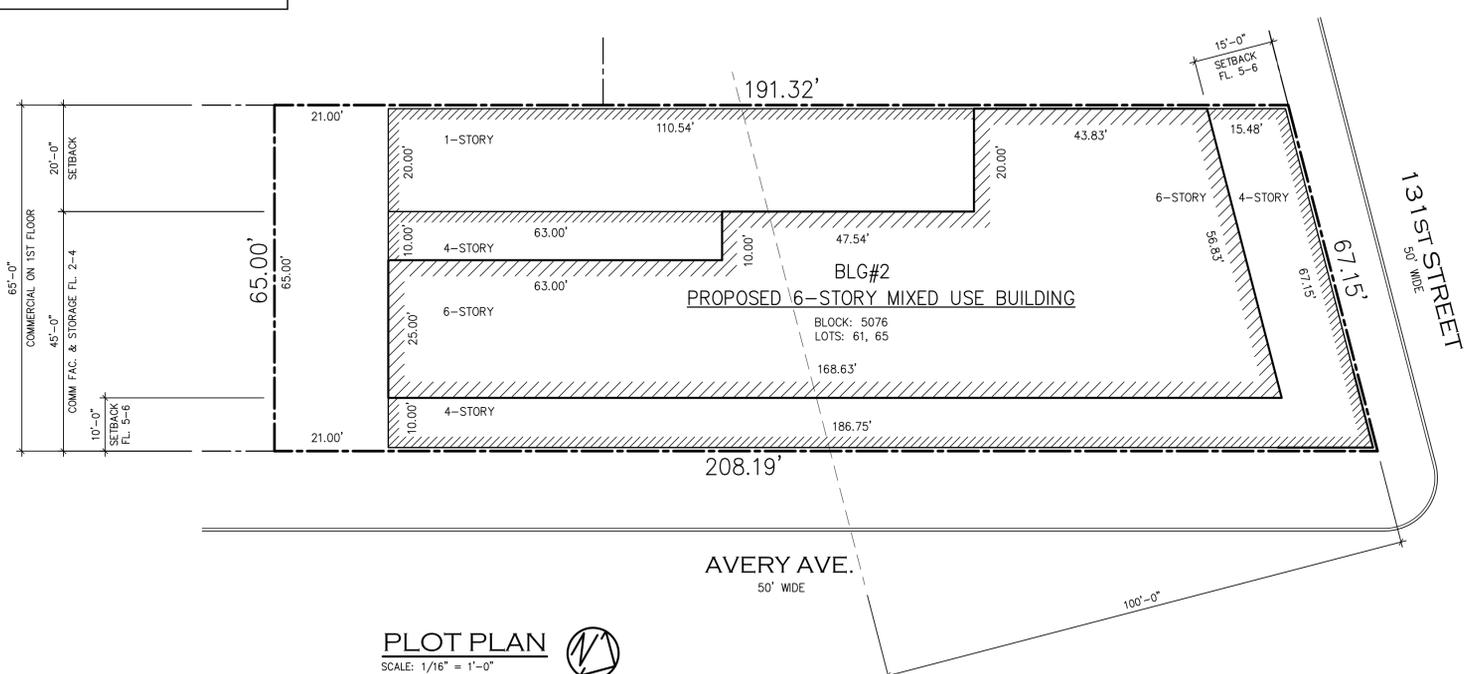
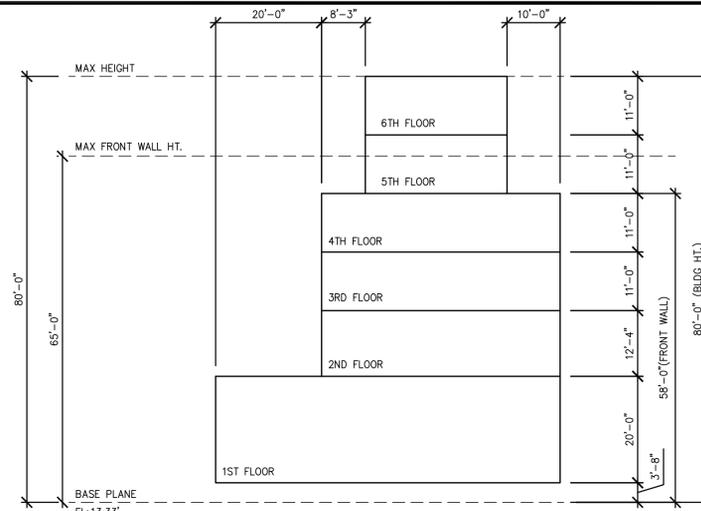
SEC. 33-122			
FLOOR AREA RATIO BY COMMERCIAL DISTRICT	MAX. PERMITTED	PROPOSED	
TOTAL LOT AREA	= 12,984		
F.A.R.			
2.0 X 12,984	= 25,968	25,968	11,587
SEC. 33-123			
FLOOR AREA RATIO BY COMMUNITY FACILITY	MAX. PERMITTED	PROPOSED	
F.A.R.			
4.0 X 12,984	= 51,936	51,936	51,936
SEC. 33-432			
HEIGHTS AND SETBACKS	MAX. PERMITTED	PROPOSED	
MAXIMUM HEIGHT OF FRONT WALL	65'	56'	
MAXIMUM BUILDING HEIGHT	80'	80'	
FRONT SETBACK (WIDE STREET)	10'	10'	
FRONT SETBACK (NARROW STREET)	15'	15'	
SIDE YARD SETBACK	0'	0'	
REAR YARD SETBACK	20'	20'	
PERMITTED OBSTRUCTION		1-STORY BLDG MAX 23' IN HEIGHT	

LIST OF ABBREVIATIONS

A/C ASPH. AVG. A.F.F. ACT. A.D.	AIR CONDITIONER ASPHALT AVERAGE ABOVE FINISHED FLOOR ACTUAL AREA DRAIN	B.S.M.T. BOARD B.C. BOTTOM OF CURB B.R.G. BEARING B.O. BOTTOM OF BOTTOM B.P. BASE PLATE	CAB. CABINET C.F.M. CUBIC FEET PER MINUTE C.L. CEILING C.O. COLUMN C.M.U. CONCRETE MASONRY UNIT C.O. CLEAN OUT E. CENTER LINE C.J. CEILING JOIST C.T. COLLAR TIES C.W. CLOTHES WASHER CONC. CONCRETE DET. DETAIL DIAM. DIAMETER DRWG. DRAWING DN. DOWN D.W. DISH WASHER	ELEV. ELEVATION EXH. EXHAUST EXT. EXTERIOR EA. EACH E.W. EACH WAY F.B. FACE BRICK F.O.S. FACE OF STUDS FIN. FINISH F.P. FIRE PROTECTED FTG. FOOTING FND. FOUNDATION FL. FLOOR F.C. FIRE CODE F.P.S.C. FIRE PROT. SOLID CORE F.D. FLOOR DRAIN F.A.I. FRESH AIR INTAKE	G.C. GENERAL CONTRACTOR GL.BLK. GLASS BLOCK GYP.BD. GYPSUM WALL BOARD GA. GAUGE GR. GRADE	HDR. HEADER H.V.A.C. HEAT/VENT/A-C H.D. HEAVY DUTY H.T. HEIGHT H.C. HOLLOW CORE H.M. HOLLOW METAL H.B. HOSE BIB H.S. HOSE	INSUL. INSULATION INV. INVERT KIT. KITCHEN KITTE. KITCHENETTE K.S. KITCHEN SINK LDR. LEADER L.G. LEGAL GRADE MFR. MANUFACTURER MAS. MASONRY M.O. MASONRY OPENING MISC. MISCELLANEOUS M.L. MICROLAM (GEORGIA PACIFIC) MTL. METAL N.T.S. NOT TO SCALE N.B. NON BEARING O.C. ON CENTER O.D. OUTSIDE DIAMETER PART. PARTITION P.LAM. PLASTIC LAMINATE PL. PLATE PLY. PLYWOOD P.V.C. POLY VINYL CHLORIDE P.C.F. POUNDS PER CUBIC FEET P.S.F. POUNDS PER SQUARE FOOT P.S.I. POUNDS PER SQUARE INCH P.P. PROPERTY LINE	RAD. REF. REGISTER R.O.W. RIGHT OF WAY R. RISER R.D. ROOF DRAIN R.M. ROOM R.O. ROUGH OPENING R.L. ROOF LEADER	SEC. SECTION SIM. SIMILAR S.C. SOLID CORE S.S. SMOKE DETECTOR S.L. STRUCLAM (WILLAMETTE) SQ. SQUARE SPEC. SPECIFICATION S.P. SOLE PLATE STR. STRUCTURAL STR. SOIL STACK TEL. TELEPHONE THK. THICKNESS T & G TONGUE AND GROOVE T.O.S. TOP OF SLAB T.R.D. TREAD T.C. TOP OF CURB T.O. TOP OF T.O.P. TOP OF PLATE TYP. TYPICAL V.S. VENT STACK W.C. WATER CLOSET W/ WITH W/O WITHOUT WD. WOOD W.W.M. WELDED WIRE MESH X.H.C.I. EXTRA HEAVY CAST IRON
---------------------------------	--	---	---	--	---	---	---	---	---

ELECTRICAL LEGEND

⊕	DUPLEX RECEPTACLE
⊕ _{G.F.A.}	DUPLEX RECEPTACLE WITH GROUND FAULTED INTERRUPT
⊕	LOCAL SWITCH (DIMMER)
⊕ ₃	3 WAY SWITCH (DIMMER)
⊕	STANDARD TELEPHONE OUTLET
⊕	MODEM LINE FOR COMPUTER
⊕	JUNCTION BOX
⊕	INCANDESCENT DOWNLIGHT FIXTURE
⊕ _{S.D.}	SMOKE DETECTOR TO BE HARD WIRED AND INTERCONNECTED
⊕ _{C.O./S.D.}	COMB. CARBON MONOXIDE & SMOKE DET. TO BE HARD WIRED AND INTERCONNECTED
⊕	SURFACE MOUNTED FIXTURE
⊕	EXTERIOR WALL MOUNTED FIXT.
⊕	EXIT LIGHT
⊕	CABLE TV HOOK UP
⊕	EXHAUST FAN W/ LIGHT OPTIONAL
⊕	PROGRAMMABLE THERMOSTAT



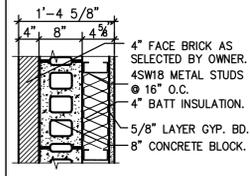
MATERIALS SCHEDULE

[Pattern]	BRICK
[Pattern]	CONCRETE BLOCK
[Pattern]	POURED CONCRETE
[Pattern]	INSULATION: BATTEN
[Pattern]	INSULATION: RIGID
[Pattern]	STEEL OR METAL
[Pattern]	GRANULAR FILL
[Pattern]	STONE
[Pattern]	WOOD: FINISH
[Pattern]	WOOD: FRAME

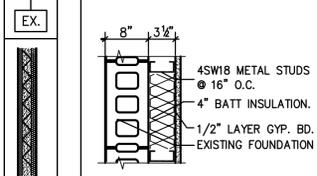
KEY TO SYMBOLS

[Symbol]	ROOM NAME
[Symbol]	ROOM NUMBER
[Symbol]	FINISH SCHEDULE CODE
[Symbol]	1ST DIGIT: FLOOR/BASE
[Symbol]	2ND DIGIT: WALLS/WANSOAT
[Symbol]	3RD DIGIT: CEILING
[Symbol]	CEILING HEIGHT
[Symbol]	DOOR TYPE
[Symbol]	HARDWARE SET
[Symbol]	THRESHOLD TYPE
[Symbol]	WINDOW TYPE
[Symbol]	INTERIOR ELEVATION DESIG.
[Symbol]	ELEVATION NUMBER
[Symbol]	DRAWING NUMBER
[Symbol]	CROSS REFERENCE
[Symbol]	BUILDING SECTION DESIG.
[Symbol]	SECTION NUMBER
[Symbol]	DRAWING NUMBER
[Symbol]	CROSS REFERENCE
[Symbol]	DETAIL DESIGNATION
[Symbol]	DETAIL NUMBER
[Symbol]	DRAWING NUMBER
[Symbol]	CROSS REFERENCE

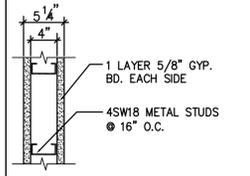
EXTERIOR WALL



TYPICAL FURRING DETAIL



TYPICAL PARTITION



ROOM FINISH MATERIAL CODE LIST

FLOOR/BASE	WALLS/WANSOAT	CEILING	REMARKS
0 EXPOSED STRUCTURE W/ SLAB SEALANT	0 EXPOSED STRUCTURE NO FINISH	0 EXPOSED STRUCTURE NO FINISH	
1 VINYL ASPHALT TILE / 4" WOOD BASE	A GYPSUM BOARD W/ VINYL WALL COVERING	1 GYPSUM BOARD W/ PAINT FINISH (CROWN MOLDING TO BE SELECTED BY OWNER)	
2 VINYL ASPHALT TILE / 4" VINYL BASE	B GLASS	2 5/8" TYPE "X" F.C. GYPSUM BD. (SEE REMARK)	1 HOUR RATED
3 CARPET / 6" WOOD BASE	C GLASS BLOCK	3 SUSPENDED GYPSUM BOARD W/ PAINT FINISH	
4 CARPET / 4" VINYL BASE	D CERAMIC TILE	4 SUSPENDED ACOUSTICAL TILE	
5 HARDWOOD FLOOR / 4" VINYL BASE	E GYPSUM BOARD W/ PAINT FINISH / CER. TILE @ 4'-0"	5 SUSPENDED METAL	
6 HARDWOOD FLOOR WOOD BASE	F PLASTER ON METAL LATH	6 CERAMIC TILE	
7 CERAMIC TILE / CERAMIC TILE BASE	G ARCHITECTURAL PANELING	7 LUMINOUS PANEL IN SUSPENDED CEILING	
8 CERAMIC TILE / WOOD BASE	H BRICK	8 CEMENT PLASTER	
9 QUARRY TILE / 6" VINYL BASE	I EXPOSED CONC. BLOCK W/ PAINT FINISH	9	
10 QUARRY TILE / 6" WOOD BASE	J GYPSUM BOARD W/ PAINT FINISH	10	
11 QUARRY TILE / QUARRY BASE	K	11	
12 RUBBER FLOOR / 4" VINYL BASE	L	12	
13 SLATE/6" WOOD BASE	M	13	

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 201-384-9595
 N.J. R.A. LIC # 07976, 16378



PROPOSED NEW : COMMERCIAL & COMM. FAC. BUILDING
 131-10 AVERY AVENUE
 QUEENS, NY 11355

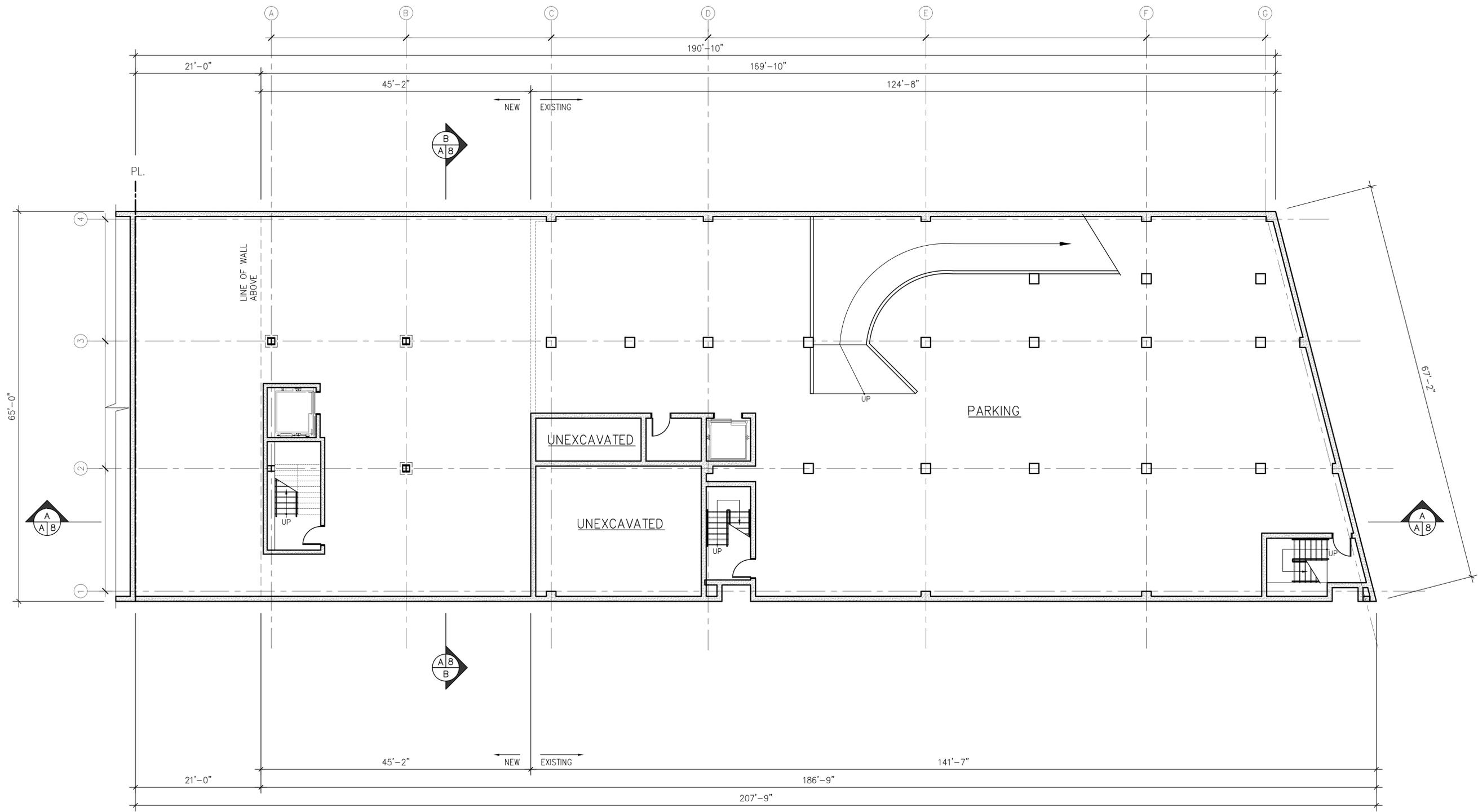
REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM	DATE

DRAWN BY:	JM	JOB NO.	1433NJ
CHECKED BY:	VF	DATE:	09.23.14

DWG. TITLE :
ZONING INFO. & PLOT PLAN

PAGE NUMBER
 2 OF 11



CELLAR FLOOR PLAN
 SCALE: 1/8" = 1'-0"

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ISSUES	JOB NO.

DRAWN BY:	JOB NO.
JM	1433NJ

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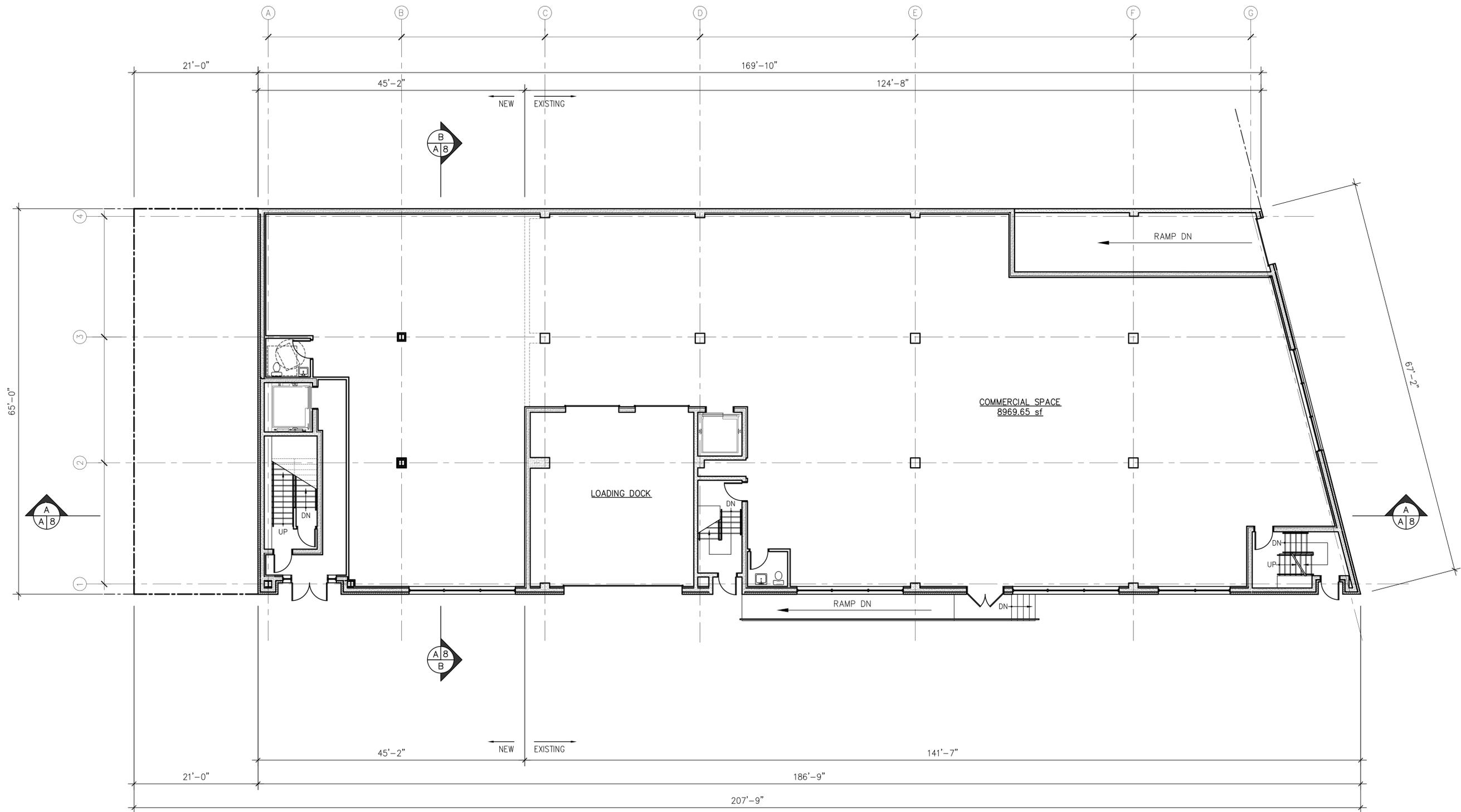
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CELLAR/ FOUNDATION FLOOR PLAN & DETAILS

PAGE NUMBER
3 OF 11

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BSCAN STICKER

A-001.00.



FIRST FLOOR PLAN
 SCALE: 1/8" = 1'-0"

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ISSUES	JOB NO.

ISSUES	DATE

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JM	1433NJ

CHECKED BY:	DATE
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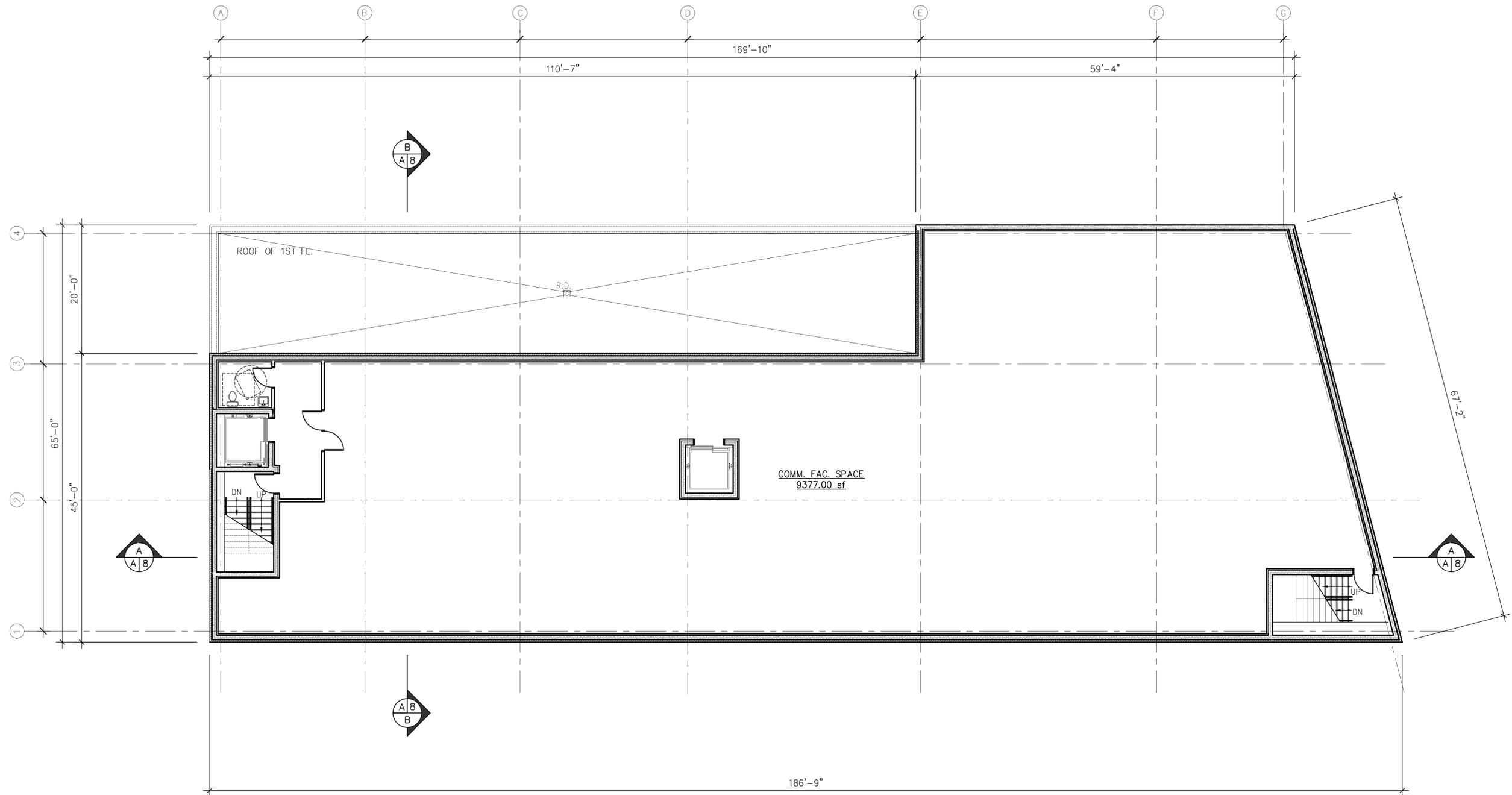
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1ST FLOOR PLAN & DETAILS

PAGE NUMBER
4 OF 11

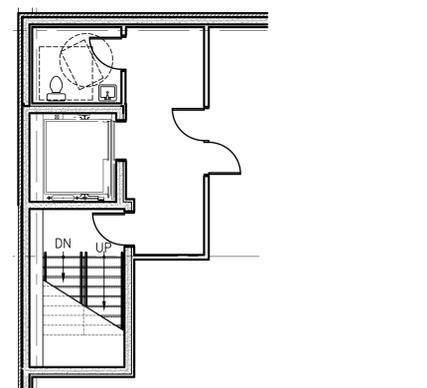
BSCAN STICKER

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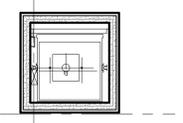
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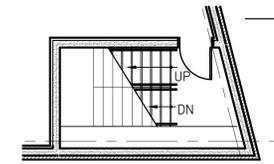
2ND - 4TH FLOOR PLAN
SCALE: 1/8" = 1'-0"



PARTIAL 3RD FLOOR PLAN
SCALE: 1/8" = 1'-0"



PARTIAL 3RD FLOOR PLAN
SCALE: 1/8" = 1'-0"



PARTIAL 3RD FLOOR PLAN
SCALE: 1/8" = 1'-0"

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COMMERCIAL & COMM. FAC. BUILDING
131-10 AVERY AVENUE
QUEENS, NY 11355

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NO.	DESCRIPTION	DATE

NO.	TO WHOM:	DATE

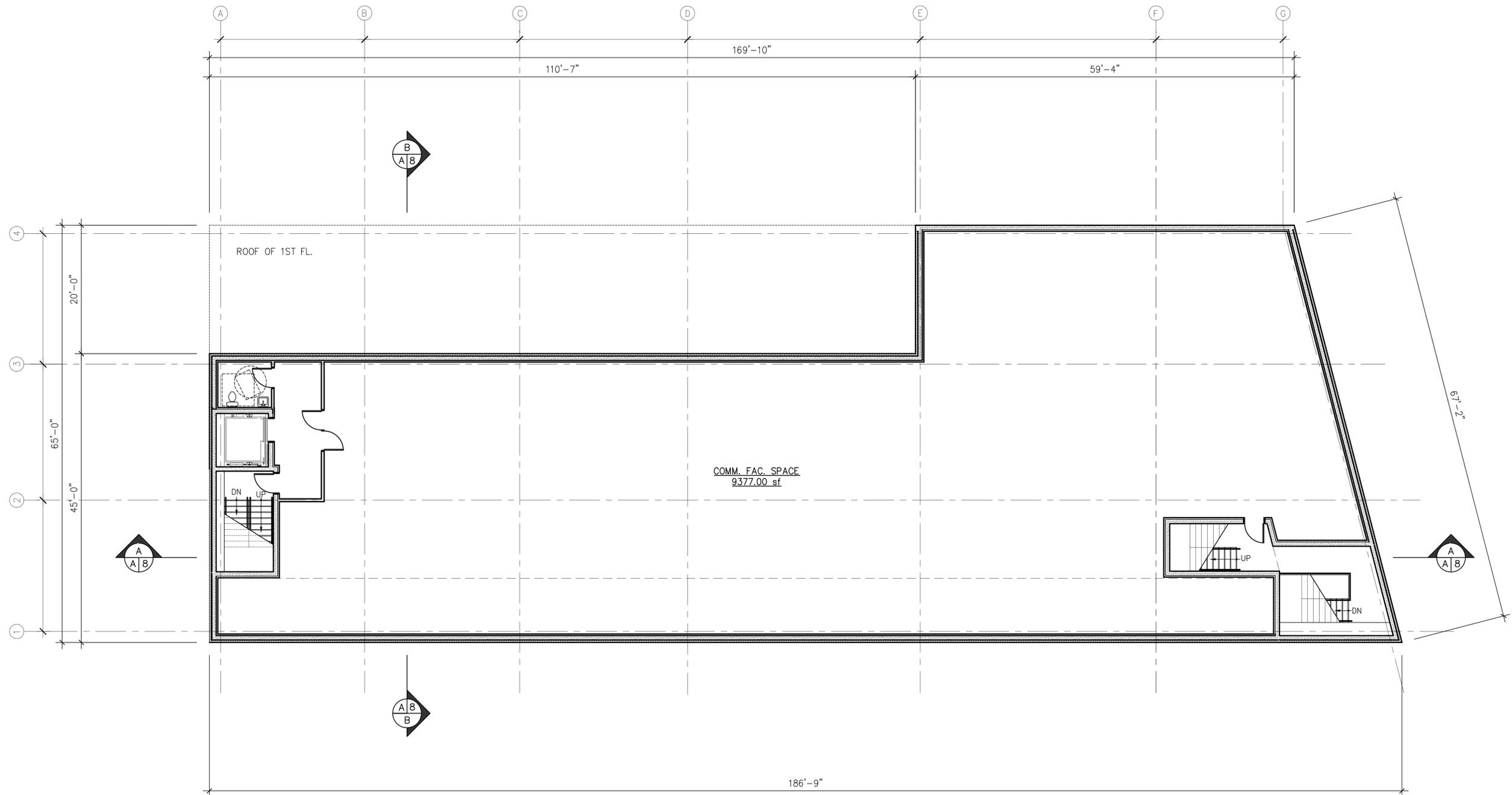
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CHECKED BY:	VF	DATE:	09.23.14

DWG. TITLE :

2ND - 3RD FLOOR PLANS

PAGE NUMBER
5 OF 11

BSCAN STICKER



4TH FLOOR PLAN
 SCALE: 1/8" = 1'-0"

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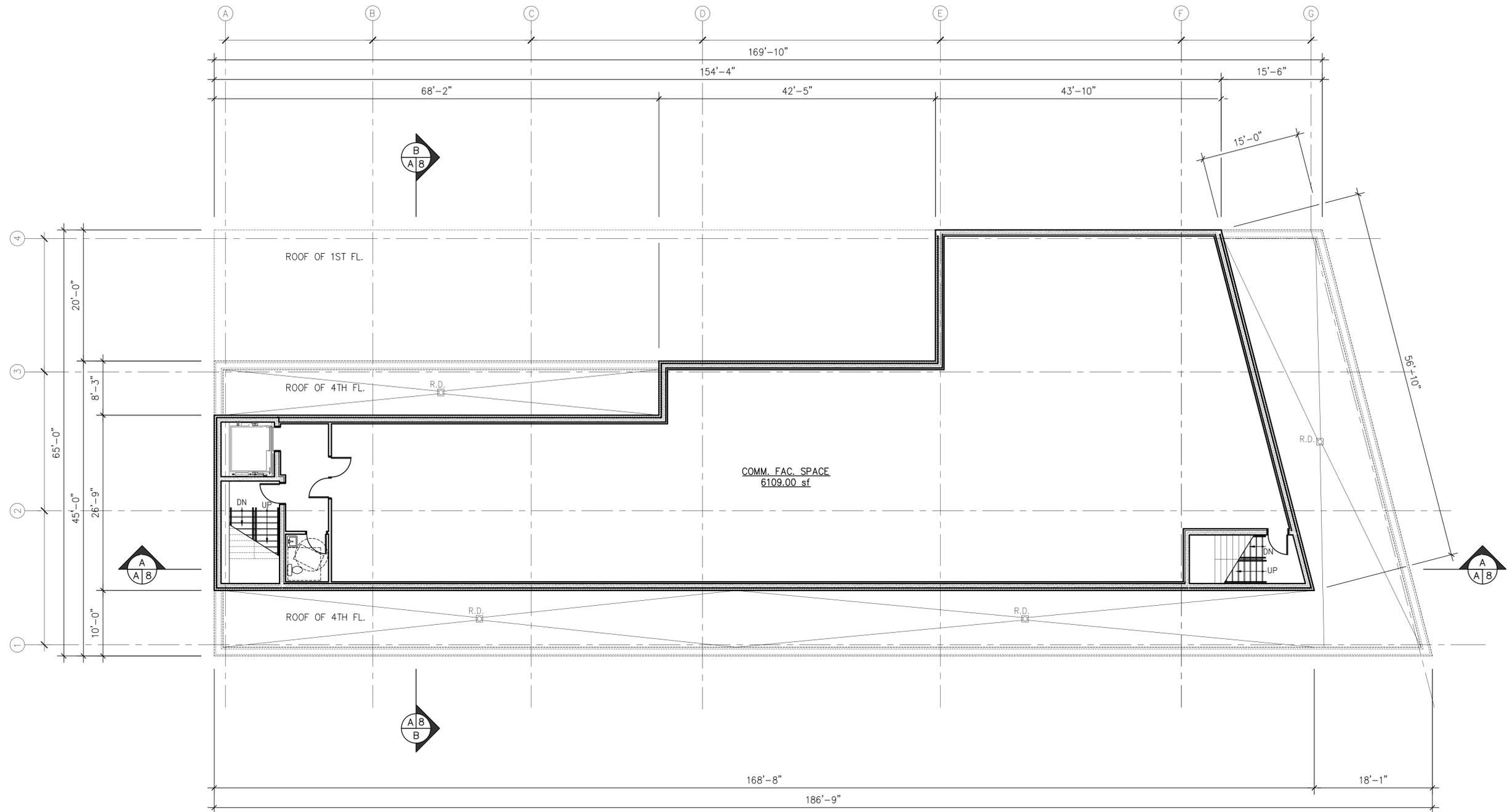
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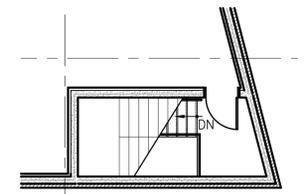
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CHECKED BY: VF	DATE: 09.23.14
DWG. TITLE: 4TH FLOOR PLAN	
PAGE NUMBER 6 OF 11	

A-004.00.

BSCAN STICKER



5TH - 6TH FLOOR PLAN
 SCALE: 1/8" = 1'-0"



PARTIAL 6TH FLOOR PLAN
 SCALE: 1/8" = 1'-0"

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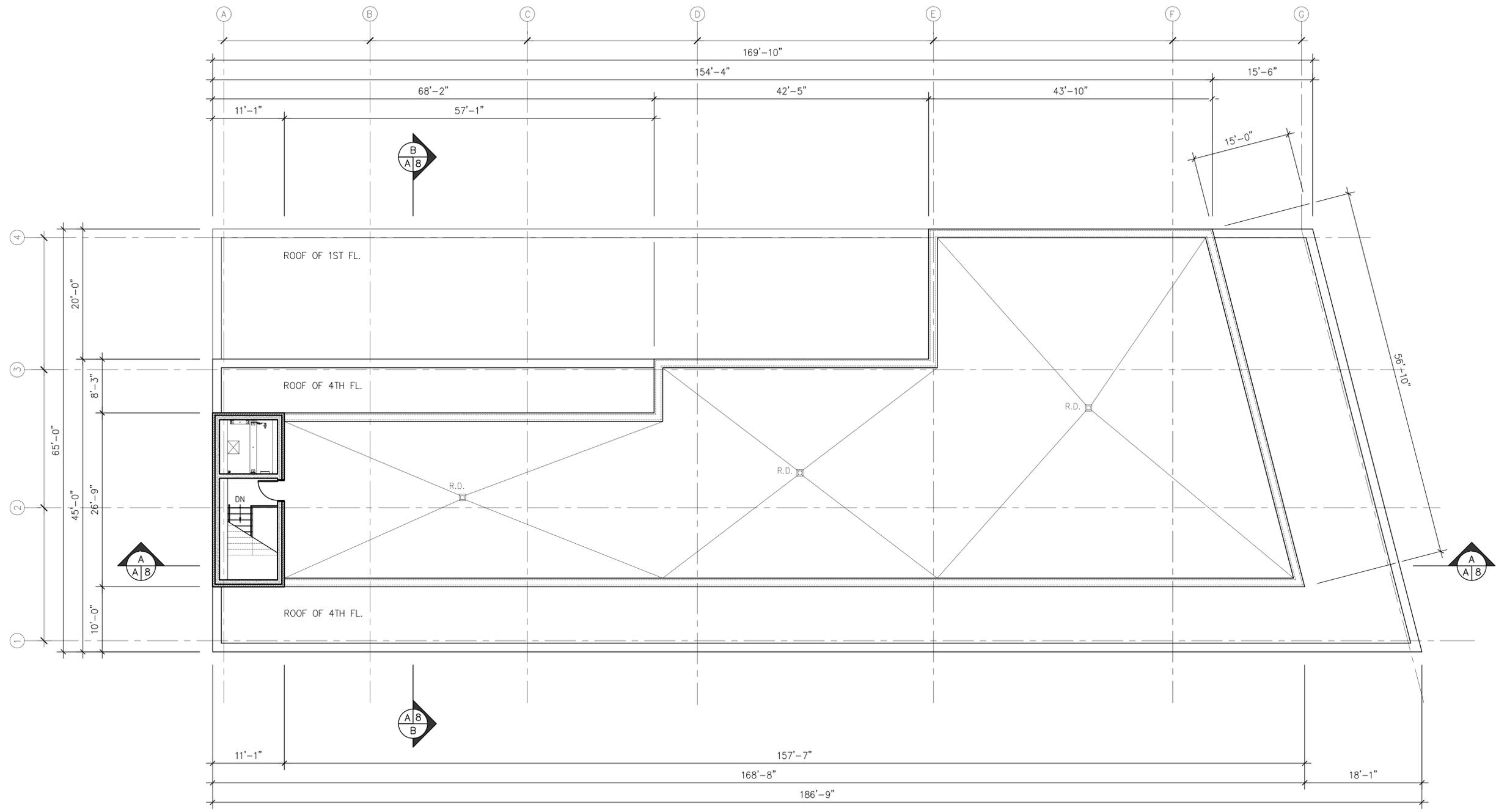
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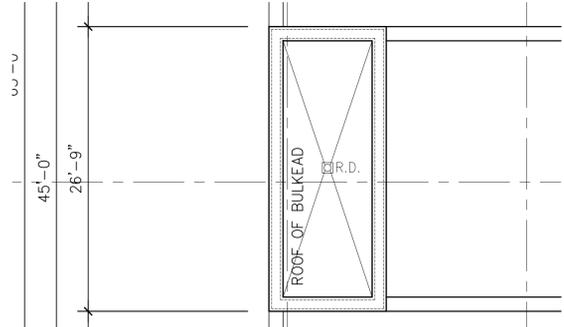
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5TH - 6TH FLOOR PLANS

PAGE NUMBER
 7 OF 11

BSCAN STICKER



ROOF PLAN
 SCALE: 1/8" = 1'-0"



BULKHEAD ROOF PLAN
 SCALE: 1/8" = 1'-0"

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COMMERCIAL & COMM. FAC. BUILDING
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ISSUES	JOB NO.

ISSUES	DATE

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JM	1433NJ

CHECKED BY:	DATE
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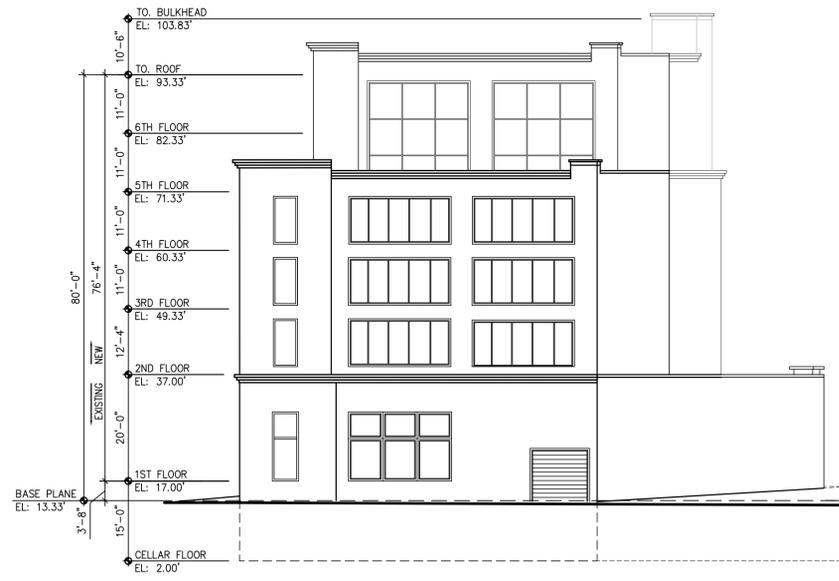
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BULKHEAD PLAN & ROOF DETAILS

PAGE NUMBER
 8 OF 11

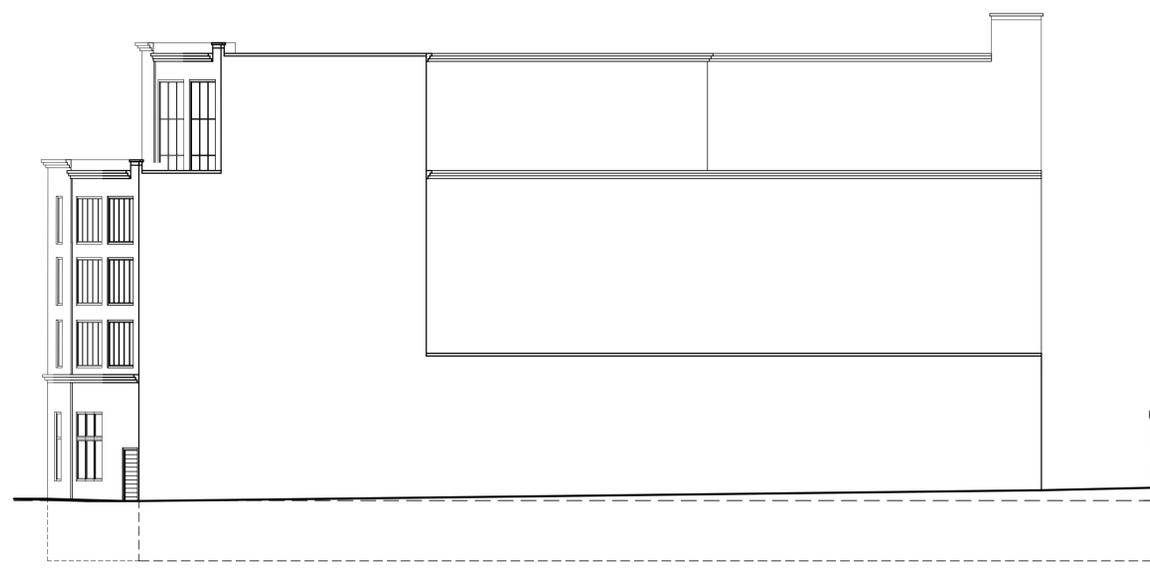
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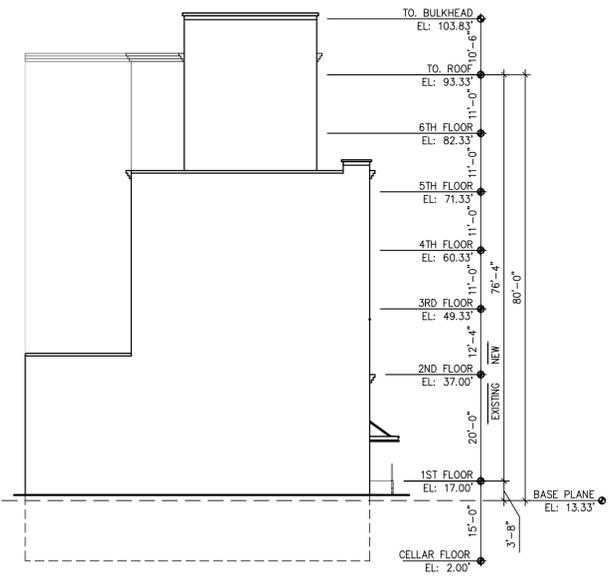
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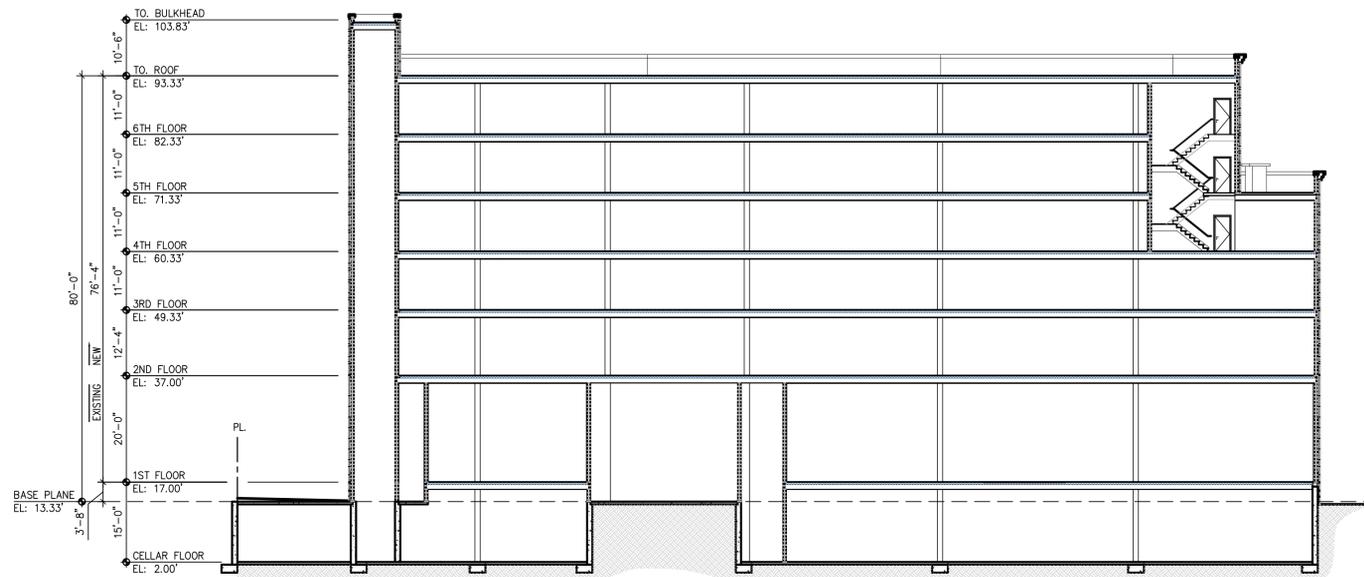
RIGHT (131ST ST.) ELEVATION
 SCALE: 1/16" = 1'-0"



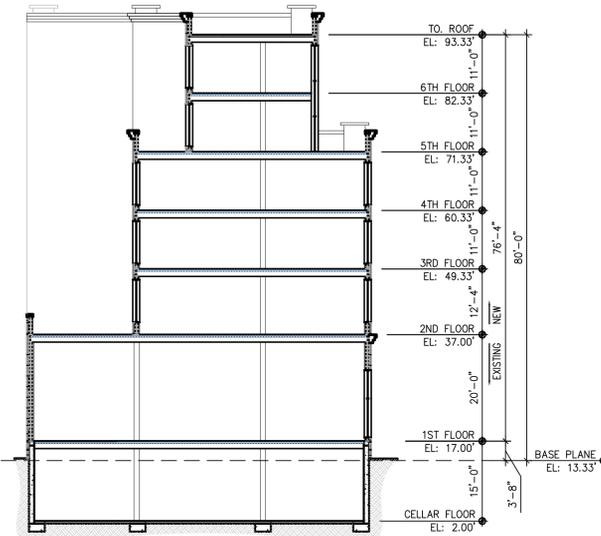
REAR ELEVATION
 SCALE: 1/16" = 1'-0"



LEFT (EAST) ELEVATION
 SCALE: 1/16" = 1'-0"



SECTION A-A
 SCALE: 1/16" = 1'-0"



SECTION B-B
 SCALE: 1/16" = 1'-0"

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PROPOSED NEW:
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DWG. TITLE :
BUILDING ELEVATIONS & SECTIONS

PAGE NUMBER
 10 OF 11

BSCAN STICKER



PERPSECTIVE NOTE:
RENDERING IS FOR ILLUSTRATION PURPOSES ONLY AND NOT
TO BE USED FOR CONSTRUCTION.

PROPOSED NEW:
MIXED USE BUILDING
131-32 AVERY AVE.
QUEENS, NY 11355

D R A W I N G L I S T

- | | | |
|--|---|---|
| 1. T-001.00 - TITLE SHEET | 5. A-003.00 - 2ND-4TH FLOOR PLANS | 9. A-007.00 - REAR & LEFT BUILDING ELEVATIONS |
| 2. Z-001.00 - ZONING INFO, PLOT PLAN & LEGENDS | 6. A-004.00 - 5TH-6TH FLOOR PLAN | 10. A-008.00 - BUILDING SECTIONS |
| 3. A-001.00 - CELLAR/FOUNDATION FLOOR PLAN & DETAILS | 7. A-005.00 - ROOF PLAN & BULKHEAD DETAILS | 11. P-001.00 - PLUMBING RISER & GAS RISER |
| 4. A-002.00 - 1ST FLOOR PLAN & DETAILS | 8. A-006.00 - FRONT & RIGHT BUILDING ELEVATIONS | 12. N-001.00 - GENERAL NOTES |

T.F. CUSANELLI & FILLETTI
ARCHITECTS, P.C.



143 TERRACE STREET
HAWORTH N.J. 07641
201-384-9595
N.J. R.A. LIC # 07976, 16378

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COMMERCIAL & COMM. FAC. BUILDING
131-32 AVERY AVENUE
QUEENS, NY 11355

REVISIONS

NO.	DESCRIPTION	DATE

ISSUES

NO.	TO WHOM	DATE

DWG. TITLE :

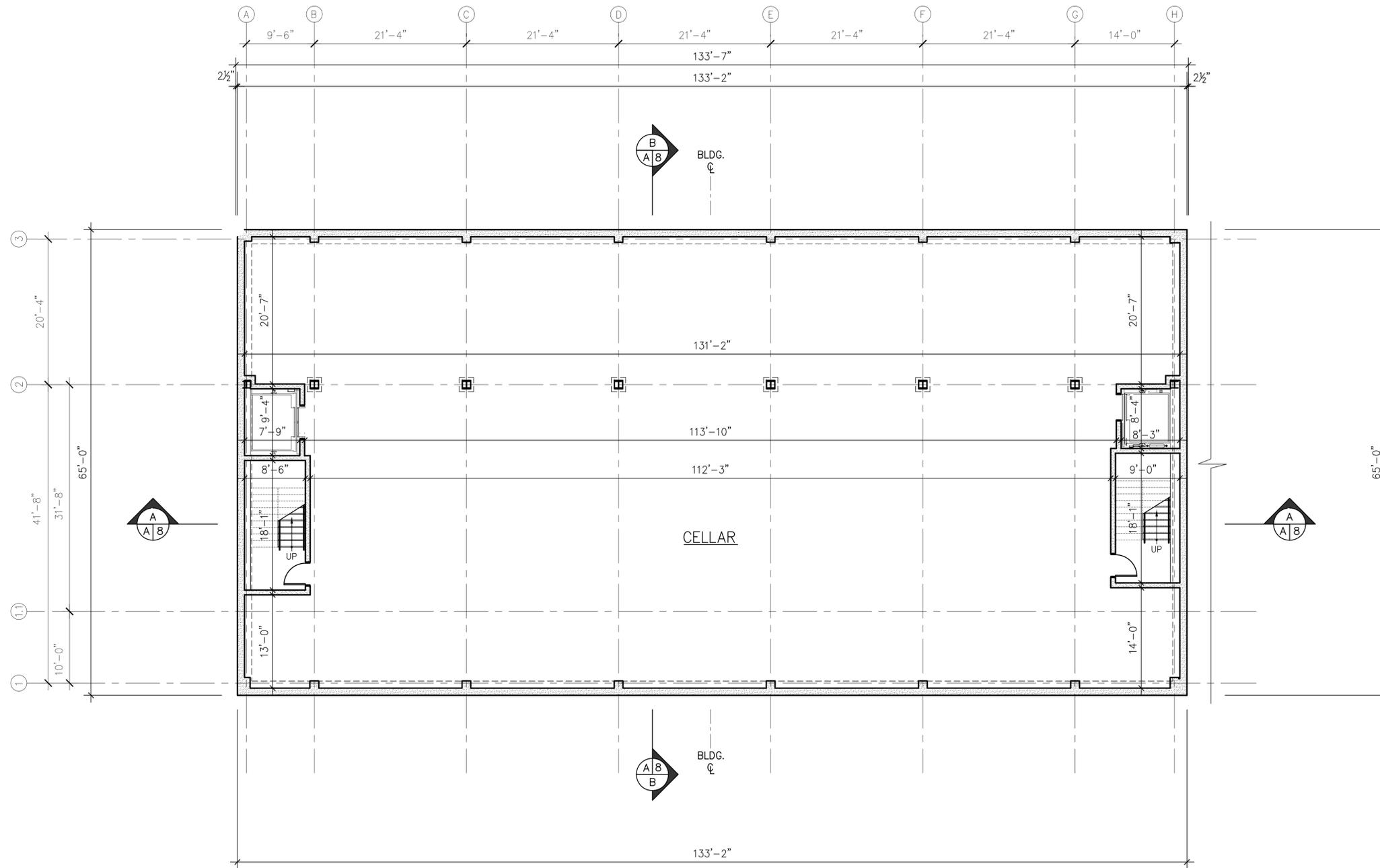
TITLE SHEET

PAGE NUMBER

1 OF 12

BSCAN STICKER

T-001.00



CELLAR FLOOR PLAN
SCALE: 1/8" = 1'-0"

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131-32 AVERY AVENUE
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REVISIONS		
NO.	DESCRIPTION	DATE

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CHECKED BY:	DATE
VF	09.23.14

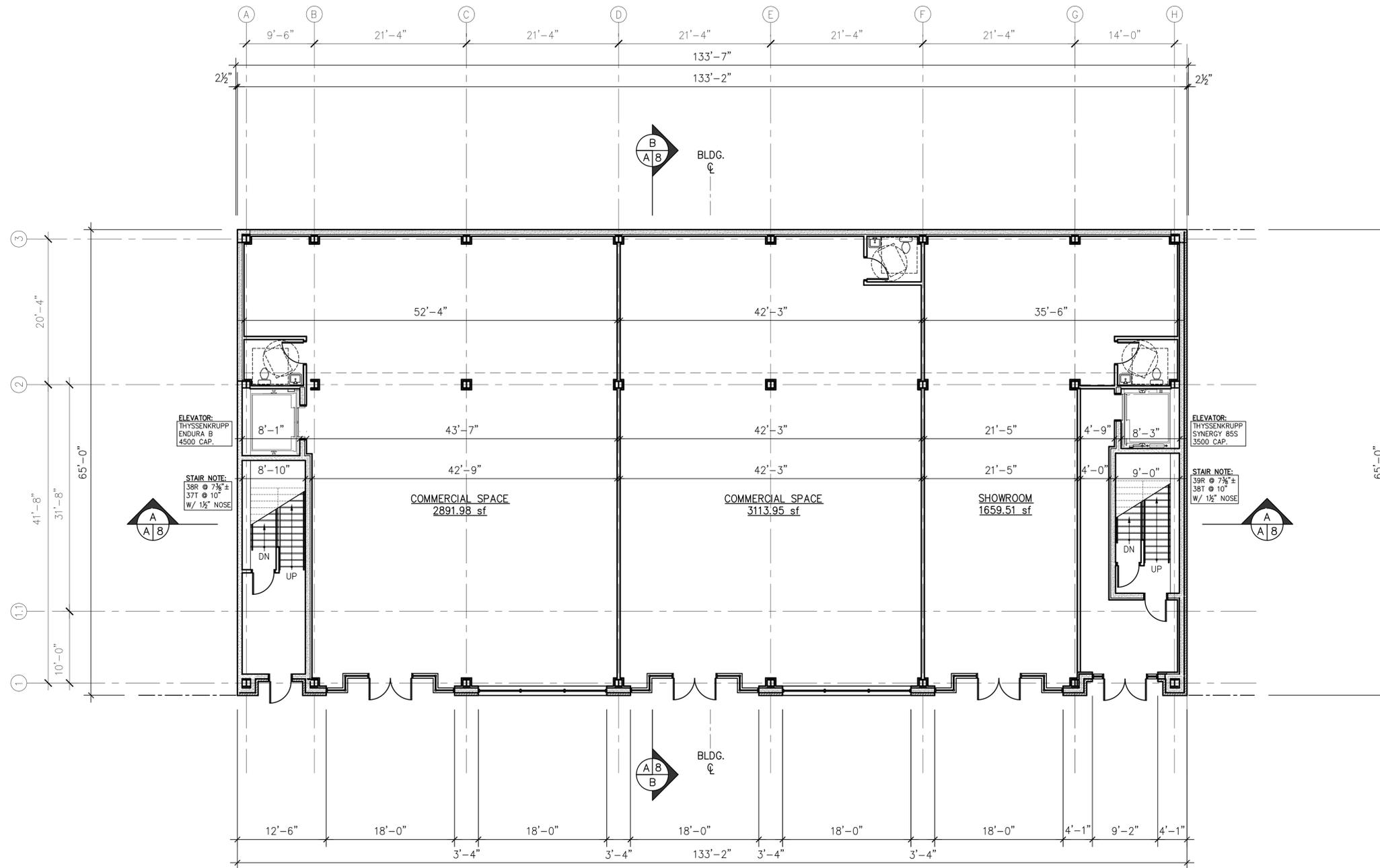
DWG. TITLE :

CELLAR/
FOUNDATION
FLOOR PLAN &
DETAILS

PAGE NUMBER
3 OF 12

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BSCAN STICKER



FIRST FLOOR PLAN
 SCALE: 1/8" = 1'-0"

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 HAWORTH N.J. 07641
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PROPOSED NEW:
COMMERCIAL & COMM. FAC. BUILDING
 131-32 AVERY AVENUE
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REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM:	DATE

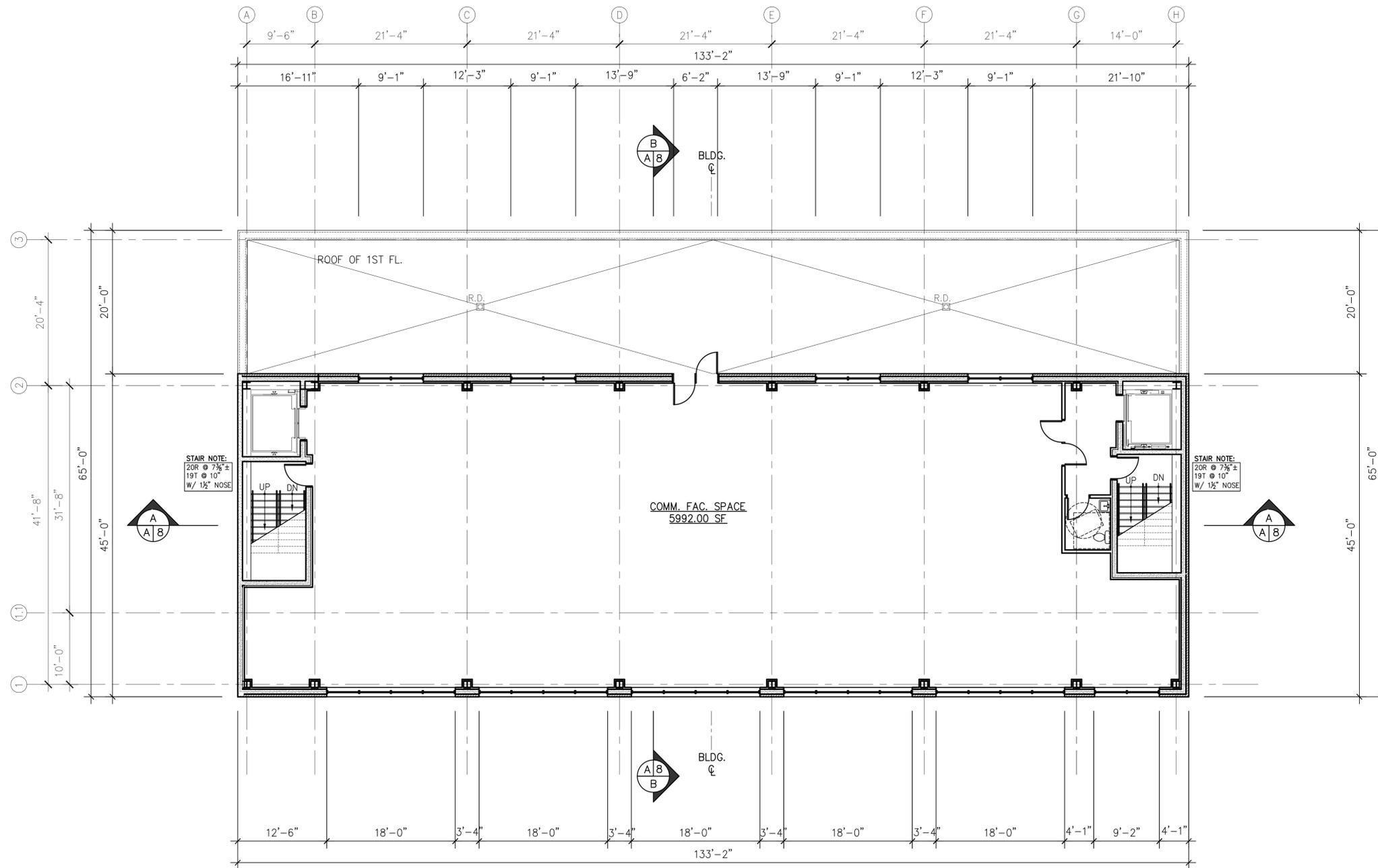
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CHECKED BY:	VF	DATE:	09.23.14

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1ST FLOOR PLAN & DETAILS

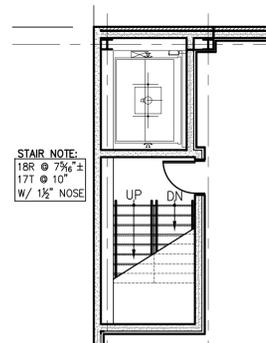
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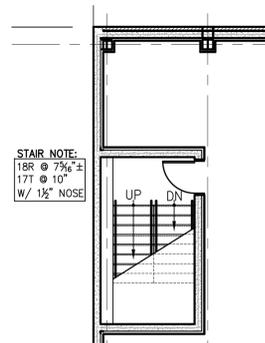
BSCAN STICKER



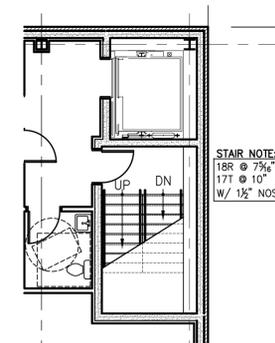
2ND - 4TH FLOOR PLAN
SCALE: 1/8" = 1'-0"



PARTIAL 3RD FLOOR PLAN
SCALE: 1/8" = 1'-0"



PARTIAL 4TH FLOOR PLAN
SCALE: 1/8" = 1'-0"



PARTIAL 3RD - 4TH FLOOR PLAN
SCALE: 1/8" = 1'-0"

T.F. CUSANELLI & FILLETTI ARCHITECTS, P.C.
143 TERRACE STREET
HAWORTH N.J. 07641
201-364-9595
N.J. R.A. LIC # 07976, 16378



PROPOSED NEW:
COMMERCIAL & COMM. FAC. BUILDING
131-32 AVERY AVENUE
QUEENS, NY 11355

REVISIONS		
NO.	DESCRIPTION	DATE

NO.	TO WHOM:	DATE

ISSUES	JOB NO.
	1433NJ

CHECKED BY:	DATE:
VF	09.23.14

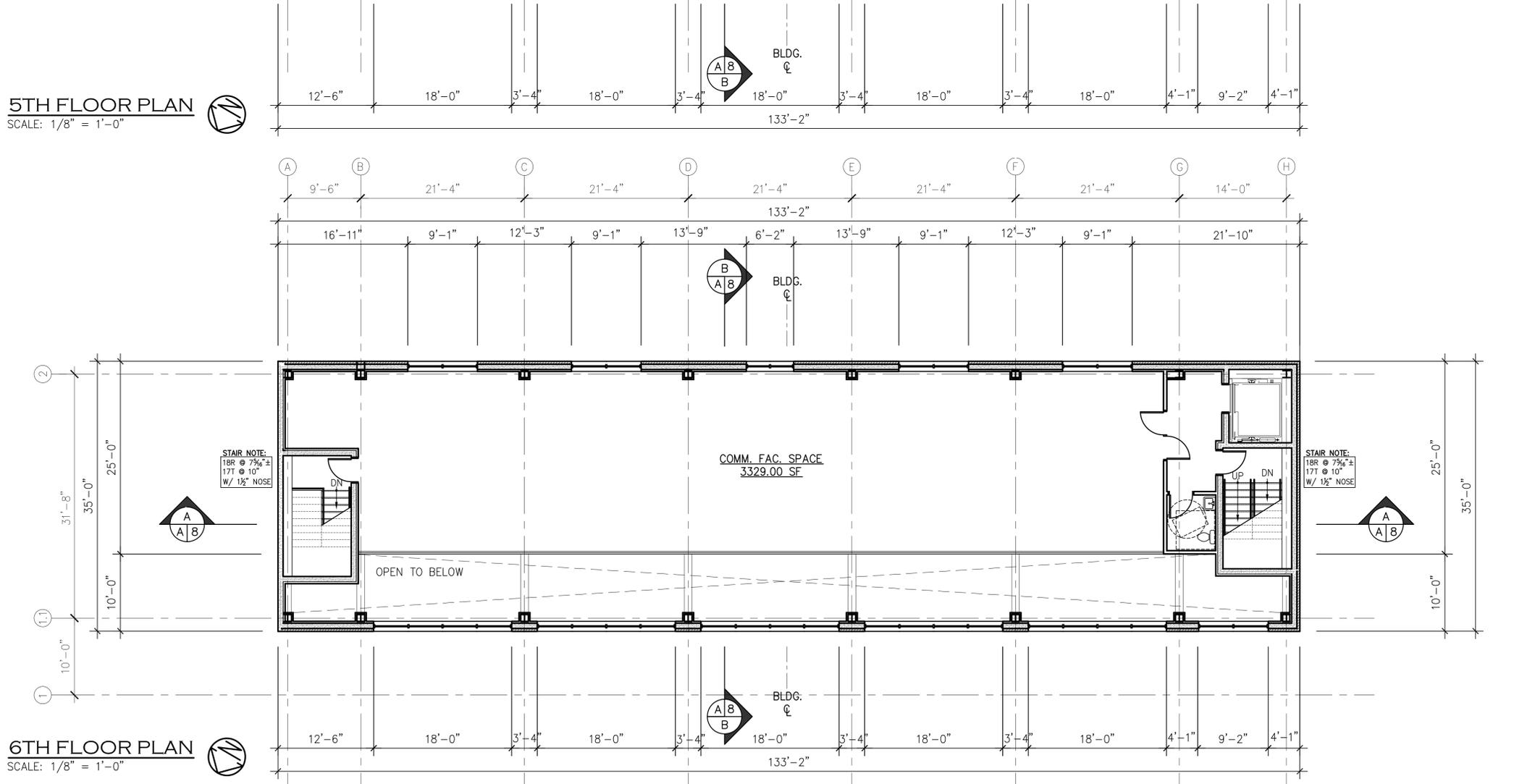
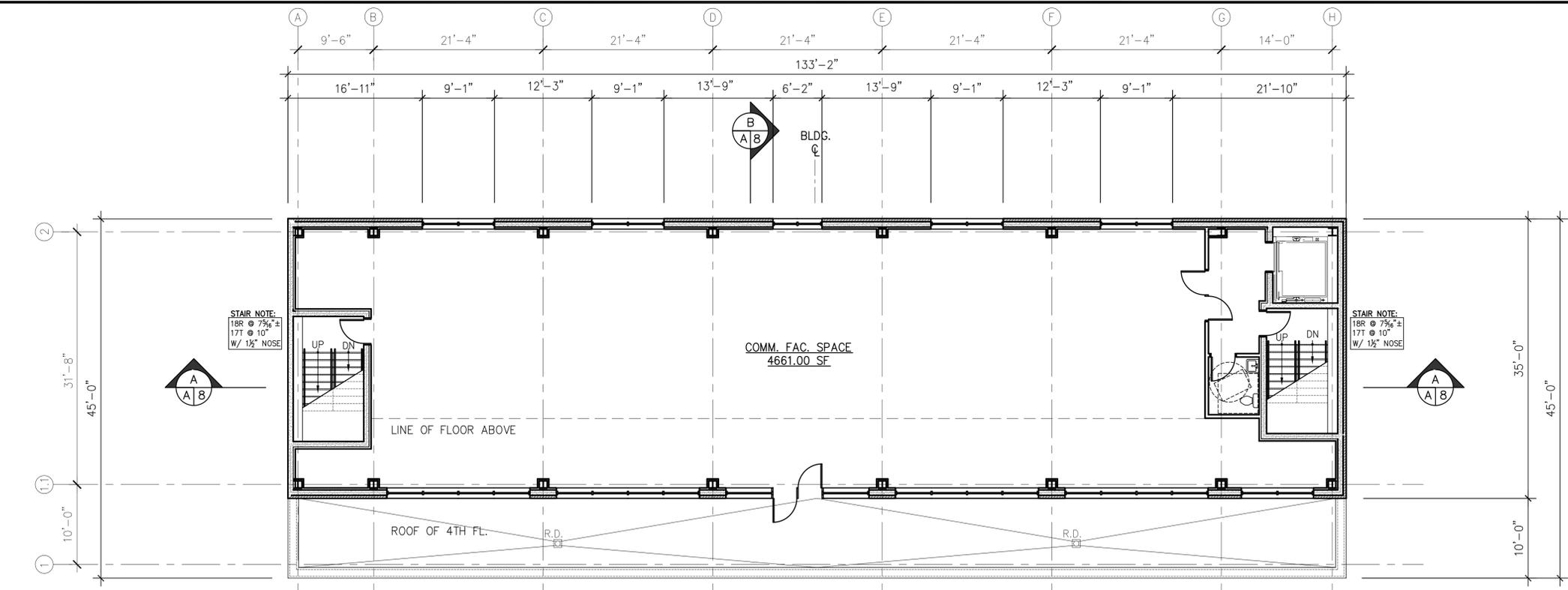
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2ND - 4TH FLOOR PLANS

PAGE NUMBER
5 OF 12

BSCAN STICKER

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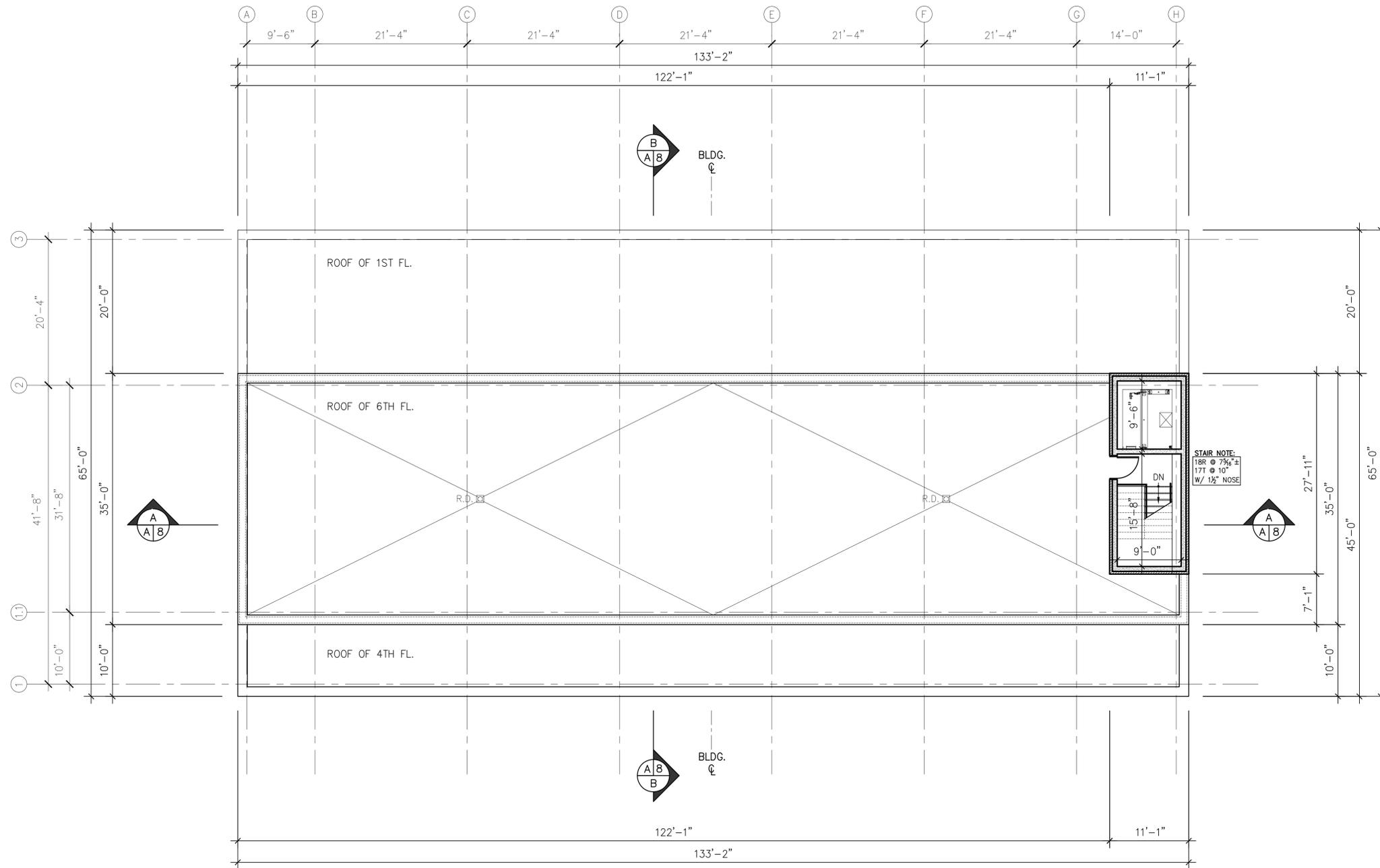
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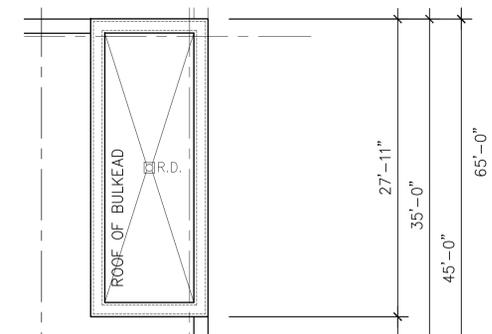
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ROOF PLAN
 SCALE: 1/8" = 1'-0"



BULKHEAD ROOF PLAN
 SCALE: 1/8" = 1'-0"

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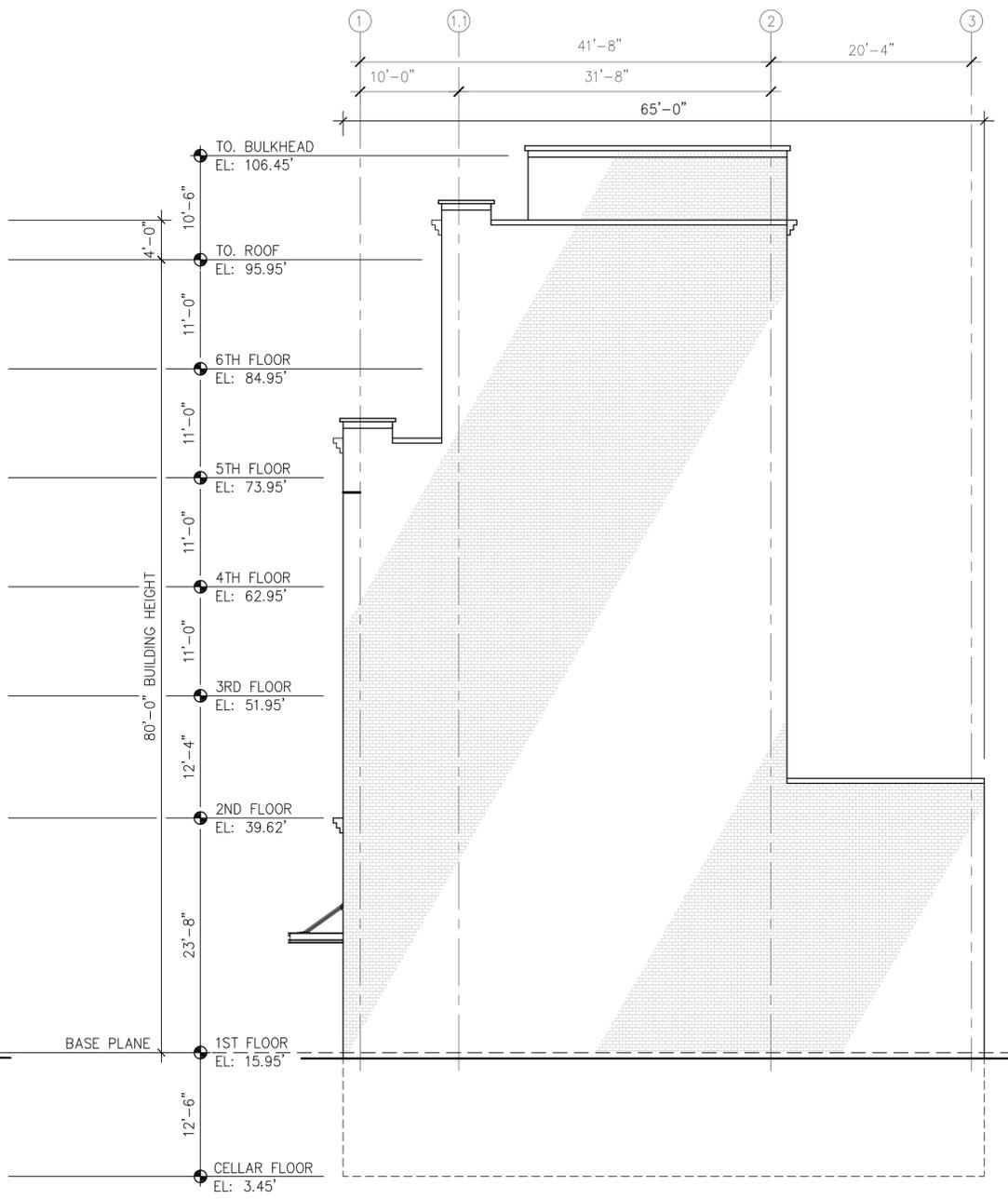
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BSCAN STICKER

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FRONT (AVERY AVE.) ELEVATION
SCALE: 1/8" = 1'-0"



RIGHT (WEST) SIDE ELEVATION
SCALE: 1/8" = 1'-0"

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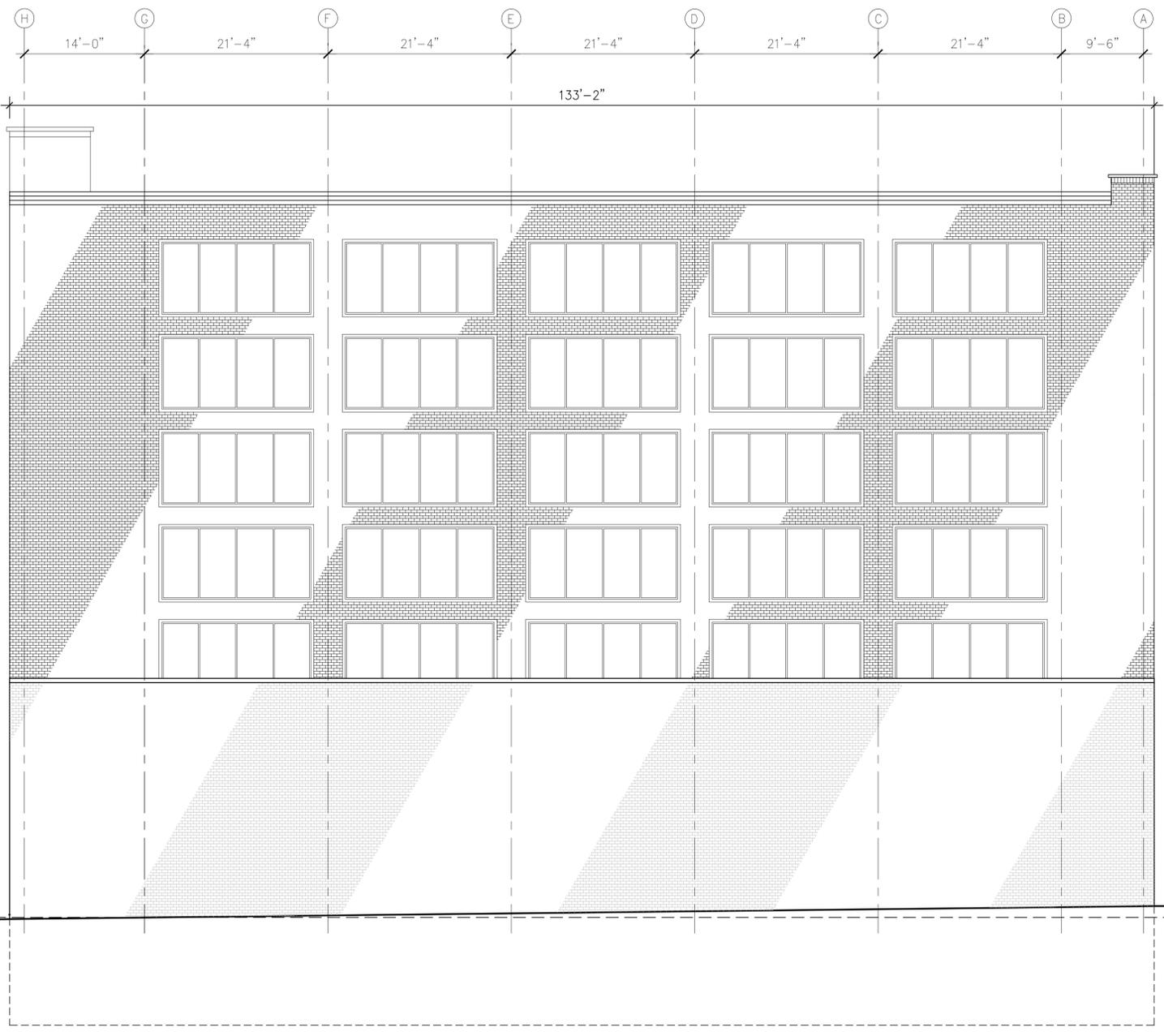
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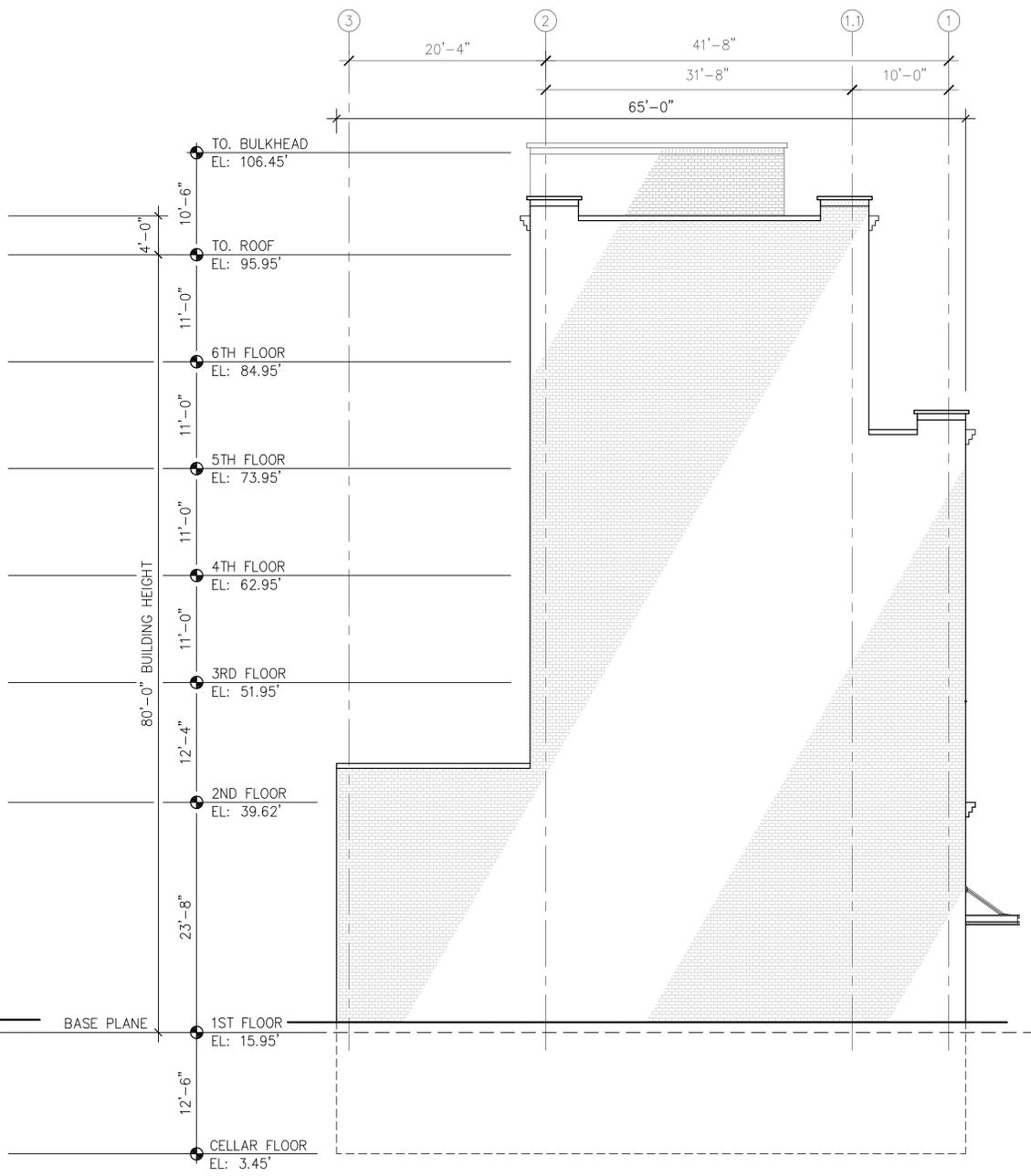
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BSCAN STICKER



REAR ELEVATION
SCALE: 1/8" = 1'-0"



LEFT (EAST) SIDE ELEVATION
SCALE: 1/8" = 1'-0"

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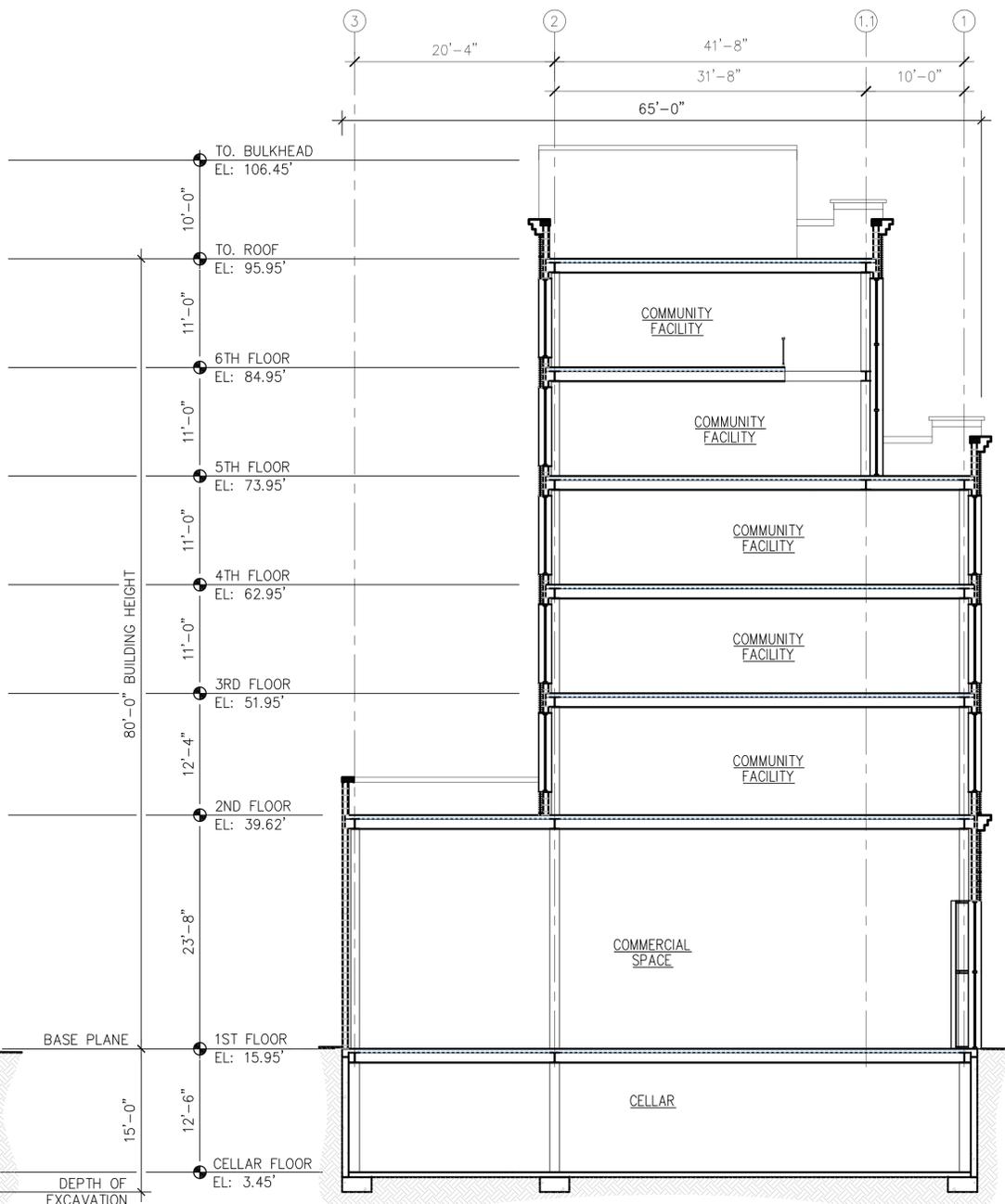
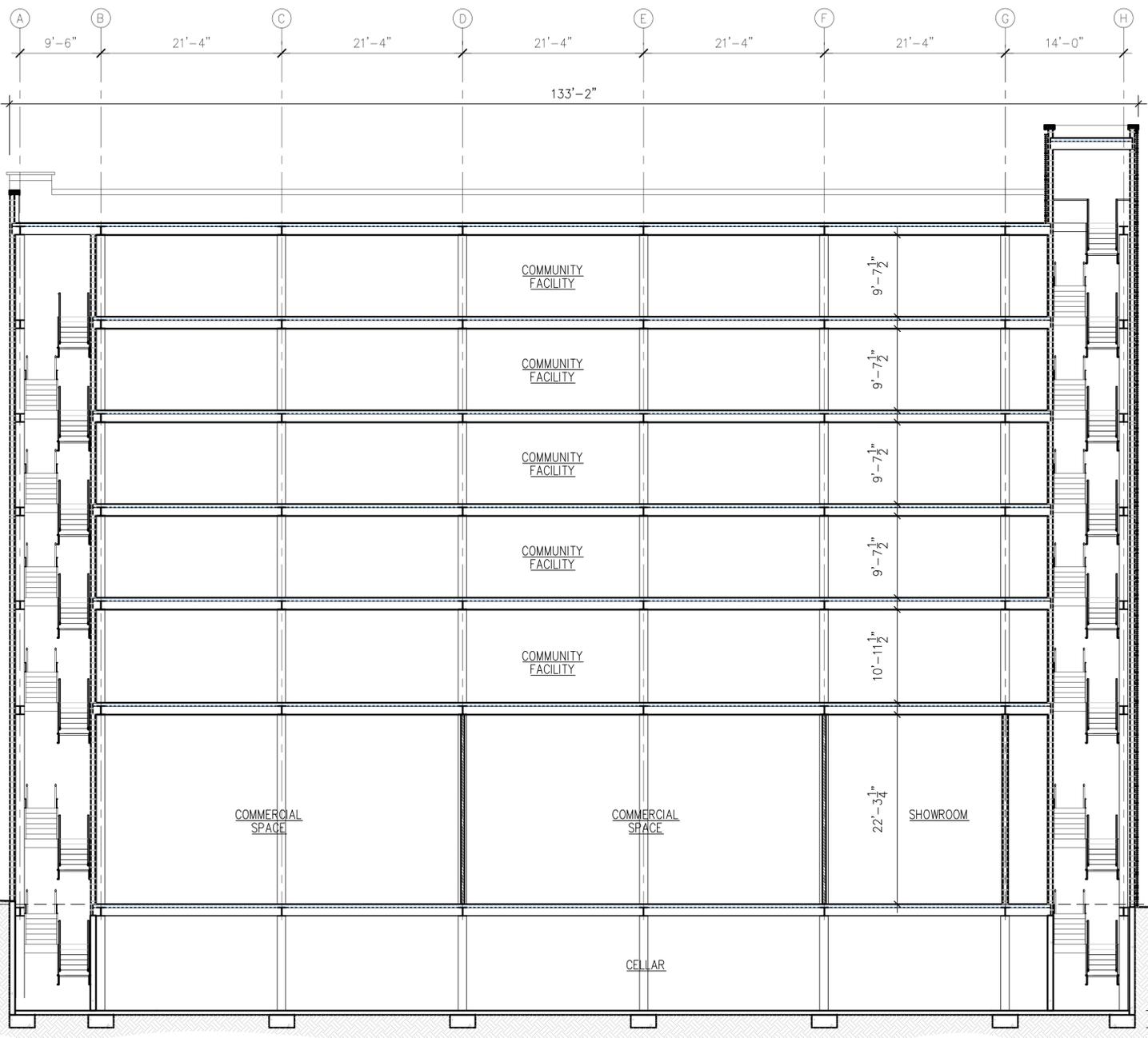
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REAR & LEFT BUILDING ELEVATIONS

PAGE NUMBER
9 OF 12

BSCAN STICKER



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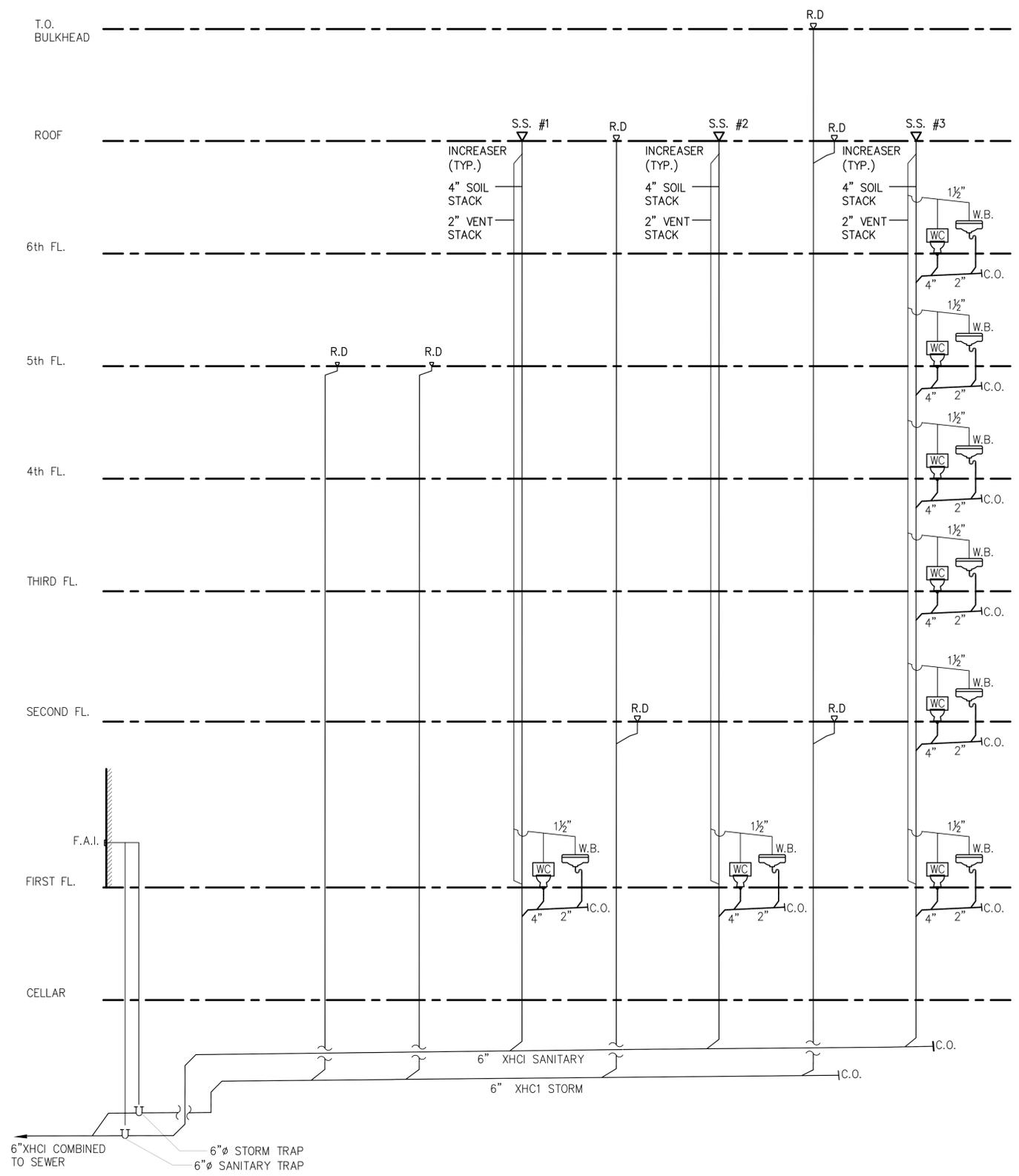
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BUILDING SECTIONS

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10 OF 12

BSCAN STICKER

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PLUMBING RISER DIAGRAM
SCALE: N.T.S.

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149 TERRACE STREET
HAWORTH, N.J. 07641
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REVISIONS		
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PLUMBING & GAS RISERS			
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10 OF 12			

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APPENDIX 2

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and Avery Group LLC & Wilson Realty Management LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, Avery Group LLC & Wilson Realty Management LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Sarah Pong, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

Project Contact List OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project

manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

Repositories A document repository is maintained online. Internet access to view OER's document repositories is available at public libraries. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. The library nearest the Site is:

Queens Library – Flushing Branch
41-17 Main Street, Flushing, New York 11355
718-661-1200

Monday: 9:00 AM to 9:00 PM
Tuesday: 1:00 AM to 9:00 PM
Wednesday: 9:00 AM to 9:00 PM
Thursday: 9:00 AM to 9:00 PM
Friday: 9:00 AM to 7:00 PM
Saturday: 9:00 AM to 7:00 PM
Sunday: 12:00 AM to 5:00 PM

Digital Documentation NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

Identify Issues of Public Concern No issues of concern are anticipated for this project.

Public Notice and Public Comment Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by Avery Group LLC & Wilson Realty Management LLC, reviewed and approved by OER prior to distribution and mailed by Avery Group LLC & Wilson Realty Management LLC. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary

Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

Citizen Participation Milestones Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

APPENDIX 3

SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

Reuse of Clean, Recyclable Materials Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

Reduce Consumption of Virgin and Non-Renewable Resources Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Conversion to Clean Fuels Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Stormwater Retention Stormwater retention improves water quality by lowering the rate of combined stormwater and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced stormwater retention capability of the redevelopment project will be included in the RAR.

Linkage with Green Building Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

Paperless Brownfield Cleanup Program Avery Group LLC & Wilson Realty Management LLC is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program Avery Group LLC & Wilson Realty Management LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

Trees and Plantings Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

APPENDIX 4

SOIL/MATERIALS MANAGEMENT PLAN

1.1 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

1.2 STOCKPILE METHODS

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

1.4 MATERIALS EXCAVATION, LOAD-OUT, AND DEPARTURE

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

1.5 OFF-SITE MATERIALS TRANSPORT

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will

be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are will be reported to OER once determined. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Queens, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the Soil Cleanup Objectives (SCOs) established in this plan may be reused on-Site. Although reuse of excavated materials on-Site is not anticipated for this project, the SCOs for on-Site reuse are Track 1 Unrestricted Use SCOs and are found in Table 1. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed. If excavated materials are re-used on the Site, the location for placement of reused material will be shown in the Remedial Action Report.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

1.8 DEMARCATION

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials

beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in Section 4.2.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence

that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

Source Screening and Testing

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department

of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

1.11 STORMWATER POLLUTION PREVENTION

Applicable laws and regulations pertaining to stormwater pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

1.12 CONTINGENCY PLAN

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found

during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

1.13 ODOR, DUST, AND NUISANCE CONTROL

Odor Control

All necessary means will be employed to prevent on- and off-Site odor 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) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the Remedial Action Report.

Dust Control

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

Other Nuisances

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

APPENDIX 5

CONSTRUCTION HEALTH AND SAFETY PLAN

CONSTRUCTION HEALTH & SAFETY PLAN

131-10 TO 131-18 (SITE A) AVERY AVENUE AND
131-24 TO 131-32 (SITE B) AVERY AVENUE
QUEENS, NEW YORK

Prepared for:

Avery Group LLC & Wilson Realty Management LLC
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Prepared by:



ATHENICA ENVIRONMENTAL
SERVICES, INC.

Environmental Consultants

45-09 GREENPOINT AVENUE
LONG ISLAND CITY, NY 11104

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1.0 *GLOSSARY OF TERMS*

AHA:	Activity Hazard Analysis
BZ:	Breathing Zone
C:	Ceiling Limit
CNS	Central Nervous System
CTPV:	Coal tar pitch volatiles
CRZ:	Contamination Reduction Zone
CSP:	Construction Superintendent
CZ:	Clean Zone
dBA:	Decibels Adjusted
ERCP:	Emergency Response and Contingency Plan
EZ:	Exclusion Zone
FDNY:	New York City Fire Department
GI:	Gastrointestinal
HSO:	Health & Safety Officer
IP:	Ionization Potential
Mg/m ³ :	Micrograms per cubic meter
MPH:	Miles per hour
NIOSH:	National Institute for Occupational Safety and Health
OSHA:	Occupational Health and Safety Administration

Owner:	Crescent Owners, LLC
PAHs:	Poly aromatic hydrocarbons
PEL:	Permissible Exposure Limit
PM:	Project Manager
PPE:	Personal Protective Equipment
PPM:	Parts per Million
PSM:	Project Safety Manager
SHASP:	Site-Specific Health and Safety Plan:
SITE:	131-10 to 131-32 Avery Avenue, Queens, NY
STEL:	Short-term exposure limit (15 minutes)
SZ:	Support Zone
TLV:	Threshold Limit Value
TWA:	Time-weighted average (8 hours)
USEPA:	United States Environmental Protection Agency
VP:	Vapor Pressure at approximately 68 F° in mm Hg

2.0 *INTRODUCTION*

The Sites are located at 131-10 to 131-24 (Site A) and 131-24 to 131-32 (Site B) in Queens, New York (the “Sites”). Site A is identified as Block 5076 and Lots 61 and 65, while Site B is identified as Block 5076 and Lots 69 and 75. The four tax lots in total consist of 21,640-square feet and are bounded by Avery Avenue to the north, a 1-story commercial building to the east, a 1-story commercial building to the south, and 131st Street to the west. Currently, the Sites are unoccupied but were most recently used as four separate commercial retail stores and contain four 1-story structures. Only the building on Lot 61 has a basement; the other three buildings do not have a basement. A map of the site boundary is shown in Figure 2-1.

This Site-Specific Construction Health and Safety Plan (CHASP) has been developed by Athenica Environmental Services (“Athenica”) for specific activities associated with the construction of a new residential building at the Site.

This CHASP documents the policies and procedures which will protect workers from potential chemical hazards associated with the soils and/or fill at this Site. Other plans and documentation will establish the policies and procedures that will protect workers from potential physical hazards associated with traditional demolition and construction activities at the Site.

This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise during the disturbance of soil/fill at the Site. This CHASP was prepared by the general contractor’s Environmental Consultant, Athenica Environmental Services (Athenica). The general contractor and its subcontractors will be required to utilize this plan when working at the site.

Although this plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require modifications from the original plan. Therefore, Athenica only makes representations or warranties as to the adequacy of this CHASP for currently anticipated activities and conditions. This flexibility allows modification by authorized personnel, e.g. Project Manager, Project Safety Manager. All changes to procedures in this plan will be documented in writing using the form provided in Appendix B.

Refusal or failure to comply with this CHASP or violation of any safety procedures by field personnel and/or subcontractors may result in immediate removal from the Site following consultation with the Project Safety Manager (PSM) and the Project Manager (PM).

It is expected that this CHASP will be implemented at a multi-employer work site. Information and references within this plan shall in no way imply or alleviate any other Site contractor from their responsibility to comply with any and all applicable State or Federal statutes or regulations regarding the completion of this project. It is the responsibility of each employer to communicate and coordinate work planning so as to prevent their work activities from becoming a potential hazard to other workers at the project site. Failure to communicate will not alter an employer's responsibilities or obligations for any resulting injuries to their employees.

2.1 SITE HISTORY

Based upon the review of the Phase I Environmental Site Assessment (ESA) Report prepared by SAI Environmental Consultants in July 2014, the Site history was established.

The Site consists of a 9,000 square-foot lot that is currently developed with two 2-story commercial buildings both with basements. Historic Sanborn Maps show the Site as unoccupied in 1898 and 1915. The 1936 Sanborn Map shows the Site as developed with one 2-story commercial structure at 38-11 31st Street, noted for "Pressing Finishing" and two 2-story dwellings with parking in the rear of the Lot. 38-11 31st Street was also listed on a 1939 city directory as "Cosmopolitn Cleaners & Dryers Inc." The 1950 Sanborn Map shows no structural changes but designated the Site commercial structure as "Machinery and Assembling". This property is listed on city directories from 1945 to 1970 as "Metropolitan Welding Supply Company" and "Metroweld Distributors". The 1979 Sanborn Map designated the commercial structure as "Welding Supplies". From 1983 to 2000 "Empire Rollers Inc" and "Arrow Rollers Inc". The 1985 Sanborn Map shows the two dwellings as vacant Lots with the commercial structure designated for Manufacturing. The 1986 Sanborn Map shows the Site developed with an additional 2-story commercial structure at 38-19 31st Street. The Site has remained unchanged to present. From 2005 to 2008 38-11 31st Street is listed on city directories as "Van Gogh Painting Corp and as "All State Banners. This property was listed as "R Wholesale Corp" in 2013. 38-17 31st Street was listed on city directories as occupied by private residents between 1934 and 1970 and 38-19 31st Street for private residents between 1934 and 1976. The Phase I ESA Report was previously submitted to OER.

Summary of work performed under the Remedial Investigation is as follows:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Performed a GPR survey;

3. Installed six (6) soil borings across the entire project Site, and collected thirteen (13) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed two (2) groundwater monitoring wells throughout the Site and collected two (2) groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed four (4) sub-slab soil vapor probes around Site perimeter and collected four (4) samples for chemical analysis.

Based on the findings of the Remedial Investigation at the Site, chlorinated solvents are present in groundwater and soil vapor beneath the Site. Several PAHs, Metals and Pesticides were also detected at elevated levels in shallow soil throughout the Site.

2.2 SCOPE OF WORK

Although the construction of the new residential and commercial mix use building involves many different activities, only those activities associated with the disturbance and handling of urban fill are addressed in this CHASP.

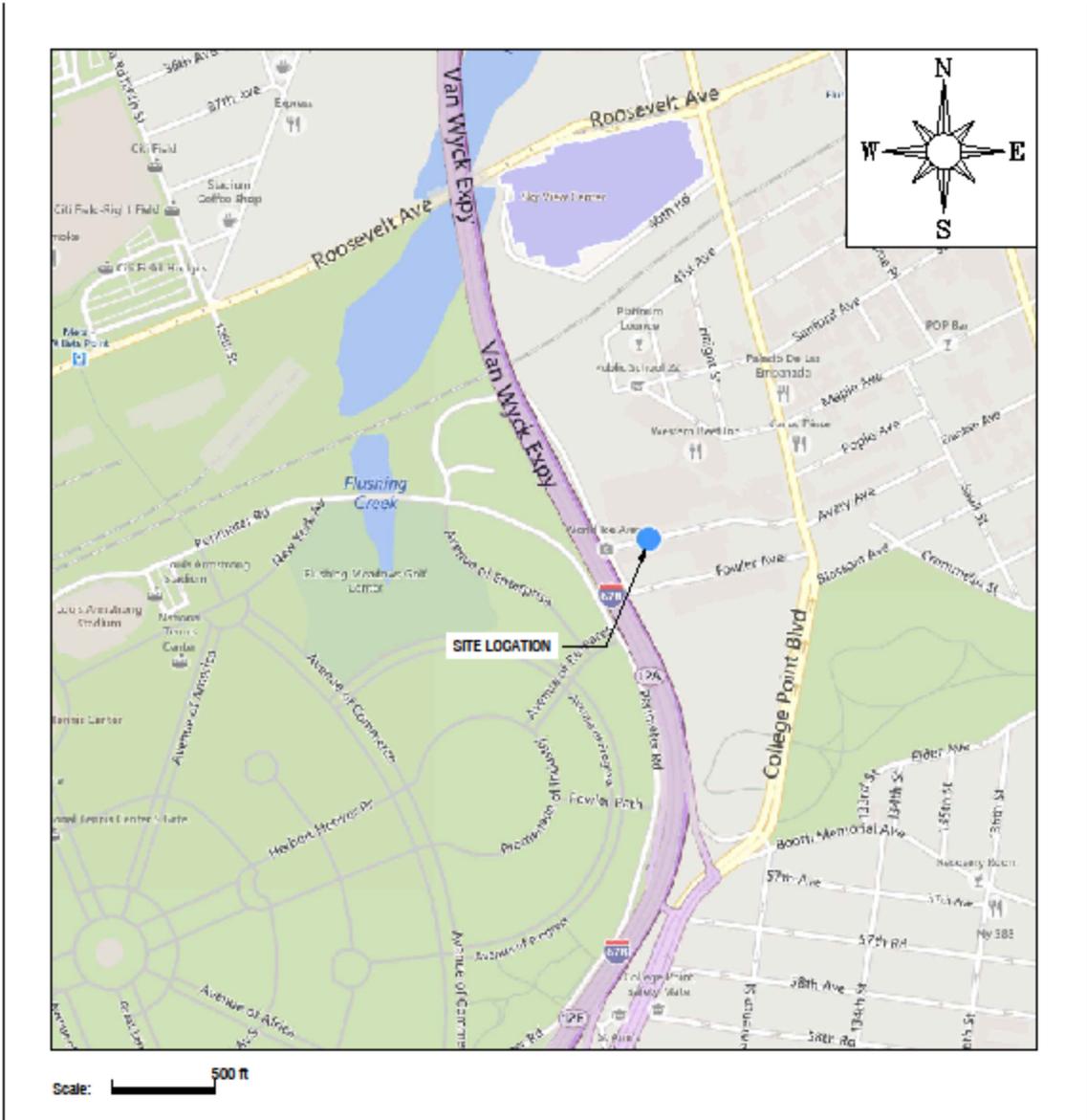
The principal tasks covered in this HASP include the following:

- Mobilization/demobilization,
- Sheeting and shoring,
- Excavation of urban fill and/or soil,
- Loading of urban fill into trucks for disposal,
- Installation of footings for new building, and
- Heavy equipment decontamination

Activity Hazard Analyses for these tasks are provided in Section 4.5.

This CHASP has been prepared and approved for the above scope of work. In order to remain approved, any changes to the scope of work will require amendment of the plan. The Site Health and Safety Amendment Documentation form (Appendix B) will be used for all revisions/amendments to this plan.

**FIGURE 2-1
 SITE LOCATION MAP**



	Drawn by: ALEJANDRO MOREJON	Site Plan: 131-18 to 131-24 AVERY AVENUE FLUSHING, NY 11355
	Checked by: ETHAN RAINEY	
	Drawing Scale: AS NOTED	Figure: FIGURE 1 Title: SITE LOCATION MAP
	Project No: 14-132-0587 Date: May 29, 2014	

3.0 *KEY PERSONNEL*

The Project Manager (PM), Construction Superintendent (CS), Health & Safety Officer (HSO), and Project Safety Manager (PSM) all share responsibilities for formulating and enforcing health and safety requirements, and assuring that the CHASP is implemented as intended. This section outlines the responsibilities for each of these positions. Responsibilities for site employees and subcontractor personnel are also outlined in this section. The General Contractor and/or other authorized personnel may also be involved and identified in future CHASP documents, as appropriate.

3.1 **PROJECT MANAGER (PM)**

The PM has the overall responsibility for the project and to assure that the requirements of the contract are attained in a manner consistent with the CHASP requirements. The PM will coordinate with the CS and the HSO to assure that the work is completed in a manner consistent with the HASP. The PM will supervise the allocation of resources and staffing to implement specific aspects of the HASP and may delegate authority to expedite and facilitate any application of the program. This role will be filled by the General Contractor or Excavation Subcontractor. OER will be notified in the future who the PM will be for this project.

3.2 **CONSTRUCTION SUPERINTENDENT (CS)**

The CS is responsible for field implementation of the CHASP and Site Emergency Response and Contingency Plan and will act as the HSO in his/her absence. This role will be filled by the general contractor or primary subcontractor. OER will be notified in the future who the CS will be for this project.

Specific responsibilities for the CS include:

- Ensures that the CHASP is implemented;
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Enforces site health and safety rules;
- Ensures that proper personal protective equipment is utilized;
- Ensures that the PSM is informed of project changes which require modifications to the CHASP;
- Ensures that the procedure modifications are implemented;
- Investigates incidents;
- Conducts the daily site safety briefing;
- Reports to PSM to provide summaries of field operations and progress; and

- Acts as Emergency Coordinator.

3.3 HEALTH AND SAFETY OFFICER (HSO)

The HSO is authorized to administer the HASP. The HSO's primary operational responsibilities include personal and environmental monitoring, selection and monitoring of personal protective equipment, assignment of protection levels, coordination/review of work permits and observation of work activities. The HSO is authorized to stop work when an imminent health or safety risk exists. The HSO will review the essential safety requirements with all on-site personnel and will facilitate the daily safety meetings. OER will be notified in the future who the HSO will be for this project.

Specific responsibilities for HSO performance include:

- Monitoring workers for signs of stress, such as cold stress, heat stress, and fatigue. Reevaluating site conditions on an on-going basis.
- Coordinating protective measures including engineering controls, work practices and personal protective equipment.
- Assisting the CS in the preparation, presentation and documentation of daily safety meetings.
- Conducting and preparing reports of daily safety inspections of work processes, site conditions, and equipment conditions. Discussing any necessary corrective actions with the CS and reviewing new procedures.
- Initiating revisions of the CHASP as necessary for new tasks or modifications of existing operations and submitting to the Project Safety Manager for approval (see Appendix B).
- Performing air monitoring as required by the CHASP.
- Assisting the PM and CS in incident investigations.
- Preparing permits for special operations, e.g., hot work, confined spaces, line breaking, etc.
- Maintaining site safety records.
- Conducting inspections of all fire extinguishers, first-aid kits and eye washes on a regular basis.
- Informing subcontractors of the elements of the CHASP.

3.4 PROJECT SAFETY MANAGER (PSM)

The Project Safety Manager (PSM) is responsible for developing/reviewing the CHASP and ensuring that it is complete and accurate. The PSM provides technical and administrative support

and will be available for consultation when required. If necessary, the PSM will direct modifications (Appendix B) to specific aspects of the HASP to adjust for on-site changes that affect safety. The HSO will coordinate with the PSM on necessary modifications to the HASP. The PSM may make periodic visits to the project site to review implementation of this HASP. This role is role will be filled by the General Contractor's representative.

3.5 EMPLOYEE SAFETY RESPONSIBILITIES

Each employee is responsible for personal safety as well as the safety of others in the work area and is expected to participate fully in the site safety and health program. Employees will use all equipment provided in a safe and responsible manner as directed by the CS. Employees shall report any hazardous conditions which might affect the health and safety of site personnel to the CS and/or HSO. To protect the health and safety of all personnel, site employees that knowingly disregard safety policies/procedures will be subject to removal.

Specific requirements include:

- Reading the CHASP and any amendments prior to the start of on-site work.
- Providing documentation of any applicable medical surveillance and training to the CS/HSO prior to the start of work.
- Attending the pre-entry briefing prior to beginning on-site work as well as other scheduled safety meetings.
- Asking any questions or reporting concerns regarding the content of the CHASP to the CS/HSO prior to the start of work.
- Reporting all potentially dangerous situations, incidents, injuries, and illnesses, regardless of their severity, to the CS/HSO.
- Complying with the requirements of this CHASP and the requests of the CS/HSO.

4.0 *ACTIVITY HAZARD ANALYSIS*

This section outlines the potential chemical and physical hazards which workers may be exposed to during work on this project. The assessment of chemical hazards in this section is based on the results provided on the Remedial Investigation by Athenica for the Site. This is a representative list of contaminants that have been identified through extensive soil and groundwater testing at this site.

4.1 **CHEMICAL HAZARDS**

Based on review of the Remedial Investigation, workers at this Site have the potential to be exposed to chemicals in soil PAHs, total PCBs, and several metals including copper, lead, and mercury. Additionally, workers have the potential to be exposed to tetrachloroethylene and trichloroethylene in groundwater and soil vapor.

Potential exposure to the contaminants of concern may occur during intrusive soil activities or where direct contact with the contaminated soil takes place. Metals and PAHs are primarily inhalation hazards and exposure can be minimized with simple dust control measures. A summary of hazard information is listed in Table 4-1

**TABLE 4-1
 CHEMICAL DATA**

COMPOUND	ACGIH TLV	OSHA PEL	ROUTE OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS	PHYSICAL DATA
Tetrachloroethylene	170 mg/m ³	670 mg/m ³	Inhalation Skin absorption	Irritate eyes, skin; headache, vertigo, visual distortion, fatigue, giddiness, tremor, nausea, vomiting; dermatitis; cardiac arrhythmia, liver damage	Eyes, skin, respiratory system, heart, liver, CNS,	Colorless liquid (unless dyed blue) with chloroform-like odor.
Trichloroethylene	67.8 mg/m ³	535 mg/m ³	Inhalation Skin absorption	Irritation of eyes, skin; headache; visual disturbance; lassitude (weakness, exhaustion), dizziness; tremor; drowsiness, nausea; vomiting; dermatitis; cardiac arrhythmias; paresthesia; liver injury	Kidneys, liver, eyes, skin, CNS, cardiovascular system	Colorless liquid (unless dyed blue) with a chloroform-like odor.
PAHs	0.2 mg/m ³	0.2 mg/m ³	Inhalation Ingestion Skin contact	Headache, nausea, vomiting, and diaphoresis	Genitourinary system, Hematopoietic system, GI Tract, Respiratory system, eyes, skin	Liquid, gas and solid, can be combustible
Copper	1.0 mg/m ³	1.0 mg/m ³	Inhalation Ingestion Skin contact	Irritant to skin	Lungs, mucous membrane	Bluish lustrous metal, Noncombustible Solid
Lead	0.05 mg/m ³	0.05 mg/m ³	Inhalation Ingestion Skin contact	Weakness, lassitude, insomnia; facial pallor; eye irritation, anorexia, low-weight, malnutrition; constipation; abdominal pain; colic; hypertension, anemia; gingival lead line; tremors; paralysis of wrist, ankles; encephalopathy; neuropathy	GI Tract, CNS, kidneys, blood, gingival tissue	Noncombustible Solid
Mercury	0.25 g/m ³	0.1 mg/m ³	Inhalation Ingestion Skin contact	Inflammation of eyes and skin; coughing; choking; shortness of breath; death	Blood, kidneys, liver, brain, peripheral nervous system, CNS	Non-combustible Liquid

Abbreviations

ACGIH = American Conference of Governmental Industrial Hygienists
C = Ceiling Unit
CNS = Central Nervous System
CVS = Cardiovascular System
GI = Gastrointestinal
TLV = Threshold Level Value

mg/m³ = milligrams per cubic meter
OSHA = Occupational Safety and Health Administration
PNS = Peripheral Nervous System
ppm = parts per million
PEL – Permissible Exposure Level

The following general symptoms may indicate exposure to a hazardous material. Personnel will be removed from the work site and provided immediate medical attention should any of the following symptoms occur:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns

4.2 PHYSICAL HAZARDS

To minimize physical hazards, standard safety protocols will be followed at all times. Failure to follow safety protocols may result in removal of the employee from the site. All personnel shall be familiar with the physical hazards presented by each of the tasks they perform. Task specific hazard analyses are provided in Section 4.5. These hazard analyses shall be reviewed prior to beginning each task and periodically throughout the task. It must be noted that these activity hazard analyses are general in nature. It is the responsibility of the CS to revise and adapt them as necessary to reflect site-specific conditions.

The CS and HSO will observe the general work practices of each crew member and enforce safe procedures. Work areas will be inspected by the crew leaders, CS and HSO. All hazards will be corrected in a timely manner. A variety of physical hazards may be encountered during work activities at this site. Activity Hazard Analyses will be developed for each principal activity and will identify all major hazards to which employees may be exposed. Hard hats, safety glasses, and steel-toe safety boots are required in all work areas of the site. Site-specific hazards and all necessary precautions will be discussed at the daily safety meetings. The General Contractor's Safety Manual will be maintained at the project site as a reference document.

4.3 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants may pose a hazard when performing outdoor tasks. The HSO and CS will take necessary actions to alleviate these hazards should they arise.

4.3.1 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. Heat stress disorders include:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages, e.g. Gatorade™. Heat stress can be prevented by assuring an adequate work/rest schedule. Guidelines are presented below.

The CS and HSO will determine the specific work-rest schedule based on project specific conditions. In addition, workers are encouraged to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the HSO and CS. The CS and HSO will determine the specific work-rest schedule based on project specific conditions. In addition, workers are encouraged to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the HSO and CS.

Heat stress can be prevented by assuring an adequate work/rest schedule and adequate fluid consumption. A guide for work-rest schedules for various protection levels (defined in Section 5.0) is given below. The number of hours before a work-rest period is based on experience with similar work. The time periods should be considered maximum. It must also be remembered that individual physical variability and differences in physical work activities may require revisions to site plans. This table should be used as a guide. Professional judgment (evaluation of individual work load, ambient weather conditions, worker acclimatization and PPE levels) of the CS and HSO is necessary to assure a fully protective plan to prevent heat stress disorders.

GUIDELINES FOR WORK-REST PERIODS FOR VARIOUS PROTECTION LEVELS (A-D) NUMBER OF HOURS BEFORE REST PERIOD				
Temperature	Level D	Level C	Level B	Level A
90+ F*	2.0	1.5	1.0	0.5
87.5 F	2.5	2.0	1.5	1.0
82.5 F	3.0	2.5	2.0	1.5
77.5 F	3.5	3.0	2.5	1.5
72.5	4.0	3.5	2.5	1.5

**Work above 100 F will be reviewed with the Project Safety Manager to determine specific requirements.*

Alternately the work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. The frequency of monitoring is described below.

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, increase the following rest period by 1/3. The initial rest period should be at least 5 minutes.

Body temperature, measured orally or through the ear canal, may also be monitored to assess heat stress. Workers should not be permitted to continue work when their body temperature exceeds 100.4 F (38C). Monitoring should be conducted at the beginning of each break period as noted above.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 72.5 degrees Fahrenheit when wearing chemical protective clothing (Level C, B, A), or 80 degrees Fahrenheit for site activities performed with no chemical protective clothing (Level D). Monitoring should include pulse rate, weight loss, oral/ or ear canal temperature, signs and symptoms of heat stress and fluid intake.

An additional measure that can be employed to minimize heat stress is through the utilization of Heat Stress Relief Stations. A Heat Stress Relief Station (HSRS) is a location inside the exclusion zone where workers can partially remove their personal protective equipment, rest and take in fluids. Since the HSRS is established inside the exclusion zone, it is imperative that its use be closely monitored and controlled to ensure that workers do not ingest contamination during use.

The following is a detailed description of the Heat Stress Relief Station:

- Location- The HSRS should be located in an area of the exclusion zone where it will be predominantly upwind of site activities. This can typically be adjacent to the contamination reduction zone.
- Delineation- The HSRS must be separated from the exclusion zone by temporary fencing and must be labeled as “Heat Stress Relief Station”.
- Elements- The HSRS contains several elements:
 - A tarp or tent for shade;
 - A bench or chairs for workers to sit on;
 - A wash station;
 - A table for fluids, cups and clean personal protective equipment (PPE); and
 - A trash can for contaminated PPE.
- Set-Up- Proper set up of the HSRS is imperative its successful use.

- In the Support Zone, prepare the water cooler with ice and water or Gatorade.
- The person bringing the items to the HSRS must don the appropriate PPE required for the Exclusion Zone.
- Bring the following items to the HSRS:
 - Cooler;
 - Clean disposable cups;
 - Disinfectant wipes;
 - A clean trash bag;
 - Surgical gloves; and
 - Duct tape.
- Ensure the wash station has clean water and paper towels for drying hands/face.
- Procedure for Use- In order for the HSRS to be effective, it must be properly used. It is imperative that workers decontaminate properly before drinking fluids so that ingestion of site contaminants does not take place. The following are the steps to properly use the HSRS:
 - Upon entering the HSRS:
 - If wearing a Tyvek, remove duct tape on wrists and unzip and tie around waist;
 - Remove your outer gloves and surgical gloves; set outer gloves aside and throw surgical gloves into trash;
 - Wash hands and/or face at Wash Station;
 - Use disinfectant wipe on hands;
 - Get drink and/or rest on bench/chair.
 - Before re-entering the Exclusion Zone:
 - Dispose of cups in trash;
 - Put on a clean pair of surgical gloves;
 - If wearing a Tyvek, pull up and rezip;
 - Re-apply duct tape to wrists;
 - Put on outer gloves.
- Monitoring- The CS and HSO are both responsible for monitoring the use of the Heat Stress Relief Station. The HSO should review the procedures for use of the HSRS with the workers before its use begins to ensure that everyone understands the parameters for proper use.

4.3.2 Exposure to Cold

With outdoor work in the winter months, the potential exists for hypothermia and frostbite. Several forms of cold stress as well as preventative measures are described in this section of the HASP.

4.3.2.1 Cold Stress Conditions and Symptoms

Typical cold stress conditions are included in the tables below, including symptoms and first aid precautions. If cold stress conditions develop, professional medical attention will be sought.

TABLE 4.3.2A COLD WEATHER INJURIES		
Cause	Symptoms	First Aid
Frostbite		
Freezing of tissue, normally due to exposure below 32°F	Numbness in affected area. Tingling, blistered, swollen or tender areas. Pale, yellowish waxy-looking skin.	Warm affected area with direct body heat. Consult with medical personnel ASAP. Do not thaw frozen area if treatment will be delayed. Do not massage or rub affected area. Do not wet area or rub with snow or ice.
Chilblain		
Repeated exposure of bare skin for prolonged periods to temperatures 20° to 60°F (for those not acclimated to cold weather).	Swollen, red skin. Tender, hot skin, usually accompanied by itching.	Warm affected area with direct body heat. Do not massage or rub. Do not wet area or rub with snow or ice. Do not expose affected area to open fire, stove or any other intense heat source.
Immersion Foot (Trench Foot)		
Prolonged exposure of the feet to wet conditions at temperatures between 32° to 50°F. Inactivity and damp socks (or tightly laced boots that impair circulation) speed onset and severity.	Cold numb feet may progress to hot with shooting pains. Swelling redness and bleeding.	Rewarm feet by exposing them to warm air. Evacuate victim to a medical facility. Do not massage, rub, moisten or expose affected area to extreme heat source.
Dehydration		
Depletion of body fluids.	Dizziness. Weakness.	Replace lost water. Water should be sipped not gulped. Get medical treatment.
Hypothermia		
Prolonged cold exposure and body heat loss. May occur at well above freezing, especially when a person is immersed in water.	Lack of shivering. Drowsiness, mental slowness, lack of coordination. Can progress to unconsciousness, irregular heartbeat and death.	Strip off clothing and wrap victim in blankets or a sleeping bag. Get victim to a heated location and medical treatment as soon as possible.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel will be instructed to pay particular attention to hands, feet, and any exposed skin when dressing. Personnel will be advised to obtain more clothing if they begin to experience loss of sensation due to cold exposure.

4.3.2.2 Monitoring and Preventative Actions

Typical cold stress monitoring procedures are included in the tables below, including temperatures to initiate monitoring, protective clothing uses and administrative practices to prevent or reduce the potential for cold stress related injury/illness. For weather conditions below -43 °C or -45 °F with no wind and/or similar conditions (see Work/Warm-up Table) all work will cease.

TABLE 4.3.2B COLD STRESS PREVENTION*		
	Temperature	Preventative Action
1	<61°F	Use thermometer to measure ambient temperature.
2	<40°F	Cold weather protective clothing available; check core body temperature at breaks using oral or ear canal thermometer. Maintain core body temperature above 96.8°F to avoid hypothermia.
3	<30°F	Record ambient temperature and wind speed every 4 hours; compare to wind chill chart when below 19.4°F.
4	<19°F	Provide and use heated warming shelters for work breaks and when cold stress symptoms appear.
5	<10°F	Constant observation of workers, i.e. “buddy system”; rest in heated shelters (see work-rest schedule); dry clothing available for change-out; acclimate new workers.
6	<0°F/ >5 mph winds	Obtain medical certification for workers subject to hypothermia risk.

* Based on “2009 ACGIH Threshold Limit Values... for Physical Agents.”
 Note: refer to wind-chill and work-warmup charts in Table 4.3.2E

TABLE 4.3.2C COLD WEATHER CLOTHING REQUIREMENTS	
1	If wind chill is a factor at a work location, the cooling effect of the wind shall be reduced by shielding the work area or providing employees an outer windbreak layer garment.
2	Extremities, ears, toes, and nose shall be protected from extreme cold by protective clothing.
3	Employees performing light work whose clothing may become wet shall wear an outer layer of clothing which is impermeable to water.
4	Employees performing moderate to heavy work whose clothing may become wet shall wear an outer layer of clothing which is impermeable to water.
5	Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat, or if not possible, a heated shelter for warming/drying clothing, or a change of clothing, shall be provided prior to returning to work in a cold environment.

Protective clothing greatly reduces the possibility of hypothermia in workers. However, personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation.

Employees will be instructed to use heated shelters on site, at regular intervals, depending upon the severity of ambient temperatures. Symptoms of cold stress, including heavy shivering, excessive fatigue, drowsiness, irritability, or euphoria necessitate immediate return to the shelter.

TABLE 4.3.2D												
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE (under calm conditions)*												
Actual Temperature Reading (F)												
Estimated Wind Speed (in MPH)	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
Equivalent Chill Temperature (F)												
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind Speeds greater than 40 mph have little additional effect.)	Little Danger In < hr with dry skin. Maximum danger of false sense of security			Increasing Danger Danger of freezing of exposed flesh within one minute.				Great Danger Flesh may freeze within 30 seconds.				
Trench foot and immersion foot may occur at any point on this chart.												

*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA. (Shaded area) Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36 C (98.6 F) per cold stress TLV.

TABLE 4.3.2E											
TLV WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT*											
Air Temperature – Sunny Sky		No Noticeable Wind		5 mph wind		10 mph wind		15 mph wind		20 mph wind	
C (appx.)	F (appx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26 to -28	-15 to -19	Normal	1	Normal	1	75 min	2	55 min	3	40 min	4
-29 to -31	-20 to -24	Normal	1	75 min	2	55 min	3	40 min	4	30 min	5
-32 to -34	-25 to -29	75 min	2	55 min	3	40 min	4	30 min	5	Non-Emergency work should cease	
-35 to -37	-30 to -34	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38 to -39	-35 to -39	40 min	4	30 min	5	Non-emergency work should cease					
-40 to -42	-40 to -44	30 min	5	Non-emergency work should		work should cease					

**TABLE 4.3.2E
 TLV WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT***

Air Temperature – Sunny Sky	No Noticeable Wind		5 mph wind		10 mph wind		15 mph wind		20 mph wind	
	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
C (appx.) F (appx.)										
< -43 < -45	Non-emergency work should cease		cease							

* Adapted from Occupational Health and Safety Division, Saskatchewan Department of Labor

4.3.3 Biological Hazards

The contractor will be required to monitor and control insects, rodents, and other pests identified on site. Standing water will not be allowed on-site, in an effort to control insects. Pest control procedures used by the contractor will include bait, trap, spray, or other means to abate pest problems that develop on site during disruption activities.

4.3.4 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 dbA (Time Weighted Average) as well as personnel working around heavy equipment. The HSO will determine the need and appropriate testing procedures, (i.e., sound level meter and/or dosimeter) for noise measurement. The provisions for noise protection for workers are presented in other safety-related documents for the Site.

4.4 VEHICLE AND HEAVY EQUIPMENT SAFETY

4.4.1 Vehicle Safety

Motor vehicle incidents are the number one cause of occupational fatalities, accounting for one in three deaths. The safety provisions for vehicle use at the Site are presented in other safety-related documents for the Site.

4.4.2 Heavy Equipment Safety

The use of backhoes, front-end loaders, etc. for excavation and other material handling equipment will present various physical hazards. The safety provisions for heavy equipment use at the Site are presented on other safety-related documents for the Site.

4.5 TASK-SPECIFIC ACTIVITY HAZARD ANALYSES (AHA)

This section of the HASP provides a breakdown of the hazards and control measures for each principal task. These Activity Hazard Analyses (AHAs) are general in nature and must be made project specific by the Construction Superintendent prior to each task. The AHAs will be field checked by the supervisor on an ongoing basis and revised as necessary. All revisions will be communicated to the work crew.

Project Identification 131-10 through 131-32 Avery Avenue	Location Queens, NY	Estimated Dates May – August 2015
Phase of Work Mobilization/ Demobilization		Analysis Approved by Spiro Dongaris
TASKS	HAZARDS	CONTROL MEASURES
1. Mobilization and demobilization of equipment site tools, personnel. 2. Set up/remove staging and decontamination areas.	Slips/trips/falls	<ul style="list-style-type: none"> • Maintain alertness to slip/trip/fall hazards • Maintain good housekeeping • Walk, do not run • Wear footwear with soles that grip
	Manual lifting/ material handling	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (50 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Temperature extremes	<ul style="list-style-type: none"> • Drink plenty of fluids • Train personnel of signs/symptoms of cold/heat stress • Monitor air temperatures when extreme weather conditions are present • Stay in visual and verbal contact with your buddy
	Hand tool usage	<ul style="list-style-type: none"> • Daily inspections will be performed • Remove broken or damaged tools from service • Use the tool for its intended purpose • Use in accordance with manufacturer instructions.
	Biological hazards	<ul style="list-style-type: none"> • Be alert to the presence of biological hazards • Wear insect repellent • CS/HSO should be aware of on-site personnel with allergic reactions in insect bites and stings.

Project Identification 131-10 through 131-32 Avery Avenue	Location Queens, NY	Estimated Dates May – August 2015
Phase of Work Trenching/Excavation		Analysis Approved by Spiro Dongaris
TASKS	HAZARDS	CONTROL MEASURES
1. Trenching and excavation. 2. Install shoring/ sheeting protective system.	Chemical hazards	<ul style="list-style-type: none"> • Wear appropriate PPE per Section 5.1 • Practice contamination avoidance • Conduct real-time air monitoring per section 7.1.1 • Follow proper decontamination procedures • Wash hands/face before eating, drinking, smoking
	Cave-in	<ul style="list-style-type: none"> • Do not allow entry into the trench unless approved protective system is in place and has been inspected by the competent person. • Follow OSHA excavation regulations • Place ladder or entry device every 25 feet of lateral travel
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> • Wear reflective warning vests when exposed to vehicular traffic • Isolate potential equipment swing areas • Make eye contact with vehicle operators before approaching/crossing high traffic areas • Understand and review hand signals • Use a spotter to direct equipment movement in high traffic areas • Audible back-up alarms on equipment • Operator inspects equipment daily for safety defects, including the braking system
	Slips/trips/falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment and tools • Mark, identify, or barricade other obstructions • Use barricades or fencing for trenches greater than 6 feet deep • Maintain alertness to slip/trip/fall hazards • Maintain good housekeeping • Walk, do not run • Wear footwear with soles that grip
	Electrical hazards	<ul style="list-style-type: none"> • Maintain 10 foot minimum clearance to any overhead power lines • Call for Utility mark out prior to digging

Project Identification 131-10 through 131-32 Avery Avenue	Location Queens, NY	Estimated Dates May – August 2015
Phase of Work Trenching/Excavation		Analysis Approved by Spiro Dongaris
TASKS	HAZARDS	CONTROL MEASURES
1. Trenching and excavation. 2. Install shoring/ sheeting protective system.	Hand and power tool usage	<ul style="list-style-type: none"> • Daily inspections will be performed on tools and cords • Ensure all guards are in place • Remove broken or damaged tools from service • Use the tool for its intended purpose • Use in accordance with manufacturer instructions
	Noise	<ul style="list-style-type: none"> • Hearing protection mandatory at or above 85 dBA. • Instruct personnel how to properly wear hearing protective devices. • Disposable ear plugs or other hearing protection required while around noisy equipment.
	Manual lifting/ Material handling	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (50 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Temperature extremes.	<ul style="list-style-type: none"> • Drink plenty of fluids: • Train personnel of signs/symptoms of cold/heat stress; • Monitor air temperatures when extreme weather conditions are present; • Stay in visual and verbal contact with your buddy; and • Use procedures in Sections 3.3.1 and 3.3.2

Project Identification 131-10 through 131-32 Avery Avenue	Location Queens, NY	Estimated Dates May – August 2015
Phase of Work Loading of Trucks		Analysis Approved by Spiro Dongaris
TASKS	HAZARDS	CONTROL MEASURES
<ol style="list-style-type: none"> 1. Load trucks with contaminated soils. 2. Cover and clean trucks. 	Chemical hazards	<ul style="list-style-type: none"> • Wear appropriate PPE per Section 6.1 • Practice contamination avoidance • Conduct real-time air monitoring per section 8.1.1 • Follow proper decontamination procedures • Wash hands/face before eating, drinking, smoking
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> • Wear reflective warning vests when exposed to vehicular traffic • Isolate potential equipment swing areas • Make eye contact with vehicle operators before approaching/crossing high traffic areas • Understand and review hand signals • Use a spotter to direct equipment movement in high traffic areas • Audible back-up alarms on equipment • Operator inspects equipment daily for safety defects, including the braking system
	Slips/trips/falls	<ul style="list-style-type: none"> • Maintain alertness to slip/trip/fall hazards • Maintain good housekeeping • Walk, do not run • Wear footwear with soles that grip
	Manual lifting/ material handling	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (50 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Temperature extremes	<ul style="list-style-type: none"> • Drink plenty of fluids • Train personnel of signs/symptoms of cold/heat stress • Monitor air temperatures when extreme weather conditions are present • Stay in visual and verbal contact with your buddy • Use procedures in Sections 4.3.1 and 4.3.2
	Noise	<ul style="list-style-type: none"> • Hearing protection mandatory at or above 85 dBA. • Instruct personnel how to properly wear hearing protective devices. • Disposable ear plugs or other hearing protection required while around noisy equipment.

Project Identification 131-10 through 131-32 Avery Avenue	Location Queens, NY	Estimated Dates May – August 2015
Phase of Work Installation of Footers		Analysis Approved by Spiro Dongaris
TASKS	HAZARDS	CONTROL MEASURES
<ol style="list-style-type: none"> 1. Build forms. 2. Pour concrete. 3. Remove forms. 	Chemical hazards	<ul style="list-style-type: none"> • Wear appropriate PPE per Section 6.1 • Practice contamination avoidance • Conduct real-time air monitoring per section 8.1.1 • Follow proper decontamination procedures • Wash hands/face before eating, drinking, smoking
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> • Wear reflective warning vests when exposed to vehicular traffic • Isolate potential equipment swing areas • Make eye contact with vehicle operators before approaching/crossing high traffic areas • Understand and review hand signals • Use a spotter to direct equipment movement in high traffic areas • Audible back-up alarms on equipment • Operator inspects equipment daily for safety defects, including the braking system
	Concrete pumper	<ul style="list-style-type: none"> • Make sure nozzle man has eye contact with pump truck operator. • Ensure steady control over nozzle
	Splashing concrete	<ul style="list-style-type: none"> • Ensure eye protection is worn and other PPE as required by Section 6.1 • A portable eyewash will be maintained in the work area
	Falls from heights	<ul style="list-style-type: none"> • Fall protection is required over 6 feet when removing forms • Use PFAS where needed • OSHA required training before use of PFAS, scaffold or lift • Competent person inspects PFAS and scaffold
	Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects being handled • Maintain all hand and power tools in a safe condition • Keep guards in place during use

Project Identification 131-10 through 131-32 Avery Avenue	Location Queens, NY	Estimated Dates May – August 2015
Phase of Work Installation of Footers		Analysis Approved by Spiro Dongaris
TASKS	HAZARDS	CONTROL MEASURES
1. Build forms. 2. Pour concrete. 3. Remove forms.	Hand and power tool usage	<ul style="list-style-type: none"> • Daily inspections will be performed on tools and cords • Ensure all guards are in place • Remove broken or damaged tools from service • Use the tool for its intended purpose • Use in accordance with manufacturer instructions
	Noise	<ul style="list-style-type: none"> • Hearing protection mandatory at or above 85 dBA. • Instruct personnel how to properly wear hearing protective devices. • Disposable ear plugs or other hearing protection required while around noisy equipment.
	Manual lifting/material handling	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (50 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips/trips/falls	<ul style="list-style-type: none"> • Maintain alertness to slip/trip/fall hazards • Maintain good housekeeping • Walk, do not run • Wear footwear with soles that grip
	Temperature extremes.	<ul style="list-style-type: none"> • Drink plenty of fluids: • Train personnel of signs/symptoms of cold/heat stress; • Monitor air temperatures when extreme weather conditions are present; • Stay in visual and verbal contact with your buddy; and • Use procedures in Sections 4.3.1 and 4.3.2

Project Identification 131-10 through 131-32 Avery Avenue	Location Queens, NY	Estimated Dates May – August 2015
Phase of Work Heavy Equipment Decontamination		Analysis Approved by Spiro Dongaris
TASKS	HAZARDS	CONTROL MEASURES
1. Pressure wash or steam clean heavy equipment and vehicles.	Chemical hazards	<ul style="list-style-type: none"> • Wear appropriate PPE per Section 6.1 • Practice contamination avoidance • Conduct real-time air monitoring per section 8.1.1 • Follow proper decontamination procedures • Wash hands/face before eating, drinking, smoking
	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> • Wear reflective warning vests when exposed to vehicular traffic • Isolate potential equipment swing areas • Make eye contact with vehicle operators before approaching/crossing high traffic areas • Understand and review hand signals • Use a spotter to direct equipment movement in high traffic areas • Audible back-up alarms on equipment • Operator inspects equipment daily for safety defects, including the braking system
	Steam/heat/splashing	<ul style="list-style-type: none"> • Wear face shield + safety glasses • Stay out of splash radius to minimize exposure • Do not direct steam/spray at anyone
	Hand and power tool usage	<ul style="list-style-type: none"> • Daily inspections will be performed on tools and cords • Ensure all guards are in place • Remove broken or damaged tools from service • Use the tool for its intended purpose • Use in accordance with manufacturer instructions
	Slips/trips/falls	<ul style="list-style-type: none"> • Maintain alertness to slip/trip/fall hazards • Maintain good housekeeping • Walk, do not run • Wear footwear with soles that grip
	Temperature extremes	<ul style="list-style-type: none"> • Drink plenty of fluids • Train personnel of signs/symptoms of cold/heat stress • Monitor air temperatures when extreme weather conditions are present • Stay in visual and verbal contact with your buddy • Use procedures in Sections 4.3.1 and 4.3.2

5.0 *WORK AND SUPPORT AREAS*

To prevent migration of contamination from personnel and equipment, work areas will be clearly specified as designated below prior to beginning operations. Each work area will be clearly identified using signs or physical barriers.

5.1 **EXCLUSION ZONE (EZ)**

The EZ is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks and monitoring performed within that zone. The EZ for this project will include the excavation areas, any stockpiling/staging areas, and areas where disturbance of urban fill is likely occurring.

5.2 **CONTAMINATION - REDUCTION ZONE (CRZ)**

The CRZ or transition zone will be established between the EZ and support zone (SZ). In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ. The CRZ for this project will be the access/egress routes to/from the EZ and the personnel and equipment decontamination stations.

5.3 **SUPPORT ZONE (SZ)**

The SZ serves as a clean, control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment or clothing will not be allowed in the SZ. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the HSO and the CS to ensure proper safety protocols are followed. The SZ will be any office areas/trailers and the parking and visitor access ways to the project site.

5.4 **SITE CONTROL LOG**

A log of all personnel visiting, entering or working on the site shall be maintained in the main office location. The log will record the date, name, company or agency, and time entering or exiting the site.

No visitor will be allowed in the EZ without showing proof of training and compliance with applicable medical monitoring requirements. Visitors will supply their own protective equipment, including hard hat, boots and respiratory equipment, if required. Visitors will attend a site orientation given by the HSO and sign the HASP.

5.5 **GENERAL**

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contamination is prohibited in the EZ and CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking or other activities which may result in ingestion of contamination.
- During site operations, each worker will consider himself as a safety backup to his partner. All personnel will be aware of dangerous situations that may develop.
- Visual contact will be maintained between workers on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any site personnel, who do not comply with safety policy, as established by the HSO or the CS, will be dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All site workers are authorized to stop work if they observe unsafe actions of workers or other unsafe conditions on site which may cause an imminent danger.
- All workers and visitors must sign in and out of the site.

6.0 *PROTECTIVE EQUIPMENT*

This section specifies the levels of personal protective equipment (PPE) which are or may be required for each principal activity performed at this site. All site personnel must be trained in the use of all PPE utilized.

6.1 ANTICIPATED PROTECTION LEVELS

The following protection levels have been established for the site work activities based on site information concerning the levels of contaminants and the scope of work. Results of site air monitoring and visual inspection of the work activities may indicate the need for changes in final PPE level(s). Changes in the initial PPE Levels prescribed in the Table below require completion of the HASP amendment form in Appendix B.

Task	Initial PPE Level	Upgrade/ Downgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
General Support Zone Activities	Level D	—	Generally none	None	Hard-hat, Steel-toe work boots, safety glasses, safety vests. Leather work gloves as needed. Hearing protection when >85 dBA.
Mobilization/ Demobilization	Level D	—	Generally none	None	Hard-hat, Steel-toe work boots, safety glasses, safety vests. Leather work gloves as needed. Hearing protection when >85 dBA.
Excavation, Loading of Trucks with Contaminated Soil/Fill, Equipment Decontamination	Level D		Generally none,	Initial: None (See Section 7)	Hard-hat, Steel-toe work boots, safety glasses, leather work gloves for material handling, hearing protection >85 dBA

6.2 PROTECTION LEVEL DESCRIPTIONS

This section lists the minimum requirements for each protection level. Modification to these requirements may have been noted in the Table shown above.

6.2.1 *Level D*

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather
- Leather work gloves when material handling

7.0 ***DECONTAMINATION PROCEDURES***

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

7.1 **PERSONNEL DECONTAMINATION**

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedures for Level D. The specific stages will vary depending on the site, the task, the protection level, etc. Dry decontamination may be used if there is insufficient space to support a full decontamination station as delineated with the steps below and approved by the HSO. The CS and the HSO will ensure that the decontamination procedures are adequate.

Level D Decontamination

1. Go to end of EZ
2. Cross into CRZ
3. Wash face and hands

7.1.1 ***Suspected Contamination***

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination area. Here the worker will remove clothing and don clean clothing. Medical attention will be provided as determined by the degree of injury.

7.1.2 ***Personal Hygiene***

Personnel will wash hands, arms, neck and face, following decontamination and before any eating, smoking, or drinking.

7.2 **EQUIPMENT DECONTAMINATION**

Heavy equipment and other vehicles operated within the EZ will be decontaminated before being removed from the site. Workers operating the equipment/vehicles will move the equipment to a gross decontamination location near the exit of the EZ. Following gross decontamination the equipment/vehicle will be moved to the decontamination pad. Equipment decontamination will be performed on the pad until the equipment is visually clean. Following decontamination

activities equipment will be inspected by the HSO or CS prior to leaving the site. Once the equipment is inspected it will be removed from the site.

Heavy Equipment / Vehicle Decontamination

1. Equipment operator will move the heavy equipment / vehicle to a position near the EZ / CRZ interchange
2. Worker will use manual equipment (shovel, track spade) to remove gross contamination from tracks, bucket, dump box, and vehicle undercarriage (as required)
3. Following removal of gross decontamination equipment will be moved onto the decontamination pad and pressure washed / steam cleaned until equipment / vehicle is visually clean.
4. Equipment / vehicle decontaminated for removal from the site will be moved to a clean area for the HSO / CS inspection.
5. Once the equipment / vehicle is inspected and approved it will be removed from the site. Vehicles that fail inspection will be returned to the decontamination pad for further cleaning and re-inspected.

7.3 DISPOSAL OF WASTES

Wastes will be disposed according to applicable Local, State and Federal regulations.

7.4 DUST /EROSION CONTROL

The contractor will control dust and implement erosion control measures to be protective of nearby ecologically sensitive areas and sensitive receptors.

8.0 ***AIR MONITORING***

Air monitoring will be conducted in order to characterize personnel exposures and fugitive emissions from site contaminants. Principal contaminants of concern are listed in Section 4.0 of this HASP. The target compounds selected for air monitoring purposes for this site include particulates. Results of air monitoring will be used to ensure the proper selection of protective clothing and equipment, including respiratory protection, to protect on-site personnel and off-site receptors from exposure to unacceptable levels of site contaminants. Descriptions of air monitoring strategies, procedures and equipment are provided below. Modification of this plan, including additional monitoring, may be considered as judged necessary by the PSM, in conjunction with the HSO.

8.1 **WORK AREA AIR MONITORING**

Work area air monitoring will include direct reading methods and personal exposure monitoring. Air monitoring will be conducted during soil/waste excavation, transportation, relocation and/or staging, and any other intrusive activities.

8.1.1 ***Direct Reading Air Monitoring***

During active sifting operations, direct reading air monitoring will be performed to determine the potential for worker exposure to airborne hazards. A summary of air monitoring information is provided in section 8.1.5. Real-time air samples will be taken at least four times each 8-hour worker shift in the workers breathing zone (BZ).

8.1.2 ***Instrumentation***

The following is a description of the air monitoring equipment to be used:

- MIE PDR-1000 Personal DataRAM, Dust trak or equivalent unit for real-time measuring particulates.

8.1.3 ***Use And Maintenance Of Survey Equipment***

All personnel using field survey equipment must have training in its operation, limitations, and maintenance. Maintenance and internal or electronic calibration will be performed in accordance with manufacturer recommendations by individuals familiar with the devices before their use on site. Repairs, maintenance, and internal or electronic calibration of these devices will be recorded in an equipment maintenance logbook. The equipment maintenance logbook for each instrument will be kept in that instrument's case. For rented monitoring equipment, repairs and

maintenance will be conducted by the rental company. Daily calibration records will be documented on a log sheet found in Appendix D.

Air monitoring equipment will be calibrated before work begins. Only basic maintenance (such as changing batteries) will be performed by on-site personnel. Any additional maintenance or repairs will be performed by a trained service technician.

8.1.4 Air Monitoring Recordkeeping

The HSO will ensure that all air-monitoring data is recorded on a data sheet found in Appendix D. The PSM may periodically review this data.

8.1.5 Action Levels

During soil/waste excavation, transportation, relocation and/or staging or any intrusive activities, direct reading air monitoring will be performed in the EZ to determine exposure to workers. A summary of air monitoring information is provided in the table below.

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action
pDr-1000 (Dust)	Soil excavation areas/laborers, technicians, equipment operators	Four times every 8-hour shift during soil disturbance activities	<5.0 mg/m ³ * ≥5.0 mg/m ³ *	Level D Stop work; notify PSM Implement dust suppression measures and resume work after dust levels are below action level

* Sustained levels in the breathing zone for 5 minutes

As indicated by the below calculations, the action level for PAHs and the metals of concern was selecting based on the OSHA PEL for respirable dust, which was found to be significantly lower than the calculated actions levels for PAHs and copper, lead, mercury, and zinc based on utilizing the highest concentrations of these contaminants found in soil.

- OSHA PEL for respirable dust: 5 mg/m³,
- Maximum concentration of PAHs found in soil is 1.2 ppm or 0.00012%.
 - 5.0 mg/m³ multiplied by 0.00012% = 0.000006 mg/m³
 - OSHA PEL for PAHs is 0.2 mg/m³
- Maximum concentration of Lead found in soil is 412 ppm or 0.0412%.
 - 5.0 mg/m³ multiplied by 0.0412% = 0.00206 mg/m³

- OSHA PEL for lead is 0.05 mg/m^3
- Maximum concentration of Mercury found in soil is 1.76 ppm or 0.000176%.
 - 5.0 mg/m^3 multiplied by 0.000176% = 0.0000088 mg/m^3
 - OSHA PEL for PAHs is 0.1 mg/m^3
- Maximum concentration of Copper found in soil is 669 ppm or 0.0669%.
 - 5.0 mg/m^3 multiplied by 0.0669% = 0.003345 mg/m^3
 - OSHA PEL for PAHs is 0.1 mg/m^3

9.0 *EMERGENCY RESPONSE AND CONTINGENCY PLAN (ERCP)*

9.1 PRE-EMERGENCY PLANNING

Prior to engaging in construction/remediation activities at the site, the CS will plan for possible emergency situations and have adequate supplies and manpower to respond. In addition, site personnel will be briefed on proper emergency response procedures during the site orientation.

The following situations would warrant implementation of the emergency plan:

Fire/Explosion	<ul style="list-style-type: none"> • The potential for human injury exists. • Toxic fumes or vapors are released. • The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions. • The use of water and/or chemical fire suppressants could result in contaminated run-off. • An imminent danger of explosion exists.
Spill or Release of Hazardous Materials	<ul style="list-style-type: none"> • The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard. • The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health.
Natural Disaster	<ul style="list-style-type: none"> • A rain storm exceeds the flash flood level. • The facility is in a projected tornado path or a tornado has damaged facility property. • Severe wind gusts are forecasted or have occurred and have caused damage to the facility.
Medical Emergency	<ul style="list-style-type: none"> • Overexposure to hazardous materials. • Trauma injuries (broken bones, severe lacerations/bleeding, burns). • Eye/skin contact with hazardous materials. • Medical Conditions e.g., loss of consciousness, heat stress (heat stroke), heart attack, respiratory failure, allergic reaction.

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.

- It will be the responsibility of the CS/HSO to brief on site personnel on anticipated hazards at the site. The CS/HSO shall also be responsible for anticipating and requesting equipment that will be needed for response activities.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. A telephone will be available to summon assistance in an emergency.

Primary communication with local responders in the event of an emergency will be accomplished using commercial telephone lines.

9.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the CS and Health & Safety Officer (HSO), through daily site inspections and employee feedback to recognize and identify hazards that are found at the site. These may include:

Chemical Hazards	<ul style="list-style-type: none"> • Materials at the site • Materials brought to the site 	
Physical Hazards	<ul style="list-style-type: none"> • Fire/explosion • Slip/trip/fall • Electrocution 	<ul style="list-style-type: none"> • Confined space • IDLH atmospheres • Excessive noise
Mechanical Hazards	<ul style="list-style-type: none"> • Heavy equipment • Stored energy system • Pinch points 	<ul style="list-style-type: none"> • Electrical equipment • Vehicle traffic
Environmental Hazards	<ul style="list-style-type: none"> • Electrical Storms • High winds • Heavy Rain/Snow 	<ul style="list-style-type: none"> • Heat Stress • Vehicle traffic

9.3 EMERGENCY TELEPHONE NUMBERS

Emergency telephone numbers can be found in Table 9-1. The emergency numbers will be posted in all site trailers.

Figure 9-1 is the Hospital Route Map with directions to the nearest hospital. Only in a non-emergency situation are personnel to be transported to the hospital by site representatives.

FIGURE 9-1

**TABLE 9-1
 EMERGENCY TELEPHONE NUMBERS**

Emergency Medical Service.....	911
<u>Police</u> : New York City Police Department (NYPD).....	911
<u>Hospital</u> : New York Hospital Queens.....	718-670-2000
<u>Fire</u> : New York City Fire Department (FDNY).....	911
New York City Office of Emergency Management.....	911
National Response Center.....	(800) 424-8802
Poison Control Center.....	(800) 222-1222
Chemtrec.....	(800) 262-8200
Center for Disease Control.....	(800) 311-3435
USEPA(Region II).....	(212) 637-5000
NYSDEC Emergency Spill Response.....	(800) 457-7362
Contractor Emergency Numbers.....	(718) 472-0830

DIRECTIONS AND HOSPITAL ROUTE MAP

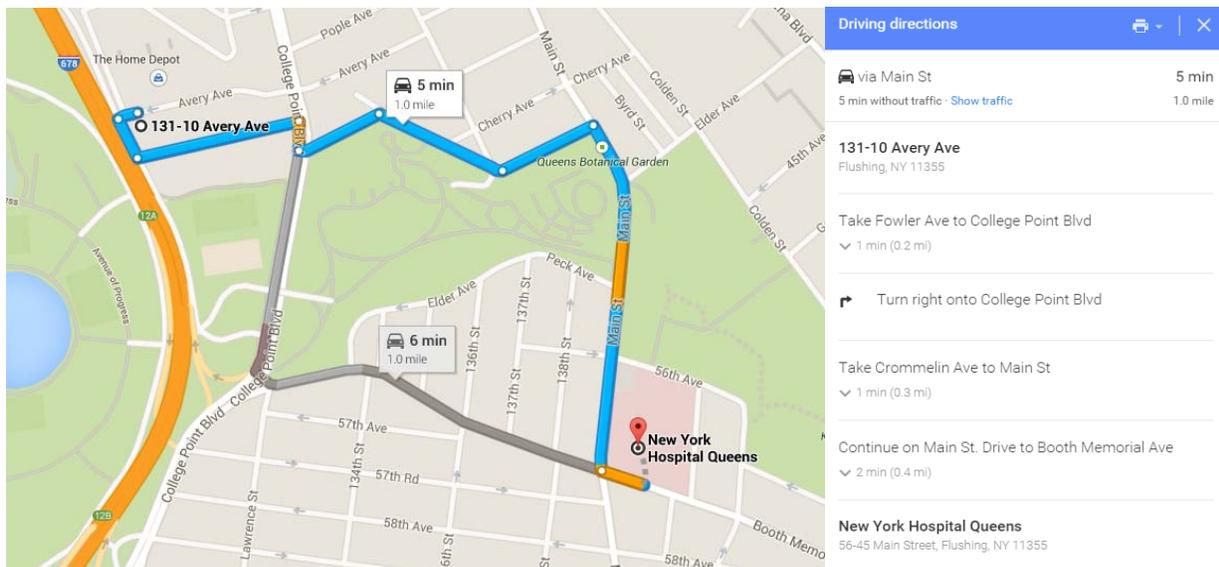
FIGURE 1 – HOSPITAL ROUTE PLAN

Site Location: 131-10 Avery Avenue, Queens, NY 11355

Hospital Location: New York Hospital Queens, 56-45 Main Street, Flushing, NY 11355

Information Line: 718-670-2000

Steps	Maneuvers	Dist.
1	Head north on 31 st Street toward 38 th Avenue	1.1 mi
2	Turn left on to 30 th Avenue	0.2 mi
3	Follow signs to the Emergency Room	
Total Est. Time: 4 minutes		Total Est. Distance: 1.3 miles



Once a hazard has been recognized, the CS and/or the HSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Personal Protective Equipment (PPE) selection/use
- Written and approved permits for hot work, confined space
- Trenching/shoring procedure

- Air monitoring
- Following all standard operating procedures

9.4 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary emergency coordinator for this site is the CS. In the event an emergency occurs and the emergency coordinator is not on site, the HSO will serve as the emergency coordinator until the CS arrives. The emergency coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The emergency coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment.

Immediately after being notified of an emergency incident, the emergency coordinator or his designee will evaluate the situation to determine the appropriate action.

9.4.1 *Responsibilities and Duties*

This section describes the responsibilities and duties assigned to the emergency coordinator.

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. Personnel will follow procedures as directed by the fire department, LEPC, State and Federal Agencies as required.

9.4.2 *On-Site Emergency Coordinator Duties*

The on-site emergency coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the emergency coordinator. Specific duties are as follows:

- Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.
- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, where safe and appropriate.

- Notify the Client Representative and local Emergency Response Teams if their help is necessary to control the incident. Table 9-1 provides telephone numbers for emergency assistance.
- Direct on-site personnel to control the incident until, if necessary, outside help arrives. Specifically: Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if safe and appropriate. The Emergency Response Coordinator is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.
- If fire or explosion is involved, notify local Fire Department.
- Have protected personnel, in appropriate PPE, on standby for rescue.

If the incident may threaten human health or the environment outside of the site, the emergency coordinator should immediately determine whether evacuation of area outside of the site may be necessary and, if so, notify the Police Department and the Office of Emergency Management.

When required, notify the National Response Center. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800-424-8802.

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.
- Containers of waste are removed or isolated from the immediate site of the emergency.
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.

- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.
- Notify the USEPA Regional Administrator that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility. The USEPA Regional Administrator's telephone number is included in the Emergency Contacts.
- Record date, time, details of the incident, and submit a written report to the USEPA Regional Administrator. The report is due to the USEPA within 15 days of the incident.

9.5 SAFE DISTANCES AND PLACES OF REFUGE

The emergency coordinator for all activities will be the CS. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

If a major incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The emergency coordinator, or his designee will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 9-1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the site entrance, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

9.6 EVACUATION ROUTES AND PROCEDURES

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the emergency coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The emergency coordinator is responsible for determining which situations require site evacuation.

9.6.1 *Evacuation Signals and Routes*

Two-way radio communication or equivalent will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. As necessary, each crew supervisor will have a two-way radio. Total site evacuation will be initiated only by the emergency coordinator, however, in his absence, decision to preserve the health and safety of employees will take precedence.

9.6.2 *Evacuation Procedures*

In the event evacuation is necessary the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the emergency coordinator.
- ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders. Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.

- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the emergency coordinator.
- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency coordinator.
- A final tally of persons will be made by the emergency coordinator or designee. No attempt to find persons not accounted for will involve endangering lives of site personnel by re-entry into emergency areas.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the Construction Superintendent.
- Personnel will be assigned by the emergency coordinator to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance is given by the emergency coordinator. At his direction, a signal or other notification will be given for re-entry into the facility.

9.7 EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 9-1 provide a quick reference guide to follow in the event of a major spill.

9.7.1 *Notification Procedures*

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site emergency coordinator.

On-site Emergency Coordinator will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release or spillage of hazardous material.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapor or smoke release is heading.

- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site emergency coordinator to assess the magnitude and potential seriousness of the spill or release.

9.7.2 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 ft. in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 ft. in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be necessary. In general an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site emergency coordinator will inform the proper agencies in the event this is necessary. (Refer to Table 9-1)

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA shall be reported.

Clean up personnel will take the following measures:

- Make sure all unnecessary persons are removed from the hazard area.

- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.
- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
- Spray the spill area with foam, if available, if volatile emissions may occur.
- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.

For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

9.7.3 *Emergency Response Equipment*

The following equipment will be staged in the support zone and throughout the site, as needed, to provide for safety and first aid during emergency responses.

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Portable eyewash

9.7.4 *Emergency Spill Response Clean-Up Materials and Equipment*

A sufficient supply of appropriate emergency response clean-up and personal protective equipment will be available as needed.

The materials listed below may be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the support zone, in a supply trailer or storage area. Small amounts, as necessary, will be placed on pallets and located in the active work areas.

- Sand or clay to solidify/absorb liquid spills.

- * **Note: All contaminated soils, absorbent materials, solvents and other materials resulting from the clean-up of spilled or discharged substances shall be properly stored, labeled, and disposed of off-site.**

9.8 EMERGENCY CONTINGENCY PLAN

This section of the ERCP details the contingency measures the Site Contractor will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

9.9 MEDICAL EMERGENCY CONTINGENCY MEASURES

The procedures listed below will be used to respond to medical emergencies. A minimum of one First-Aid/CPR trained personnel should be available on site.

9.9.1 *Response*

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site emergency coordinator to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the emergency, if known

The Emergency Coordinator will notify the Health & Safety Officer. The following actions will then be taken depending on the severity of the incident:

- *Life-Threatening Incident* – If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. Any injury within the EZ will be evacuated by personnel to a clean area for treatment by EMS personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.
- *Non Life-Threatening Incident* – If it is determined that no threat to life is present, the Health & Safety Officer will direct the injured person through decontamination

procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

- * **Note: The area surrounding an accident site must not be disturbed until the scene has been cleared by the Health & Safety Officer.**

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- Alert emergency and off-site medical personnel to potential contamination, instruct them about specific decontamination procedures.
- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

All injuries, no matter how small, will be reported to the HSO or the CS. An accident/injury/illness report will be completely and properly filled out and submitted to the Corporate Health and Safety Manager.

A list of emergency telephone numbers is given in Table 9.1.

9.9.2 Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-site Emergency Coordinator
- Workers in the affected areas
- Client Representative

9.10 FIRE CONTINGENCY MEASURES

Because flammable/combustible materials are present at this site, fire is an ever-present hazard. Safety personnel are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the emergency coordinator by radio and vacate the structure or area. The emergency coordinator will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.
- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

9.10.1 *Response*

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify their supervisor who will then contact the Emergency Coordinator by radio. The emergency coordinator will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a small fire has been extinguished by a worker, the emergency coordinator will be notified.

9.11 HAZARDOUS WEATHER CONTINGENCY MEASURES

Operations outside will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy Rains/Snow
- High Winds

9.11.1 *Response*

- Excavation/soil stock piles will be covered with plastic liner.
- All equipment will be shut down and secured to prevent damage.
- Personnel will be moved to safe refuge. The emergency coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

9.11.2 *Notification*

The emergency coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- Site workers and subcontractors
- Client Representative
- Local Emergency Management Agency

9.12 SPILL/RELEASE CONTINGENCY MEASURES

In the event of release or spill of a hazardous material the following measures will be taken:

9.12.1 *Response*

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

First aid will be administered to injured/contaminated personnel. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve or temporarily sealing a hole with a plug.

The emergency coordinator will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Air monitoring will be implemented by the emergency coordinator and HSO to determine the potential impact on the surrounding community. Notification procedures will be followed to inform on-site personnel and off-site agencies. The emergency coordinator will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth
- Digging a sump, installing a polyethylene liner and
- Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- Transferring the material from its original container to another container

The emergency coordinator will notify the Client Representative of the spill and steps taken to institute clean-up. Emergency response personnel will clean-up all spills following the spill clean-up plan developed by the emergency coordinator. Supplies necessary to clean up a spill may include, but are not limited to:

- Shovel, rake
- Clay absorbent
- Polyethylene liner
- Personal safety equipment
- Steel drums
- Pumps and miscellaneous hand tools

The emergency coordinator will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the Client Representative. If necessary, soil, water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean-up effort. The emergency coordinator will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The emergency coordinator will review the cause with the Client Representative and obtain his concurrence with the remedial action plan.

10.0 TRAINING REQUIREMENTS

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and be required to sign the CHASP Acknowledgment form in Appendix A.

10.1 SITE-SPECIFIC TRAINING ORIENTATION

Outlines of the orientation for site workers, subcontractor personnel and visitors are presented below:

CONTRACTOR WORKERS	VISITORS
<ul style="list-style-type: none"> • HASP sign off • Sign in/out procedures • Site background/characterization • Chain of command • Rules and regulations • Hours of work • Absences • Personal Protective Equipment/respirator fit test (if applicable) • Emergency Information <ul style="list-style-type: none"> • Emergency signal • Gathering point • Responsibilities/roles • Emergency phone numbers • Site Control/Work Zones • Hazards/AHAs • Air Monitoring Program • Forms, site-specific • Incident Reporting • Lead Awareness (Appendix C) 	<ul style="list-style-type: none"> • Sign in/out procedures • Site Background/Characterization • Review of Site map • Work Zones in progress • Emergency plan/signals • Training/medical requirements • Zones/areas open to visitors

10.2 DAILY SAFETY MEETINGS

A safety meeting will be conducted by the CS and the HSO before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

APPENDIX A

- *HEALTH AND SAFETY PLAN CERTIFICATION*
- *GENERAL/SUB-CONTRACTOR HEALTH & SAFETY PLAN ACKNOWLEDGEMENT*
- *NOTICE OF SAFETY VIOLATION*
- *PRE-JOB SAFETY CHECKLIST*

NOTICE OF SAFETY VIOLATION

TO: _____ (Name of Contractor/Subcontractor Supervisor)
FROM: _____ (Name of Owner/Contractor's Project Manager)
DATE: _____
SUBJECT: *Notice of Safety Violations*

The following Safety Violations were observed at the Name of Site/Project on Date.

1. _____
2. _____
3. _____
4. _____
5. _____

You are requested to take the necessary corrective action to alleviate these safety violations by _____ (Date).

Please notify _____ (Name of Contractor/Subcontractor's Project Manager) when you have completed this corrective action.

Thank you in advance for your cooperation in this effort.

CONTRACTOR/SUBCONTRACTOR
PRE-JOB SAFETY CHECKLIST

JOB:

SUBCONTRACTOR:

LOCATION:

PROJECT NO.

		<u>Yes</u>	<u>No</u>
1.	Standard emergency signals fully understood?	<input type="checkbox"/>	<input type="checkbox"/>
2.	Subcontractor responsibility in time of emergency understood?	<input type="checkbox"/>	<input type="checkbox"/>
3.	Fire and ambulance telephone numbers known?	<input type="checkbox"/>	<input type="checkbox"/>
4.	Areas for possible evacuation designated?	<input type="checkbox"/>	<input type="checkbox"/>
5.	Special safety rules for the plant or area known?	<input type="checkbox"/>	<input type="checkbox"/>
6.	Nature of Chemical or special hazards for area reviewed with safety officer?	<input type="checkbox"/>	<input type="checkbox"/>
7.	Special safety equipment for the area of job known?	<input type="checkbox"/>	<input type="checkbox"/>
8.	Safety shower and eye wash locations known?	<input type="checkbox"/>	<input type="checkbox"/>
9.	Smoking area designated?	<input type="checkbox"/>	<input type="checkbox"/>
10.	Have you been advised of potential hazards, protective Measures and availability of hazard information? e.g. Health & Safety Plan	<input type="checkbox"/>	<input type="checkbox"/>
11.	Do you understand you are required to provide your employees with the information in (10) above?	<input type="checkbox"/>	<input type="checkbox"/>
12.	Have you provided MSDSs to Athenica for any hazardous material you intend to bring on site?	<input type="checkbox"/>	<input type="checkbox"/>
13.	Have you submitted training/medical certification records?	<input type="checkbox"/>	<input type="checkbox"/>
14.	Are your subcontractors aware of the above rules?	<input type="checkbox"/>	<input type="checkbox"/>

Remarks: (Explain all No Answers) _____

Subcontractor's Supervisor

Date

Contractor's Project Manager

Date

Contractor's Project Supervisor

Date

Health & Safety Officer

Date

APPENDIX B

HEALTH AND SAFETY PLAN AMENDMENTS AND DOCUMENTATION FORM

**SITE-SPECIFIC HEALTH AND SAFETY PLAN
AMENDMENT DOCUMENTATION**

Project Name: _____ **Project No.:** _____

Amendment No.: _____ **Date:** _____

Amendment Page(s): _____ **Revises:** _____ **Section(s):** _____

Task(s) Amendment Affects:* _____

**(Attach new/revised Job Safety Analyses)*

Reason For Amendment:

Amendment: *(Attach separate sheet(s) as necessary)*

Completed by: _____ **Approved by:** _____

**SITE-SPECIFIC HEALTH AND SAFETY PLAN
AMENDMENT DOCUMENTATION**

Project Name: _____ **Project No.:** _____

Amendment No.: _____ **Date:** _____

Amendment Page(s): _____ **Revises:** _____ **Section(s):** _____

**SITE-SPECIFIC HEALTH AND SAFETY PLAN
AMENDMENT DOCUMENTATION**

Project Name: _____ **Project No.:** _____

Amendment No.: _____ **Date:** _____

Amendment Page: _____ **Revises:** _____ **Section:** _____

Task(s) Amendment Affects:* _____

**(Attach new/revised Job Safety Analyses)*

Reason For Amendment:

Amendment: *(Attach separate sheet(s) as necessary)*

Completed by: _____ **Approved by:** _____

APPENDIX C

DAILY SAFETY REPORT FORM

AIR MONITORING FORMS

	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			
	pDR-1500, Dusttrack or equivalent			Filter			

Calibration gases: 1. 100 ppm isobutylene, 2. 50% LEL methane, 3. 50 ppm CO, 4. 25 ppm H₂S

APPENDIX D

TAILGATE SAFETY MEETING FORM

Daily Safety Meeting Report

Project Name:

Location:

Date:

Today's Tasks/Activities:

Potential Chemical/Physical Hazards:

Personal Protective Equipment:

Attendees:

<hr/>	<hr/>



HSO: _____ Const. Supt:

(Signature) (Signature)



APPENDIX 6

VAPOR BARRIER SPECIFICATIONS AND MANUFACTURER'S COMPATIBILITY LETTER

PREPRUFE® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

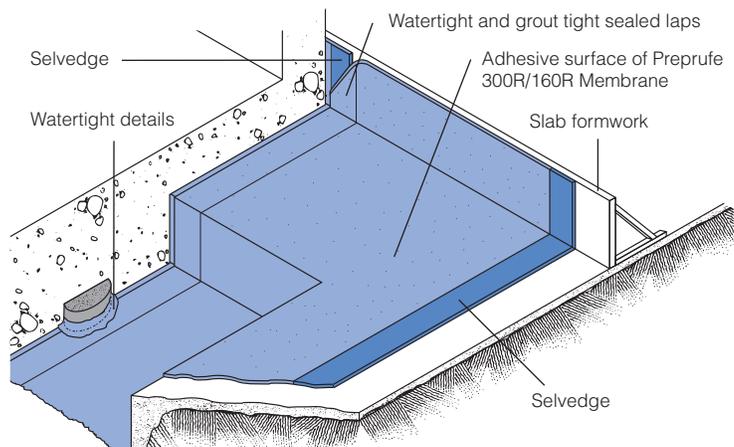
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
 - not reliant on confining pressures or hydration
 - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only. Please refer to graceconstruction.com for specific application details.

Installation

The most current application instructions, detail drawings and technical letters can be viewed at graceconstruction.com. For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 4 ft (1.2 m) wide, with a selvage on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

All surfaces—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

Horizontal—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

Vertical—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions 55°F (<13°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe LT data sheet for more information.

Horizontal substrates—Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed (see Figure 2).

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvage. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Refer to Grace Tech Letter 15 for information on suitable rebar chairs for Preprufe.

Vertical substrates—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvage using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to

overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 3). Immediately remove printed plastic release liner from the tape.

Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit graceconstruction.com. This manual gives comprehensive guidance and standard details.

Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvage has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe membrane and tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 1500 psi (10 N/mm²) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.

Figure 1

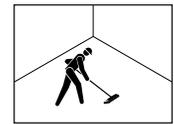


Figure 2

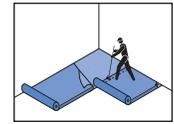
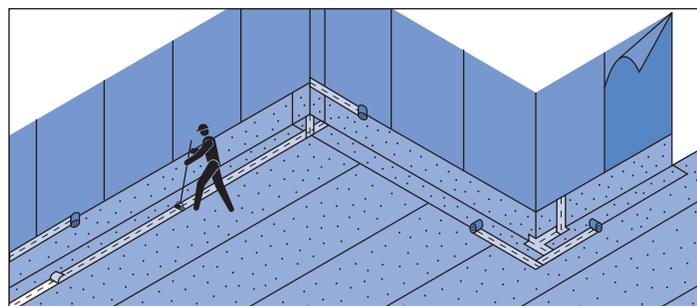
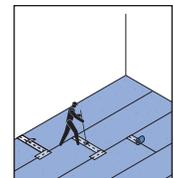


Figure 3

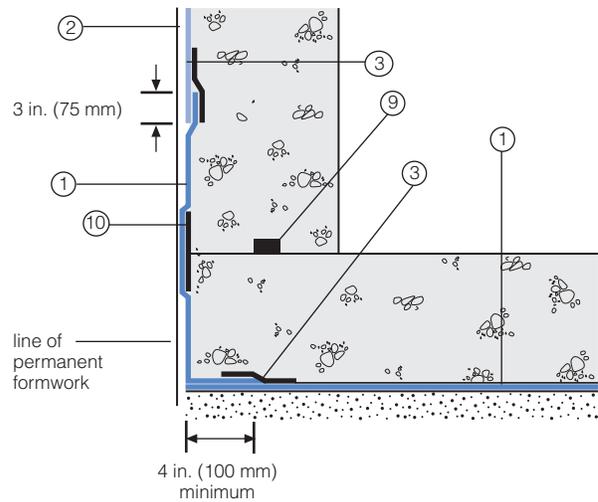


Detail Drawings

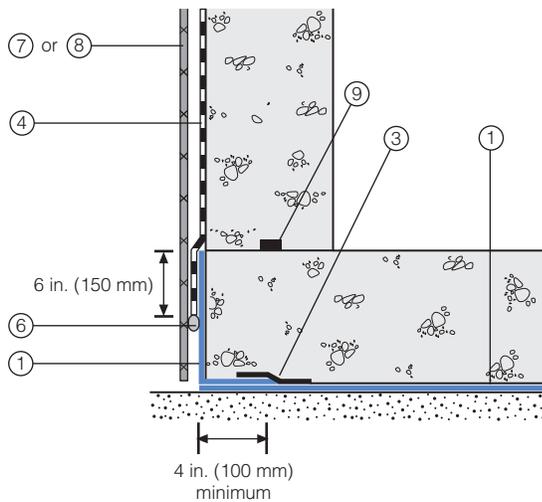
Details shown are typical illustrations and not working details. For a list of the most current details, visit us at graceconstruction.com.

For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

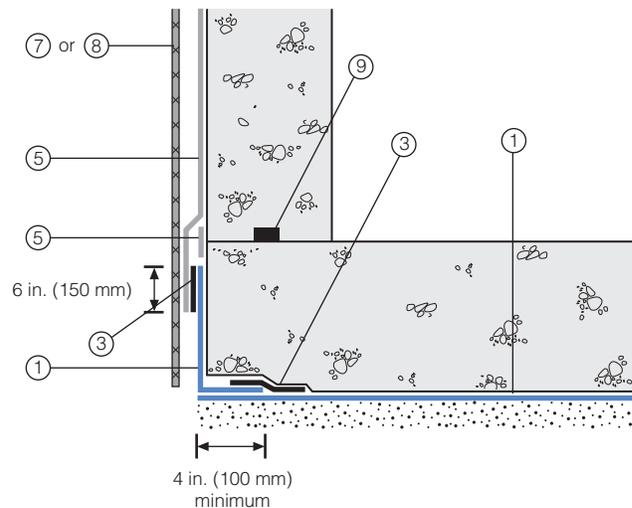
Wall base detail against permanent shutter



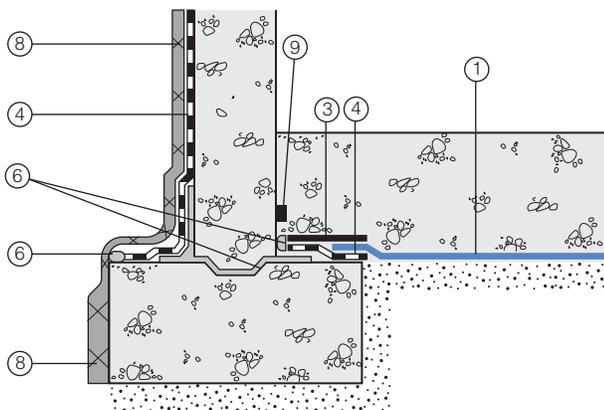
Bituthene wall base detail (Option 1)



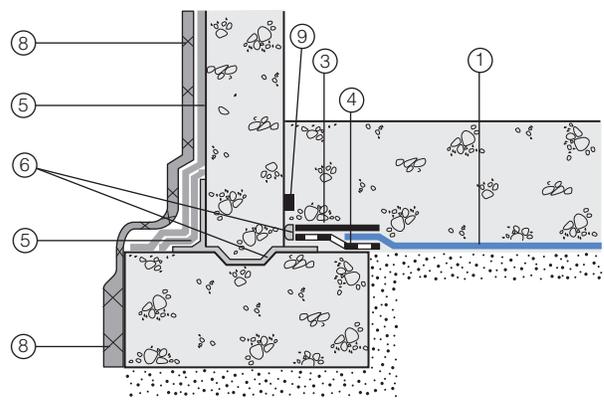
Procor wall base detail (Option 1)



Bituthene wall base detail (Option 2)



Procor wall base detail (Option 2)



- 1 Preprufe 300R
- 2 Preprufe 160R
- 3 Preprufe Tape
- 4 Bituthene

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

- 8 Hydroduct®
- 9 Adcor ES
- 10 Preprufe CJ Tape

Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	4 ft x 98 ft (1.2 m x 30 m)	4 ft x 115 ft (1.2 m x 35 m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft ² (36 m ²)	460 ft ² (42 m ²)	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
Ancillary Products			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified ¹
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified ²
Elongation	500%	500%	ASTM D412, modified ³
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified ⁴
Lap peel adhesion	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D1876, modified ⁵
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa × s × m ²))	0.01 perms (0.6 ng/(Pa × s × m ²))	ASTM E96, method B
Water absorption	0.5%	0.5%	ASTM D570

Footnotes:

- Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
- Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
- Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
- Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
- The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute.

Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)

Adcor is a trademark and Preprufe, Bituthene and Hydroduct are registered trademarks of W. R. Grace & Co.—Conn. Procor is a U.S. registered trademark of W. R. Grace & Co.—Conn., and is used in Canada under license from PROCOR LIMITED.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.
PF-111H Printed in U.S.A. 07/12

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FA/PDF

GRACE

BITUTHENE® 3000 AND BITUTHENE LOW TEMPERATURE

Self-adhesive, rubberized asphalt/polyethylene waterproofing membranes for basements and sub-structures

Description

Bituthene® 3000 and Bituthene Low Temperature are self-adhesive, rubberized asphalt/polyethylene waterproofing membranes used in basements and sub-structures.

Advantages

- **Waterproof**—high hydrostatic head resistance
- **Cross laminated film**—provides dimensional stability, high tear strength, puncture and impact resistance
- **Cold applied**—no flame hazard; self-adhesive overlaps ensure continuity
- **Chemically resistant**—provides effective external protection against aggressive soils and ground water
- **Flexible**—accommodates minor settlement and shrinkage movement
- **Controlled thickness**—factory made sheet ensures constant, non-variable site application
- **Wide application window**—
 - **Bituthene Low Temperature** surface and ambient temperatures between 25°F (-4°C) and 60°F (16°C)
 - **Bituthene 3000** surface and ambient temperatures at 40°F (5°C) or above

- **Ripcord® split release on demand**—faster application in the straight-aways, ease of membrane positioning in detailed areas

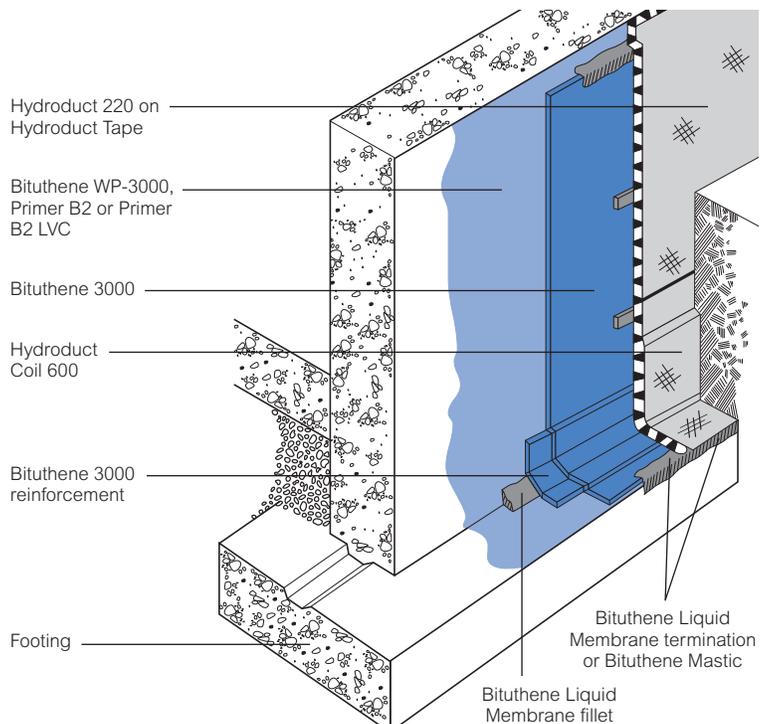
Use

Bituthene is ideal for waterproofing concrete, masonry and wood surfaces where in-service temperatures will not exceed 130°F (54°C). It can be applied to foundation walls, tunnels, earth sheltered structures and split slab construction, both above and below grade. (For above grade applications, see *Above Grade Waterproofing Bituthene 3000 and Bituthene Low Temperature.*)

Bituthene is 1/16 in. (1.5 mm) thick, 3 ft (0.9 m) wide and 66.7 ft (20 m) long and is supplied in rolls. It is unrolled sticky side down onto concrete slabs or applied onto vertical concrete faces primed with Bituthene Primer WP-3000, Primer B2 or Primer B2 LVC. Continuity is achieved by overlapping a minimum 2 in. (50 mm) and firmly rolling the joint.

Product Advantages

- Waterproof
- Cross laminated film
- Cold applied
- Chemically resistant
- Flexible
- Controlled thickness
- Wide application window
- Ripcord split release on demand



Drawings are for illustration purposes only. Please refer to graceconstruction.com for specific application details.

Bituthene is extremely flexible. It is capable of bridging shrinkage cracks in the concrete and will accommodate minor differential movement throughout the service life of the structure.

Application Procedures

Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable. For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at graceconstruction.com and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

Surface Preparation

Surfaces should be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Concrete must be properly dried (minimum 7 days for normal structural concrete and 14 days for lightweight structural concrete).

If time is critical, Bituthene Primer B2 or Bituthene Primer B2 LVC may be used to allow priming and installation of membrane on damp surfaces or green concrete. Priming may begin in this case as soon as the concrete will maintain structural integrity. Use form release agents which will not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane. Cure concrete with clear, resin-based curing compounds which do not contain oil, wax or pigment. Except with Primer B2 or Primer B2 LVC, allow concrete to thoroughly dry following rain. Do not apply any products to frozen concrete.

Repair defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form match lines. On masonry surfaces, apply a parge coat to rough concrete block and brick walls or trowel cut mortar joints flush to the face of the concrete blocks.

Temperature

- Apply Bituthene 3000 Membrane only in dry weather and at air and surface temperatures of 40°F (5°C) and above.
- Apply Bituthene Low Temperature Membrane only in dry weather and when air and surface temperatures are between 25°F (-4°C) and 60°F (16°C).
- Apply Bituthene Primer WP-3000 in dry weather above 40°F (5°C).

- Apply Bituthene Primer B2 in dry weather above 25°F (-4°C). (See separate product information sheet.)

Priming

- Apply Bituthene Primer WP-3000 by spray or roller at a coverage rate of 500–600 ft²/gal (12–15 m²/L). Allow to dry one hour or until concrete returns to original color.
- Apply Bituthene Primer B2 by a lamb's wool roller at a coverage rate of 250–350 ft²/gal (6–8 m²/L). Allow primer to dry one hour or until tack-free.
- Apply Bituthene Primer B2 LVC by a lamb's wool roller at a coverage rate of 325–425 ft²/gal (7.5–10 m²/L). Allow primer to dry one hour or until tack free.
- Dry time may be longer in cold temperatures. Reprime areas if contaminated by dust. If the work area is dusty, apply membrane as soon as the primer is dry.
- **Do not apply any primer to Bituthene membrane.**

Corner Details

The treatment of corners varies depending on the location of the corner. For detailed information on Bituthene Liquid Membrane, see separate product information sheet.

- At wall to footing inside corners—
 - Option 1:** Apply membrane to within 1 in. (25 mm) of base of wall. Treat the inside corner by installing a ¾ in. (20 mm) fillet of Bituthene Liquid Membrane. Extend Bituthene Liquid Membrane at least 2½ in. (65 mm) onto footing, and 2½ in. (65 mm) onto wall membrane.
 - Option 2:** Treat the inside corner by installing a ¾ in. (20 mm) fillet of Bituthene Liquid Membrane. Apply 12 in. (300 mm) wide strip of sheet membrane centered over fillet. Apply wall membrane over inside corner and extend 6 in. (150 mm) onto footing. Apply 1 in. (25 mm) wide troweling of Bituthene Liquid Membrane over all terminations and seams within 12 in. (300 mm) of corner.
- At footings where the elevation of the floor slab is 6 in. (150 mm) or more above the footing, treat the inside corner either by the above two methods or terminate the membrane at the base of the wall. Seal the termination with Bituthene Liquid Membrane.

Joints

Properly seal all joints with waterstop, joint filler and sealant as required. Bituthene membranes are not intended to function as the primary joint seal. Allow sealants to fully cure. Pre-strip all slab and wall cracks over ¼ in. (1.5 mm) wide and all construction and control joints with 9 in. (230 mm) wide sheet membrane strip.

Application on Horizontal Surfaces

(Note: Preprufe® pre-applied membranes are strongly recommended for below slab or for any application where the membrane is applied before concreting. See Preprufe product information sheets.)

Apply membrane from the low point to the high point so that laps shed water. Overlap all seams at least 2 in. (50 mm). Stagger all end laps. Roll the entire membrane firmly and completely as soon as possible. Use a linoleum roller or standard water-filled garden roller less than 30 in. (760 mm) wide, weighing a minimum of 75 lbs (34 kg) when filled. Cover the face of the roller with a resilient material such as a ½ in. (13 mm) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Seal all T-joints and membrane terminations with Bituthene Liquid Membrane at the end of the day.

Protrusions and Drains

Apply membrane to within 1 in. (25 mm) of the base of the protrusion. Apply Bituthene Liquid Membrane 0.1 in. (2.5 mm) thick around protrusion. Bituthene Liquid Membrane should extend over the membrane a minimum of 2½ in. (65 mm) and up the penetration to just below the finished height of the wearing course.

Vertical Surfaces

Apply membrane in lengths up to 8 ft (2.5 m). Overlap all seams at least 2 in. (50 mm). On higher walls apply membrane in two or more sections with the upper overlapping the lower by at least 2 in. (50 mm). Roll all membrane with a hand roller.

Terminate the membrane at grade level. Press the membrane firmly to the wall with the butt end of a hardwood tool such as a hammer handle or secure into a reglet. Failure to use heavy pressure at terminations can result in a poor seal. A termination bar may be used to ensure a tight seal.

Terminate the membrane at the base of the wall if the bottom of the interior floor slab is at least 6 in. (150 mm) above the footing. Otherwise, use appropriate inside corner detail where the wall and footing meet.

Membrane Repairs

Patch tears and inadequately lapped seams with membrane. Clean membrane with a damp cloth and dry. Slit fishmouths and repair with a patch extending 6 in. (150 mm) in all directions from the slit and seal edges of the patch with Bituthene Liquid Membrane. Inspect the membrane thoroughly before covering and make any repairs.

Drainage

Hydroduct® drainage composites are recommended for both active drainage and protection of the membrane. See Hydroduct product information sheets.

Protection of Membrane

Protect Bituthene membranes to avoid damage from other trades, construction materials or backfill. Place protection immediately in temperatures above 77°F (25°C) to avoid potential for blisters.

- On vertical applications, use Hydroduct 220 Drainage Composite. Adhere Hydroduct 220 Drainage Composite to membrane with Hydroduct Tape. Alternative methods of protection are to use ¼ in. (6 mm) asphalt impregnated board or 1 in. (25 mm) extruded polystyrene. Such alternatives do not provide positive drainage to the system. Adhere protection board with an adhesive or Hydroduct Tape.
- In mud slab waterproofing, or other applications where positive drainage is not desired and where reinforced concrete slabs are placed over the membrane, the use of ¼ in. (6 mm) hardboard or 2 layers of ⅛ in. (3 mm) hardboard is recommended.

Insulation

Always apply Bituthene membrane directly to primed or conditioned structural substrates. Insulation, if used, must be applied over the membrane. Do not apply Bituthene membranes over lightweight insulating concrete.

Backfill

Place backfill as soon as possible. Use care during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added and compacted in 6 in. (150 mm) to 12 in. (300 mm) lifts.

For areas which cannot be fully compacted, a termination bar is recommended across the top termination of the membrane.

Placing Steel

When placing steel over properly protected membrane, use concrete bar supports (dobies) or chairs with plastic tips or rolled feet to prevent damage from sharp edges. Use special care when using wire mesh, especially if the mesh is curled.

Approvals

- City of Los Angeles Research Report RR 24386
- U.S. Department of Housing and Urban Development (HUD) HUD Materials Release 628E

Warranty

Five year material warranties covering Bituthene and Hydroduct products are available upon request. Contact your Grace sales representative for details.

Technical Services

Support is provided by full time, technically trained Grace representatives and technical service personnel, backed by a central research and development staff.

Supply

Bituthene 3000 or Bituthene Low Temperature Roll weight Palletization Storage	3 ft x 66.7 ft roll (200 ft ²) [0.9 m x 20 m (18.6 m ²)] 83 lbs (38 kg) gross 25 rolls per pallet Store upright in dry conditions below 95°F (+35°C).
Ancillary Products	
Bituthene WP-3000	5 gal (18.9 L) pail/24 pails per pallet
Bituthene Primer B2	5 gal (18.9 L) pail/48 pails per pallet
Bituthene Primer B2 LVC	5 gal (18.9 L) pail/48 pails per pallet
Bituthene Liquid Membrane	1.5 gal (5.7 L) pail/100 pails per pallet or 4 gal (15.1 L) pail/24 pails per pallet
Hydroduct Tape	1 in. x 200 ft (2.5 cm x 61.0 m) roll/6 rolls per carton
Bituthene Mastic	Twelve 30 oz (0.9 L) tubes/carton or 5 gal (18.9 L) pail/36 pails per pallet

Equipment by others: Soft broom, utility knife, brush or roller for priming

Physical Properties for Bituthene Membrane

Property	Typical Value	Test Method
Color	Dark gray-black	
Thickness	1/16 in. (1.5 mm) nominal	ASTM D3767—method A
Flexibility, 180° bend over 1 in. (25 mm) mandrel at -25°F (-32°C)	Unaffected	ASTM D1970
Tensile strength, membrane, die C	325 lbs/in. ² (2240 kPa) minimum	ASTM D412 modified ¹
Tensile strength, film	5,000 lbs/in. ² (34.5 MPa) minimum	ASTM D882 modified ¹
Elongation, ultimate failure of rubberized asphalt	300% minimum	ASTM D412 modified ¹
Crack cycling at -25°F (-32°C), 100 cycles	Unaffected	ASTM C836
Lap adhesion at minimum application temperature	3000: 4 lbs/in. (700 N/m) Low Temp: 5 lbs/in. (880 N/m)	ASTM D1876 modified ²
Peel strength	9 lbs/in. (1576 N/m)	ASTM D903 modified ³
Puncture resistance, membrane	50 lbs (222 N) minimum	ASTM E154
Resistance to hydrostatic head	200 ft (60 m) of water	ASTM D5385
Permeance	0.05 perms (2.9 ng/m ² sPa) maximum	ASTM E96, section 12—water method
Water absorption	0.1% maximum	ASTM D570

Footnotes:

1. The test is run at a rate of 2 in. (50 mm) per minute.
2. The test is conducted 15 minutes after the lap is formed and run at a rate of 2 in. (50 mm) per minute at 40°F (5°C).
3. The 180° peel strength is run at a rate of 12 in. (300 mm) per minute.

www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)

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We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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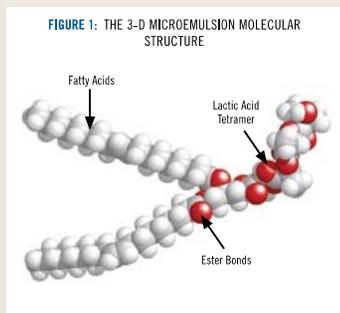
APPENDIX 7

**PROPOSED GROUNDWATER REMEDIATION
PRODUCT MSDS & BROCHURE**

Achieve wide-area, rapid and sustained reductive dechlorination with continuous distribution and staged hydrogen release

PRODUCT FEATURES

- **Three Stage Electron Donor Release – Immediate, Mid-Range and Long-Term Hydrogen Production**
 - Provides free lactic acid, controlled-release lactic acid and long release fatty acids for effective hydrogen production for periods of up to 3 to 5 years.
- **Low-Cost**
 - 3-D Microemulsion is 25¢ to 42¢ per pound as applied
- **Maximum and Continuous Distribution via Micellar Transport**
 - Unlike oil products, 3DMe forms micelles which are mobile in groundwater and significantly enhance electron donor distribution after injection.
- **Wide-Area/High Volume Microemulsion Application**
 - High volume application increases contact with contaminants and reduces number of injection points required for treatment – minimizes overall project cost.



PRODUCT COMPOSITION

3-D Microemulsion (3DMe)™ is a form of HRC Advanced® and has a molecular structure specifically designed to maximize the cost-effective anaerobic treatment of contaminants in subsurface soils and groundwater. This structure (patent pending) is composed of free lactic acid, controlled-release lactic acid (polylactate) and certain fatty acid components which are esterified to a carbon backbone molecule of glycerin (Figure 1).

3DMe produces a sequential, staged release of its electron donor components. The immediately available free lactic acid is fermented rapidly while the controlled-release lactic acid is metabolized at a more controlled rate. The fatty acids are converted to hydrogen over a mid to long-range timeline giving 3DMe an exceptionally long electron donor release profile (Figure 2). This staged fermentation provides an immediate, mid-range and very long-term, controlled-release supply of hydrogen (electron donor) to fuel the reductive dechlorination process.

Typical 3DMe single application longevity is rated at periods of up to 3 to 5 years. With 5 years occurring under optimal conditions, e.g. low permeability, low consumption environments.



APPLICATION AND DISTRIBUTION

3DMe applications can be configured in several different ways including: **grids, barriers and excavations.** The material itself can be applied to the subsurface through the use of **direct-push injection, hollow-stem auger, existing wells or re-injection wells.**

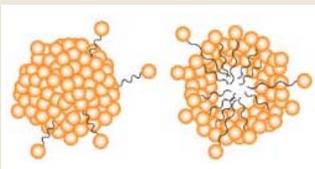
3DMe is typically applied in high-volumes as an emulsified, micellar suspension (microemulsion). The microemulsion is easily pumped into the subsurface and is produced on-site by mixing specified volumes of water and delivered 3DMe concentrate. Detailed preparation and installation instructions are available at www.regensis.com.

3DMe is usually applied throughout the entire vertical thickness of the determined treatment area. Once injected, the emulsified material moves out into the subsurface pore spaces via micellar transport, eventually coating most all available surfaces. Over time the released soluble components of 3-D Microemulsion are distributed within the aquifer via the physical process of advection and the concentration driven forces of diffusion.

MORE ON MICELLES

Micelles (Figure 3) are groups (spheres) of molecules with the hydrophilic group facing out to the water and the "tails" or lipophilic moiety facing in. They are formed during the 3-D Microemulsion emulsification process and provide the added benefit of increased distribution via migration to areas of lower concentration.

FIGURE 3: MICELLE REPRESENTATION



MORE ON APPLICATIONS



3-D Microemulsion is delivered in 55 gallon drums, 300 gallon totes, tankers or buckets.



The microemulsion is easily prepared on-site and applied in high-volumes for maximum subsurface distribution.



3-D Microemulsion is typically applied through permanent wells or by using direct-push injection.

PERFORMANCE

Case Study #1

A site in Massachusetts showed high levels of PCE and its daughter products TCE and cis-DCE which had been consistently present for more than two years. 3DMe was applied in a grid configuration around monitoring well #16. In Figure 4, the contaminant concentration results indicate a rapid decrease in the parent product PCE and evidence of reductive dechlorination as demonstrated by the relative increases in daughter products TCE and cis-DCE.

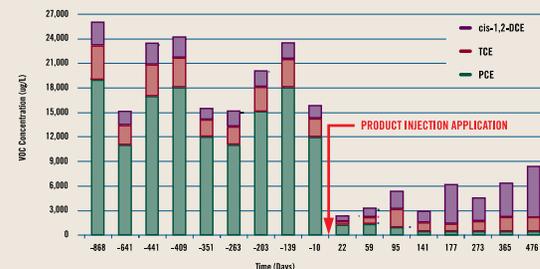


FIGURE 4: MW-16 CONTAMINANT CONCENTRATION DATA

Case Study #2

A site in Florida was characterized with PCE contamination approaching 225 ug/L. A total of 1,080 pounds of 3DMe was applied via 16 direct-push injection points to reduce PCE concentrations. Monitoring results in well MW-103 indicated a PCE reduction of approximately 67% within 75 days of the 3DMe application. PCE concentrations continued to decline by 96% one year after application and daughter products remained at low levels. Total Organic Carbon (TOC) levels remained elevated at 17-19 mg/L after 275 days demonstrating the longevity of 3DMe (Figure 5).

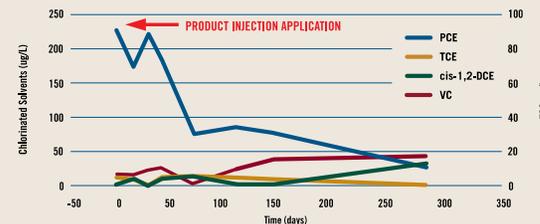


FIGURE 5: MW-103 CONTAMINANT CONCENTRATION DATA

PERFORMANCE

3-D Microemulsion (3DMe)TM
MATERIALS SAFETY DATA SHEET

Last Revised: March 26, 2007

Section 1 – Material Identification

Supplier:



REGENESIS

1011 Calle Sombra
San Clemente, CA 92673

Phone: 949.366.8000

Fax: 949.366.8090

E-mail: info@regenesis.com

Chemical Name(s):

- Glycerides, di-, mono [2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]propanoates]
- Propanoic acid, 2-[2-[2-(2-hydroxy-1-oxopropoxy)-1-oxopropoxy]-1-oxopropoxy]-1,2,3-propanetriyl ester
- Glycerol

Chemical Family: Organic Chemical

Trade Name: 3-D Microemulsion (3DMe)TM

Synonyms: HRC AdvancedTM HRC-PED (Hydrogen Release Compound – Partitioning Electron Donor)

Product Use: Used to remediate contaminated groundwater (environmental applications)

Section 2 – Chemical Identification

<u>CAS#</u>	<u>Chemical</u>
823190-10-9	HRC-PED
61790-12-3 or 112-80-1	Fatty Acids (neutralized)
201167-72-8	Glycerol Tripolylactate
56-81-5	Glycerol

Section 3 – Physical Data

Melting Point:	Not Available (NA)
Boiling Point:	Not determined (ND)
Flash Point:	> 200 °F using the Closed Cup method
Density:	0.9 -1.1 g/cc
Solubility:	Slightly soluble in acetone. Insoluble in water.
Appearance:	Amber semi-solid.
Odor:	Not detectable
Vapor Pressure:	None

Section 4 – Fire and Explosion Hazard Data

Extinguishing Media: Use water spray, carbon dioxide, dry chemical powder or appropriate foam to extinguish fires.

Water May be used to keep exposed containers cool.

For large quantities involved in a fire, one should wear full protective clothing and a NIOSH approved self contained breathing apparatus with full face piece operated in the pressure demand or positive pressure mode as for a situation where lack of oxygen and excess heat are present.

Section 5 – Toxicological Information

Acute Effects: May be harmful by inhalation, ingestion, or skin absorption. May cause irritation. To the best of our knowledge, the chemical, physical, and toxicological properties of the 3-D Microemulsion have not been investigated. Listed below are the toxicological information for glycerol, lactic acid and fatty acid.

RTECS# MA8050000
Glycerol

Irritation Data:	SKN-RBT 500 MG/24H MLD	85JCAE-,207,1986
	EYE-RBT 126 MG MLD	BIOFX* 9-4/1970
	EYE-RBT 500 MG/24H MLD	85JCAE-,207,1986

Section 5 – Toxicological Information (cont)

Toxicity Data:	ORL-MUS LD50:4090 MG/KG	FRZKAP (6),56,1977
	SCU-RBT LD50:100 MG/KG	NIIRDN 6,215,1982
	ORL-RAT LD50:12,600 MG/KG	FEPRA7 4,142,1945
	IHL-RAT LC50: >570 MG/M3/1H	BIOFX* 9-4/1970
	IPR-RAT LD50: 4,420 MG/KG	RCOCB8 56,125,1987
	IVN-RAT LD50:5,566 MG/KG	ARZNAD 26,1581,1976
	IPR-MUS LD50: 8,700 MG/KG	ARZNAD 26,1579,1978
	SCU-MUS LD50:91 MG/KG	NIIRDN 6,215,1982
	IVN-MUS LD50:4,250 MG/KG	JAPMA8 39,583,1950
	ORL-RBT LD50: 27 MG/KG	DMDJAP 31,276,1959
	SKN-RBT LD50: >10 MG/KG	BIOFX* 9-4/1970
	IVN-RBT LD50: 53 MG/KG	NIIRDN 6,215,1982
ORL-GPG LD50: 7,750 MG/KG	JHTAB 23,259,1941	

Target Organ Data: Behavioral (headache), gastrointestinal (nausea or vomiting), Paternal effects (spermatogenesis, testes, epididymis, sperm duct), effects of fertility (male fertility index, post-implantation mortality).

Only selected registry of toxic effects of chemical substances (RTECS) data is presented here. See actual entry in RTECS for complete information on lactic acid and glycerol.

Fatty Acids

Acute oral (rat) LD50 value for fatty acids is 10000 mg/kg. Aspiration of liquid may cause pneumonitis. Repeated dermal contact may cause skin sensitization.

Section 6 – Health Hazard Data

One should anticipate the potential for eye irritation and skin irritation with large scale exposure or in sensitive individuals. Product is not considered to be combustible. However, after prolonged contact with highly porous materials in the presence of excess heat, this product may spontaneously combust.

Handling: Avoid continued contact with skin. Avoid contact with eyes.

In any case of any exposure which elicits a response, a physician should be consulted immediately.

First Aid Procedures

Inhalation: Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.

Ingestion: No effects expected. Do not give anything to an unconscious person. Call a

physician immediately. DO NOT induce vomiting.

Section 6 – Health Hazard Data (cont)

Skin Contact: Flush with plenty of water. Contaminated clothing may be washed or dry cleaned normally.

Eye Contact: Wash eyes with plenty of water for at least 15 minutes lifting both upper and lower lids. Call a physician.

Section 7 – Reactivity Data

Conditions to Avoid: Strong oxidizing agents, bases and acids

Hazardous Polymerization: Will not occur.

Further Information: Hydrolyses in water to form lactic acid, glycerol and fatty acids.

Hazardous Decomposition Products: Thermal decomposition or combustion may produce carbon monoxide and/or carbon dioxide.

Section 8 – Spill, Leak or Accident Procedures

After Spillage or Leakage: Neutralization is not required. The material is very slippery. Spills should be covered with an inert absorbent and then be placed in a container. Wash area thoroughly with water. Repeat these steps if slipperiness remains.

Disposal: Laws and regulations for disposal vary widely by locality. Observe all applicable regulations and laws. This material may be disposed of in solid waste. Material is readily degradable and hydrolyses in several hours.

No requirement for a reportable quantity (CERCLA) of a spill is known.

Section 9 – Special Protection or Handling

Should be stored in plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass containers.

Protective Gloves: Vinyl or Rubber

Eyes: Splash Goggles or Full Face Shield. Area should have approved means of washing eyes.

Ventilation: General exhaust.

Storage: Store in cool, dry, ventilated area. Protect from incompatible materials.

Section 10 – Other Information

This material will degrade in the environment by hydrolysis to lactic acid, glycerol and fatty acids. Materials containing reactive chemicals should be used only by personnel with appropriate chemical training.

The information contained in this document is the best available to the supplier as of the time of writing. Some possible hazards have been determined by analogy to similar classes of material. No separate tests have been performed on the toxicity of this material. The items in this document are subject to change and clarification as more information becomes available.