

**417 MANHATTAN AVENUE
BROOKLYN, NEW YORK 11222**

Remedial Action Work Plan

**NYC VCP Number: 15CVCP152K
E-Designation Site Number: 15EHA294K**

Prepared for:

434 Manhattan Avenue LLC
1303 53rd Street STE 308
Brooklyn, NY 11219

Prepared by:

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

1808 Middle Country Road
Ridge, NY 11961

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REMEDIAL ACTION WORK PLAN

TABLE OF CONTENTS

LIST OF ACRONYMS

CERTIFICATION

EXECUTIVE SUMMARY	A
COMMUNITY PROTECTION STATEMENT.....	G
REMEDIAL ACTION WORK PLAN	1
1.0 SITE BACKGROUND.....	1
1.1 Site Location and Current Usage	1
1.2 Proposed Redevelopment Plan	1
1.3 Description of Surrounding Property.....	2
1.4 Remedial Investigation	3
2.0 REMEDIAL ACTION OBJECTIVES	6
3.0 REMEDIAL ALTERNATIVES ANALYSIS	7
3.1 Threshold Criteria	9
3.2. Balancing Criteria	10
4.0 REMEDIAL ACTION.....	17
4.1 Summary of Preferred Remedial Action.....	17
4.2 Soil Cleanup Objectives and Soil/Fill Management.....	19
4.3 Engineering Controls	23
4.4 Institutional Controls	24
4.5 Site Management Plan	25
4.6 Qualitative Human Health Exposure Assessment	26
5.0 REMEDIAL ACTION MANAGEMENT.....	31
5.1 Project Organization and Oversight.....	31
5.2 Site Security	31
5.3 Work Hours.....	31
5.4 Construction Health and Safety Plan	31
5.5 Community Air Monitoring Plan.....	32

5.6	Agency Approvals	34
5.7	Site Preparation	34
5.8	Traffic Control	38
5.9	Demobilization.....	38
5.10	Reporting and Record Keeping.....	39
5.11	Complaint Management.....	40
5.12	Deviations from the Remedial Action Work Plan	40
6.0	REMEDIAL ACTION REPORT	41
7.0	SCHEDULE.....	43

TABLES

Table 1	Imported Backfill and Clean Soil Limits
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FIGURES

Figure 1	Site Location Map
Figure 2	Site Plan
Figure 3	Layout of Proposed Site Development
Figure 4	Surrounding Land Usage
Figure 5	Excavation and Capping Plan
Figure 6	Endpoint Sampling Plan
Figure 7	Waterproofing Membrane/Vapor Barrier Plan
Figure 8	Truck Route

ATTACHMENTS

Attachment A	Proposed Development Plans
Attachment B	Citizen Participation Plan
Attachment C	Sustainability Statement
Attachment D	Soil/Materials Management Plan
Attachment E	Site-Specific Construction Health and Safety Plan (CHASP)
Attachment F	Waterproofing Membrane/Vapor Barrier Specifications

LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CSOP	Contractors Site Operation Plan
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
VCA	Voluntary Cleanup Agreement
NOC	Notice of Completion
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	NYSDEC Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
OSHA	United States Occupational Health and Safety Administration
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
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

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 designing the remedial program for the 417 Manhattan Avenue, Brooklyn, Site number: 15CVCP152K. 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

PE License Number

Signature

Date

PE Stamp

EXECUTIVE SUMMARY

434 Manhattan Avenue, LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 2,500-ft² Site located at 417 Manhattan Avenue in the Williamsburg section of Brooklyn, 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 Current Usage

The Site is located at 417 Manhattan Avenue in the Williamsburg section of Brooklyn, New York, and is identified as Block 2723, Lot 29 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 2,500 square feet in size and is located on the west side of Manhattan Avenue, between Bayard Street to the north and Brooklyn-Queens Expressway to the south. The Site is improved with a one-story building (no basement) covering the entire lot. A map of the site boundary is shown in Figure 2. Currently, the Site is developed with a single-story, slab on-grade commercial building which is in use as a light industrial use consisting of a warehouse and offices.

Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of redeveloping the lot with a 5-story residential building cover approximately 65% of the lot with a full cellar. The cellar will contain two accessory spaces to the apartments above on the 1st floor, each with a bathroom. The cellar will also contain the mechanical room, sprinkler room, stairwell, elevator, and refuse storage. The first floor will consist of two apartments, the residential lobby, the elevator, staircases and a metal grid deck. The second, third, fourth and fifth floors will consist of apartments. The third and fourth floors will each have two balconies and the fifth floor will have two terraces. The sixth floor (rooftop) will consist of an elevator, and small lobby containing a space for laundry.



The cellar level will require excavation to a depth of approximately 6 feet below grade across approximately 65% of the Site (the building footprint). The remaining portion of the Site will be used as a rear at-grade courtyard, and will be excavated to 2 feet below grade. An estimated 361 cubic yards (542 tons) of soil will require excavation for the new building's cellar, with additional excavations of 65 cubic yards (97 tons) for the rear courtyard and 24 cubic yards (35 tons) for the cellar windows, for a total of 450 cubic yards (674 tons). The building will not be equipped with any parking areas. The water table is present at a depth of approximately 5 feet below grade, and therefore will be encountered during excavation.

Layout of the proposed site development is presented in Figure 3. The current zoning designation is M1-2; manufacturing and residential R6A. The proposed use is consistent with existing zoning for the property.

Summary of Environmental Findings

1. Elevation of the property is approximately 14 feet.
2. Depth to groundwater is estimated to be approximately 5 feet below sidewalk grade.
3. Groundwater flow is generally southwest beneath the Site.
4. Depth to bedrock is at the Site is greater than 100 feet.
5. The stratigraphy of the Site, from the surface down, consists of 4 feet of historic fill underlain by brown to gray silty sand.
6. Six Soil/fill samples collected during the remedial investigation were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted Residential Soil Cleanup Objectives (RRSCOs) as presented in 6NYCRR Part 375-6.8 and CP51. No pesticides or PCBs were found exceeding Unrestricted Use or Restricted Residential SCOs. Data collected during the RI showed trace concentrations of VOCs, including 1,2,4-Trimethylbenzene, (maximum 1.5 µg/Kg), 1,3,5-Trimethylbenzene (maximum 1.7 µg/Kg), acetone (maximum 23 µg/Kg) carbon disulfide (maximum 1.8 µg/Kg), methyl ethyl ketone (6.8 µg/Kg), methylene chloride (maximum 1.8 µg/Kg), p-isopropyltoluene (100 µg/Kg) and toluene (1.1 µg/Kg), all below Unrestricted Use SCOs. Five SVOCs consisting of the polycyclic aromatic hydrocarbons (PAHs), benz(a)anthracene (maximum 1,400 µg/kg), benzo(a)pyrene (maximum 1,200 µg/kg),

benzo(b)fluoranthene (maximum 1,300 µg/kg), chrysene (maximum 1,400 µg/kg), and indeno(1,2,3-cd)pyrene (740 µg/kg), were found exceeding Unrestricted Use SCOs and Restricted Residential SCOs, with the exception of chrysene. Five metals including cadmium (maximum of 6.45 mg/Kg), copper (maximum of 4,510 mg/Kg), lead (maximum of 676 mg/Kg), mercury (maximum 26.4 mg/Kg), and zinc (maximum of 6,940 mg/Kg), exceeded both Unrestricted Use SCOs and Restricted Residential Use SCOs in both shallow and deep soils. Mercury at 26 ppm was detected in deeper sample at boring B-2, indicating a hotspot area. Overall, the soil results were consistent with data identified at sites with historic fill material in NYC. Soil exceedances extend to approximately 12 feet below grade across the site.

7. Three groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the investigation showed no pesticides detected. Seven VOCs were detected in trace amounts, including 1,2,4-trimethylbenzene (0.23 µg/L), 1,3,5-trimethylbenzene (0.27 µg/L) acetone (maximum of 7.7 µg/L), carbon disulfide (maximum 0.31 µg/L), chloromethane (maximum of 0.34 µg/L), methyl ethyl ketone (maximum 0.81 µg/L), methyl t-butyl ether (MTBE) (maximum 8.9 µg/L), none of which exceeded their respective GQSs. Five SVOCs, including benz(a)anthracene (maximum 0.37 µg/L), benzo(b)fluoranthene (maximum 0.43 µg/L), benzo(k)fluoranthene (maximum 0.16 µg/L), chrysene (maximum 0.35 µg/L), and indeno(1,2,3-cd)pyrene (maximum 0.16 µg/L) were found exceeding GQS. One PCB, PCB-1254 (maximum 0.095 µg/L), was found exceeding GQS in one sample. Four metals, iron (maximum 15.7 mg/L), magnesium (maximum of 44.9 mg/L), manganese (maximum of 0.952 mg/L) and sodium (maximum of 147 mg/L) (dissolved) exceeded their respective GQS.
8. Three soil vapor results collected during the RI were compared to the compounds listed in the New York State Department of Health (NYSDOH) Vapor Intrusion Matrices located in the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006. Soil vapor samples collected during the RI showed petroleum related VOCs were present at low concentrations. Total concentrations of petroleum-related VOCs (BTEX) were detected at a maximum of 46.91 µg/m³. Chlorinated VOCs including carbon tetrachloride were detected at 0.42 µg/m³ and tetrachloroethene (PCE)

detected between $0.41 \mu\text{g}/\text{m}^3$ and $7.32 \mu\text{g}/\text{m}^3$ were both reported at concentrations below guidance matrix established by NYSDOH. Trichloroethane (TCE) and 1,1,1-trichloroethane were not detected in any soil gas samples.

Summary of the Remedy

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 a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to start of remedial action.
4. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs).
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
6. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. For development purposes, 65% of the Site will require excavation to a depth of approximately 6 ft below grade for the building cellar level. Additional excavations to 2 ft will be required for the rear courtyard. Additional hotspot excavation will be performed at boring B-2. Approximately 674 tons of soil will be removed.
7. 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.

8. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
10. 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. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of three end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. Dewatering in compliance with city, state, and federal laws and regulations. Extracted groundwater will either be containerized for off-site licensed or permitted disposal or will be treated under a permit from New York City Department of Environmental Protection (NYCDEP) to meet pretreatment requirements prior to discharge to the sewer system.
14. Installation of a waterproofing/vapor barrier system below the concrete slab of the building as well as behind foundation walls of the proposed building. The waterproofing/vapor barrier will consist of a Preprufe 300R system as manufactured by Grace or equivalent system. Preprufe 300R is a 1.2 mm (0.046 in) thick HDPE film with a pressure sensitive adhesive that bonds to the poured concrete.
15. Construction and maintenance of an engineered composite cover consisting of the 16 inch thick concrete cellar slab and a minimum 4 inch thick concrete courtyard slab to prevent human exposure to residual soil/fill remaining under the Site.
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities,

certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.

19. Submission of an approved Site Management Plan (SMP) in the 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.
20. The property will continue to be registered with an E-Designation by 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

The Office of Environmental Remediation created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies that show the location of 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 NYC VCP, 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 plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration (OSHA). This plan includes many protective elements including those discussed below.

Site Safety Coordinator. This project has a designated Site Safety Coordinator to implement the Health and Safety Plan. The Site Safety Coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site Safety Coordinator is Mr. Kevin Waters of Environmental Business Consultants. Mr. Waters can be reached at (631) 504-6000.

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 only to workers performing specific tasks including removing hazardous 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 (CAMP). Results will be regularly reported to the NYC OER. 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 includes 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 on-Site Project Manager, Mr. Kevin Waters at (631) 504-6000 or NYC Office of Environmental Remediation Project Manager, Horace Zhang at (212) 788-8484.

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.

Storm-Water Management. To limit the potential for soil erosion and discharge, this cleanup plan has provisions for storm-water management. The main elements of the storm water 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 are 7:00AM to 6:00PM Monday through Friday.

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 locations of 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, Kimberly Somers (EBC) at (631) 504-6000, the NYC Office of Environmental Remediation Project Manager, Horace Zhang at (212) 788-8484, 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 you to review online at the public document repositories. Access to the document repository is available at the Brooklyn Public Library - Greenpoint Branch (107 Norman Avenue, Brooklyn).

Long-Term Site Management. To provide long-term protection after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC OER. Requirements that the property owner must comply with are established through a city environmental designation. 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

434 Manhattan Avenue LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 417 Manhattan Avenue in the Williamsburg section of Brooklyn, New York (the Site). 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 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 Current Usage

The Site is located at 417 Manhattan Avenue in the Williamsburg section of Brooklyn, New York, and is identified as Block 2723 and Lot 29 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 2,500-square feet in size and is located on the west side of Manhattan Avenue, between Bayard Street to the north and Brooklyn-Queens Expressway to the south. A map of the site boundary is shown in Figure 2. Currently, the Site is developed with a single-story commercial building consisting of a warehouse and offices occupied by a light industrial use.

1.2 Proposed Redevelopment Plan

The proposed future use of the Site will consist of a new 5-story apartment building with a cellar the full size of the building footprint. The cellar will contain two accessory spaces to the apartments above on the 1st floor, each with a bathroom. The cellar will also contain mechanical room, sprinkler room, stairwell, elevator, and refuse storage. The first floor will consist of two apartments, the residential lobby, the elevator, staircases and a metal grid deck. The second, third, fourth and fifth floors will consist of apartments. The third and fourth floors will each have



two balconies and the fifth floor will have two terraces. The sixth floor (rooftop) will consist of an elevator, and small lobby containing a space for laundry.

The cellar level will require excavation to a depth of approximately 6 feet below grade across approximately 65% of the Site (the building footprint). The remaining portion of the Site will be used as a rear at-grade courtyard, and will be excavated to 2 feet below grade. An estimated 361 cubic yards (542 tons) of soil will require excavation for the new building's cellar, with additional excavations of 65 cubic yards (97 tons) for the rear courtyard and 24 cubic yards (35 tons) for the cellar windows, for a total of 450 cubic yards (674 tons). The building will not be equipped with any parking areas. The water table is present at a depth of approximately 5 feet below grade, and therefore will be encountered during excavation.

Layout of the redevelopment plans for the cellar and first floor is presented in Figure 3. The current zoning designation is M1-2/R6A. 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 area surrounding the Site consists of a mix of residential, mixed-use and industrial properties. Figure 4 shows the surrounding land usage of the adjacent properties listed below as well as additional properties located up to 500 feet away from the Site. No hospitals, daycare facilities or schools are located within a 250 ft radius of the Site.

Surrounding Property Usage

Direction	Property Description
North – Adjacent Property	<u>Block 2723, Lot 28</u> - 419 Manhattan Avenue A 2,500 ft ² lot developed with a two-story office building.
South – Adjacent Property	<u>Block 2723, Lot 30</u> - 415 Manhattan Avenue A 2,500 ft ² lot with a residential 1 & 2 family building.
East – Across Manhattan Avenue	<u>Block 2724, Lot 1</u> - 411 Meeker Street A 3,715 ft ² mixed use commercial and residential building.
West – Adjacent property	<u>Block 2723, Lot 14</u> - 106 Bayard Street A 15,440 ft ² lot developed with a two-story industrial building.

1.4 Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 417 Manhattan Avenue, Brooklyn, NY*”, dated April 2015 (RIR).

Summary of Past Uses of Site and Areas of Concern

EBC was able to establish the following site history based upon Sanborn maps and historical city directories dating back to 1905. Lot 29 appears to have been developed by 1905 with a small 1-story garage-like structure situated along the southern property boundary. The Site appears to have been redeveloped sometime between 1905 and 1916 with a 1-story commercial building, as it exists today. A garage use was identified for the Site on the 1942 Sanborn map (no underground gasoline storage tanks identified on map). The Site was apparently used for manufacturing for the years 1940 through 2007, including a potential printing use (“Bicentennial Publishing Corp” for 1992) and a coal company (1940).

The AOCs identified for this Site include:

1. The Site has been assigned and E-designation (E-138) for Hazmat and Air, as part of the Greenpoint-Williamsburg rezoning action completed by the City in May 2005.
2. The historic usage of the Site is a garage.

Summary of the Work Performed under the Remedial Investigation

434 Manhattan Avenue LLC performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed three soil borings across the Site, and collected six soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed three groundwater monitoring wells throughout the Site to establish groundwater flow and collected three groundwater samples and one duplicate groundwater sample for chemical analysis to evaluate groundwater quality; and
4. Installed three soil gas implants and collected three soil gas samples for chemical analysis.

Summary of Environmental Findings

9. Elevation of the property is approximately 14 feet.
10. Depth to groundwater is estimated to be approximately 5 feet below sidewalk grade.
11. Groundwater flow is generally southwest beneath the Site.
12. Depth to bedrock is at the Site is greater than 100 feet.
13. The stratigraphy of the Site, from the surface down, consists of 4 feet of historic fill underlain by brown to gray silty sand.
14. Six Soil/fill samples collected during the remedial investigation were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted Residential Soil Cleanup Objectives (RRSCOs) as presented in 6NYCRR Part 375-6.8 and CP51. No pesticides or PCBs were found exceeding Unrestricted Use or Restricted Residential SCOs. Data collected during the RI showed trace concentrations of VOCs, including 1,2,4-Trimethylbenzene, (maximum 1.5 µg/Kg), 1,3,5-Trimethylbenzene (maximum 1.7 µg/Kg), acetone (maximum 23 µg/Kg) carbon disulfide (maximum 1.8 µg/Kg), methyl ethyl ketone (6.8 µg/Kg), methylene chloride (maximum 1.8 µg/Kg), p-isopropyltoluene (100 µg/Kg) and toluene (1.1 µg/Kg), all below Unrestricted Use SCOs. Five SVOCs consisting of the polycyclic aromatic hydrocarbons (PAHs), benz(a)anthracene (maximum 1,400 µg/kg), benzo(a)pyrene (maximum 1,200 µg/kg), benzo(b)fluoranthene (maximum 1,300 µg/kg), chrysene (maximum 1,400 µg/kg), and indeno(1,2,3-cd)pyrene (740 µg/kg), were found exceeding Unrestricted Use SCOs and Restricted Residential SCOs, with the exception of chrysene. Five metals including cadmium (maximum of 6.45 mg/Kg), copper (maximum of 4,510 mg/Kg), lead (maximum of 676 mg/Kg), mercury (maximum 26.4 mg/Kg), and zinc (maximum of 6,940 mg/Kg), exceeded both Unrestricted Use SCOs and Restricted Residential Use SCOs in both shallow and deep soils. Mercury at 26 ppm was detected in deeper sample at boring B-2, indicating a hotspot area. Overall, the soil results were consistent with data identified at sites with historic fill material in NYC. Soil exceedances extend to approximately 12 feet below grade across the site.
15. Three groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected

during the investigation showed no pesticides detected. Seven VOCs were detected in trace amounts, including 1,2,4-trimethylbenzene (0.23 µg/L), 1,3,5-trimethylbenzene (0.27 µg/L) acetone (maximum of 7.7 µg/L), carbon disulfide (maximum 0.31 µg/L), chloromethane (maximum of 0.34 µg/L), methyl ethyl ketone (maximum 0.81 µg/L), methyl t-butyl ether (MTBE) (maximum 8.9 µg/L), none of which exceeded their respective GQSs. Five SVOCs, including benz(a)anthracene (maximum 0.37 µg/L), benzo(b)fluoranthene (maximum 0.43 µg/L), benzo(k)fluoranthene (maximum 0.16 µg/L), chrysene (maximum 0.35 µg/L), and indeno(1,2,3-cd)pyrene (maximum 0.16 µg/L) were found exceeding GQS. One PCB, PCB-1254 (maximum 0.095 µg/L), was found exceeding GQS in one sample. Four metals, iron (maximum 15.7 mg/L), magnesium (maximum of 44.9 mg/L), manganese (maximum of 0.952 mg/L) and sodium (maximum of 147 mg/L) (dissolved) exceeded their respective GQS.

16. Three soil vapor results collected during the RI were compared to the compounds listed in the New York State Department of Health (NYSDOH) Vapor Intrusion Matrices located in the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006. Soil vapor samples collected during the RI showed petroleum related VOCs were present at low concentrations. Total concentrations of petroleum-related VOCs (BTEX) were detected at a maximum of 46.91 µg/m³. Chlorinated VOCs including carbon tetrachloride were detected at 0.42 µg/m³ and tetrachloroethene (PCE) detected between 0.41 µg/m³ and 7.32 µg/m³ were both reported at concentrations below guidance matrix established by NYSDOH. Trichloroethane (TCE) and 1,1,1-trichloroethane were not detected in any soil gas samples.

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:

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.

Soil Vapor

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

Groundwater

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

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 exceedence of applicable standards, criteria and guidance values (SCGs). A remedy is then developed 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.

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

Alternative 1 involves:

- 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 the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. If soil/fill containing analytes at concentrations above Track 1 Unrestricted Use SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building's cellar is complete, additional

excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCO;

- No Engineering or Institutional Controls are required for a Track 1 Unrestricted Use cleanup, however, a vapor barrier will be installed beneath the basement foundation and behind foundation sidewalls of the new building as a part of development to prevent any potential future exposures from off-Site soil vapor; and
- Placement of a final cover over the entire Site as part of new development.

Alternative 2 involves:

- Establishment of Track 4 Site-Specific SCOs.
- 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. Excavation for construction of the new building's cellar level would take place to a depth of approximately 5 feet below grade across 65% of the Site. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building's cellar is complete, additional excavation will be performed to ensure complete removal of soil that does not meet Track 4 Site-Specific SCOs;
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a soil vapor barrier system beneath the buildings slab, and along foundation side walls to prevent any potential future exposures from off-Site soil vapor;
- 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; and

- Continued registration as an E-designated property to memorialize the remedial action and the Engineering and Institutional Controls required by the RAWP.

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 contaminated 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. The vapor barrier would prevent any soil vapors from entering the new building.

Alternative 2 would achieve comparable protections of human health and the environment by excavating the historic fill at the Site 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. The vapor barrier would mitigate any vapor issues from entering the building. Implementing Institutional Controls including a Site Management Plan would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils during construction would be minimized by implementing a Construction Health and Safety Plan (CHASP), an approved Soil/Materials Management Plan 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 building would be prevented by installing a vapor barrier system below the new building's basement slab and continuing the vapor barrier around foundation walls.

3.2. Balancing Criteria

Compliance with Standards, Criteria and Guidance (SCGs)

This evaluation criterion assesses the ability of the alternatives 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 Groundwater Protection Standards. Compliance with SCGs for soil vapor would also be achieved by installing a waterproofing membrane/vapor barrier system below the new building's basement slab and continuing the vapor barrier around foundation walls, as part of development.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil beneath the building to meet Track 4 Site-Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a waterproofing membrane/vapor barrier system below the new building's basement slab and continuing the waterproofing membrane/vapor barrier around foundation walls. A Site Management Plan would ensure that these controls remained protective for the long term.

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 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 workers during remedial actions.

Both alternatives 1 and 2 have similar short-term effectiveness during their respective implementations, as each requires excavation of historic fill material. 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 if excavation of greater amounts of historical fill material is encountered below the excavation depth of the proposed building. However, focused attention to means and methods during the remedial action during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize or negate 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 27, 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 effects of these potential adverse impacts to the community, workers and the environment will be minimized through implementation of corresponding 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 (personal protective equipment would be worn 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 Site 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 ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill and enabling unrestricted usage of the property.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; establishing Engineering Controls including a composite cover system across the Site; establishing Institutional Controls to ensure long-term management including use restrictions, a Site Management Plan and maintaining continued registration as an E-designation 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 will provide a continued high level of protection in perpetuity.

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

Alternative 2 would remove most, if not all, of the historic fill at the Site, and any remaining on-Site soil beneath the new building and at-grade rear courtyard will meet Track 4 - Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on-Site.

The removal of soil across 65% of the Site to approximately 6 feet for the new development in both scenarios would probably result in relatively minor differences 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 proposed remedial action is both feasible and implementable. The techniques, materials and equipment to implement Alternatives 1 and 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. They use standard materials and services that are well established technology. 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.

Costs associated with Alternative 1 would be significantly higher than Alternative 2 since historic fill with analytes above Unrestricted Use SCOs is present in the 35-foot rear yard area, which is not being excavated beyond 2 ft below grade for the new development. 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.

The remedial plan creates an approach that combines the remedial action with the redevelopment of the Site, including the construction of the building foundation and subgrade structures. The remedial plan is also cost effective in that it will take into consideration the selection of the closest and most appropriate disposal facilities to reduce transportation and disposal costs during the excavation of historic fill and other soils during the redevelopment of the Site.

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.

Based on the overall goals of the remedial program and initial permitting associated with the proposed site development, no adverse community opinion is anticipated for either alternative. 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 Attachment B.

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 proposed redevelopment of the Site is compatible with its current zoning and is consistent with recent development patterns. Following remediation, the Site will meet either Track 1 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are appropriate for its planned residential use. Improvements in the current environmental condition of the property achieved by both alternatives are also consistent with the City's goals for cleanup of contaminated land and bringing such properties into productive reuse. Both alternatives are equally protective of natural resources and cultural resources.

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.

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. New York City Clean Soil Bank program may be utilized

for reuse of native soils. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the 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. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix C.

4.0 REMEDIAL ACTION

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is the Track 4 Alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative 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 a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to start of remedial action.
4. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs).
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
6. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. For development purposes, 65% of the Site will require excavation to a depth of approximately 6 ft below grade for the building cellar level. Additional excavations to 2 ft will be required for the rear courtyard. Additional hotspot excavation will be performed at boring B-2. . Approximately 674 tons of soil will be removed.
7. 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.

8. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
10. 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. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of three end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. Dewatering in compliance with city, state, and federal laws and regulations. Extracted groundwater will either be containerized for off-site licensed or permitted disposal or will be treated under a permit from New York City Department of Environmental Protection (NYCDEP) to meet pretreatment requirements prior to discharge to the sewer system.
14. Installation of a waterproofing/vapor barrier system below the concrete slab of the building as well as behind foundation walls of the proposed building. The vapor barrier will consist of a Preprufe 300R system as manufactured by Grace or equivalent system. Preprufe 300R is a 1.2 mm (0.046 in) thick HDPE film with a pressure sensitive adhesive that bonds to the poured concrete.
15. Construction and maintenance of an engineered composite cover consisting of the 16 inch thick concrete cellar slab and a minimum 4 inch thick concrete courtyard slab to prevent human exposure to residual soil/fill remaining under the Site.
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities,

certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.

19. Submission of an approved Site Management Plan (SMP) in the 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.
20. The property will continue to be registered with an E-Designation by 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 Soil Cleanup Objectives (SCOs) are proposed for this project. The following Track 4 Site-Specific SCOs will be used:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	100 ppm
Copper	350 ppm
Lead	800 ppm
Mercury	2.5 ppm (in shallow soils)

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 Attachment D. The location of planned excavations is shown in Figure 5.

Sampling locations B-1 and B2 at 7-8 feet will be removed as hotspot areas, and one post-excavation endpoint sample will be collected from the bottom of each hotspot location to

document removal of material exceeding Track 4 SCOs. Hot-spot areas will be removed to the extent practical.

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

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed off-Site is 674 tons. Disposal location(s) will be reported promptly to the OER Project Manager prior to the start of the remedial action.

End-Point Sampling

Removal actions under this plan will be performed in conjunction with remedial end-point sampling. Confirmation end-point sampling and testing will be performed following materials removal and completed proper to Site development activities. To evaluate attainment of Track 4 Site-Specific SCOs, four confirmation end-point samples will be collected and analyzed for the trigger compounds (VOCs, SVOCs and metals) and elements established on the Track 4 Site-Specific SCOs list from within the building footprint. The approximate collection location of the confirmation end-point soil samples is shown on Figure 6.

In addition, if hotspots are encountered, hotspot removal end-point sampling frequency will consist of the following:

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 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.

New York State ELAP certified labs will be used for all end-point sample analyses. Labs for 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. End-point samples will be analyzed for trigger analytes (those for which SCO exceedence is identified) and will be coordinated with OER in advance of endpoint sampling 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.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization 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 duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters. One trip blank will be submitted to the laboratory with each shipment of soil samples.

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

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. Trip blanks will not be used for samples to be analyzed for metals, SVOCs or pesticides. One blind duplicate sample will be prepared and submitted for analysis every 20 samples.

Import and Reuse of Soils

Import of soils onto the property and reuse of soils already on-Site will be performed in

conformance with the Soil/Materials Management Plan in Attachment D. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 0 tons. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is 0 tons.

4.3 Engineering Controls

The excavation required for the proposed Site development will achieve Track 4 Site Specific SCOs. Engineering Controls are required in the remedial action to address residual contamination remaining at the Site. The Site has two primary Engineering Control Systems: composite cover system and waterproofing/vapor barrier system.

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 the 16 inch thick concrete cellar slab and an at least 4 inch thick courtyard concrete slab.

The composite cover system would serve as a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual 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 RAR. Figure 5 shows the location of the composite cover system.

Waterproofing Membrane/Vapor Barrier

Migration of on-site soil vapor will be mitigated with a combination of building slab and waterproofing membrane/vapor barrier. The waterproofing membrane/vapor barrier will consist of the Preprufe 300R system as manufactured by Grace or equivalent system. Preprufe 300R is a 1.2 mm (0.046 in) thick HDPE film with a pressure sensitive adhesive that bonds to the poured concrete. The waterproofing membrane/vapor barrier will be installed prior to pouring the building's concrete slab. The waterproofing membrane/vapor barrier will extend throughout the area occupied by the footprint of the new building and up the foundation sidewalls in accordance with manufacturer specifications. The specifications for installation will be provided to the

construction management company and the foundation contractor or installer of the liner. The specifications state that all waterproofing membrane/vapor barrier seam, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the waterproofing membrane/vapor barrier. The extent of the proposed waterproofing membrane/vapor barrier membrane is provided in Figure 7. Product specification sheets are provided in Attachment F.

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 manufacturer's certificate of warranty.

4.4 Institutional Controls

Institutional Controls (IC) have been incorporated in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be established in a site-specific Site Management Plan (SMP) that will be included in the RAR.

Institutional Controls for this remedial action are:

- The property will continue to be registered with an E-Designation by the NYC Buildings Department. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. 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;
- 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;
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

4.5 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 this RAWP 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) inspection and certification of EC's; and (3) reporting.

Site management activities, reporting, and EC/IC certification will be scheduled on a periodic basis to be established in 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 31 of the year following the reporting period.

4.6 Qualitative Human Health Exposure Assessment

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA).

The objective of the qualitative exposure assessment is to identify potential receptors 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.

Investigations 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 by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This EA 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 Sources

Based on the results of the Remedial Investigation Report the contaminants of concern found are:

Soil

- Metals, including cadmium, copper, lead, mercury, and zinc exceeding Restricted Residential SCOs; and
- SVOCs (PAH compounds) including benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene exceeding Restricted Residential SCOs and chrysene exceeding Unrestricted Use SCOs.

Groundwater

- Metals, including iron, magnesium, manganese and sodium exceeding Groundwater Quality Standards;
- One PCB, PCB-1254, exceeding Groundwater Quality Standards; and
- SVOCs (PAH compounds), including benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene exceeding Groundwater Quality Standards.

Soil Vapor

- Chlorinated VOCs, including carbon tetrachloride and tetrachloroethene detected at low concentrations, below NYS DOH monitoring thresholds;
- Petroleum VOCs detected at low concentrations including benzene, ethylbenzene, xylenes and toluene.

Nature, Extent, Fate and Transport of Contaminants

SVOCs and metals are present in the historic fill materials to depths of 12 feet below grade. SVOCs and metals are also present in deeper soil above Restricted Residential SCOs, to depths of approximately 10 to 12 feet below grade. SVOCs found in soil were also found at low levels dissolved in groundwater above their respective GQS, and is likely the result of sample turbidity rather than dissolved groundwater conditions. The metals iron, manganese and sodium exceeding GQS are not linked to on-site conditions. The chlorinated and petroleum-related VOCs identified in soil vapor and groundwater were not identified in on-site soil and are believed to be associated with an off-site source.

Potential Routes of Exposure

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population. An exposure pathways is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the

future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of fill/soil;
- Inhalation of vapors and particulates; and
- Dermal contact with water, fill, soil, or building materials.

Points of Exposure

Current Conditions: The potential for exposure to surficial historic fill is limited due to the present of the concrete slab of the current building. The Site is served by public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site. Due to the low detections of chlorinated VOCs and BTEX in the on-site soils, the potential for accumulation of soil vapor into the building does not exist.

Construction/Remediation Activities: Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils, as a result of on-Site construction and excavation activities. 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 remedial action, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the implementation of the Soil/Materials Management Plan, stormwater pollution prevention, 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 Site-Specific SCOs will be removed. The Site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and a vapor barrier system will prevent any exposure to potential off-Site soil vapors in the future. The Site is served by a public water supply, and groundwater is not used at the Site for potable supply. There are no plausible off-site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

Receptor Populations

On-Site Receptors - The Site is currently occupied by a light industrial use and consists of small office spaces and a warehouse. Current receptor populations include commercial employers and visitors. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents and visitors.

Off-Site Receptors - Potential off-Site receptors within a 0.25-mile radius of the Site include: adult and child residents, and commercial and construction workers, pedestrians, trespassers, and cyclists, based on the following:

1. Commercial Businesses (up to 0.25 mile) - existing and future
2. Residential Buildings (up to 0.25 mile) - existing and future
3. Building Construction/Renovation (up to 0.25 mile) - existing and future
4. pedestrians, Trespassers, Cyclists (up to 0.25 mile) - existing and future
5. Schools (up to 0.25 mile) - existing and future

Overall Human Health Exposure Assessment

There are no complete exposure pathways (i.e., source, route to exposure, receptor population) for the post-construction condition. There is a potential complete exposure pathway that requires mitigation during implementation of the remedy. This assessment takes into consideration the reasonably anticipated use of the Site, which includes a residential structure, site-wide impervious surface cap, and a subsurface waterproofing membrane/vapor barrier system for the building. 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. There are no surface waters in close proximity to the Site that could be impacted or threatened.

Based upon this analysis, complete on-Site exposure pathways appear to be present only during the current unremediated phase and the remedial action phase. Under current conditions, on-Site exposure pathways exist for commercial workers, patrons and visitors. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the 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 to onsite soil/fill, as the entire Site will be capped with concrete and a waterproofing membrane/vapor barrier system will have been installed to mitigate potential vapor intrusion.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Kimberly Somers, Project Manager-EBC and Kevin Waters, Field Operations Officer-EBC. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Ariel Czemerinski P.E., AMC Engineering and Charles Sosik P.G. EBC.

5.2 Site Security

Site access will be controlled by a chain link or wooden construction fence, which will surround the property.

5.3 Work Hours

The hours for operation of remedial construction will be from 7:00AM to 6:00PM. These hours conform to the New York City Department of Buildings construction code requirements.

5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be Kevin Waters - EBC. 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 HASP. 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 baling/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 Markout 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

Groundwater is present at approximately 7 feet below grade and dewatering is not expected. In the event that dewatering of groundwater during construction will be necessary, the water will be disposed into the New York City combined sanitary/storm sewer system. A permit to discharge will be obtained from the New York City Department of Environmental Protection (NYCDEP). As part of the permit to discharge, the location of discharge will be based on the Site-Specific requirements of the DEP. The need for pretreatment will be determined by DEP's requirements for the discharge permit. If pretreatment is required by the DEP, it will be performed in accordance with the requirements of the DEP.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations. Staging locations will be reported to OER prior to the start of the remedial action.

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, haybales; 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. Storm-water 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 on-Site 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 it 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 the following:

- a) Continue north on Manhattan Avenue to Newton Street;
- b) Turn right on Newton Street and follow signs to Brooklyn Queens Expressway.

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;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan;
- 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 and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- 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;
- Account 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.
- 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, _____, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the [Site name Site number].

I certify that the OER-approved Remedial Action Work Plan dated month day year and Stipulations in a letter dated month day, year; if any 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.

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 2 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	1
Demobilization	8	1
Submit Remedial Action Report	15	-

TABLES

TABLE 1
Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
METALS							
Arsenic	7440-38 -2	16 _f	16 _f	16 _f	16 _f	13 _f	16 _f
Barium	7440-39 -3	350 _f	400	400	10,000 _d	433	820
Beryllium	7440-41 -7	14	72	590	2,700	10	47
Cadmium	7440-43 -9	2.5 _f	4.3	9.3	60	4	7.5
Chromium, hexavalent _h	18540-29-9	22	110	400	800	1 _e	19
Chromium, trivalent _h	16065-83-1	36	180	1,500	6,800	41	NS
Copper	7440-50 -8	270	270	270	10,000 _d	50	1,720
Total Cyanide _h		27	27	27	10,000 _d	NS	40
Lead	7439-92 -1	400	400	1,000	3,900	63 _f	450
Manganese	7439-96 -5	2,000 _f	2,000 _f	10,000 _d	10,000 _d	1600 _f	2,000 _f
Total Mercury		0.81 _j	0.81 _j	2.8 _j	5.7 _j	0.18 _f	0.73
Nickel	7440-02 -0	140	310	310	10,000 _d	30	130
Selenium	7782-49 -2	36	180	1,500	6,800	3.9 _f	4 _f
Silver	7440-22 -4	36	180	1,500	6,800	2	8.3
Zinc	7440-66 -6	2200	10,000 _d	10,000 _d	10,000 _d	109 _f	2,480
PESTICIDES / PCBs							
2,4,5-TP Acid (Silvex)	93-72-1	58	100 _a	500 _b	1,000 _c	NS	3.8
4,4'-DDE	72-55-9	1.8	8.9	62	120	0.0033 _e	17
4,4'-DDT	50-29-3	1.7	7.9	47	94	0.0033 _e	136
4,4'-DDD	72-54-8	2.6	13	92	180	0.0033 _e	14
Aldrin	309-00-2	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	319-84-6	0.097	0.48	3.4	6.8	0.04 _g	0.02
beta-BHC	319-85-7	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	5103-71 -9	0.91	4.2	24	47	1.3	2.9
delta-BHC	319-86-8	100 _a	100 _a	500 _b	1,000 _c	0.04 _g	0.25
Dibenzofuran	132-64-9	14	59	350	1,000 _c	NS	210
Dieldrin	60-57-1	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	959-98-8	4.8 _i	24 _i	200 _i	920 _i	NS	102
Endosulfan II	33213-65-9	4.8 _i	24 _i	200 _i	920 _i	NS	102
Endosulfan sulfate	1031-07 -8	4.8 _i	24 _i	200 _i	920 _i	NS	1,000 _c
Endrin	72-20-8	2.2	11	89	410	0.014	0.06
Heptachlor	76-44-8	0.42	2.1	15	29	0.14	0.38
Lindane	58-89-9	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	1336-36 -3	1	1	1	25	1	3.2
SEMI-VOLATILES							
Acenaphthene	83-32-9	100 _a	100 _a	500 _b	1,000 _c	20	98
Acenaphthylene	208-96-8	100 _a	100 _a	500 _b	1,000 _c	NS	107
Anthracene	120-12-7	100 _a	100 _a	500 _b	1,000 _c	NS	1,000 _c
Benz(a)anthracene	56-55-3	1 _f	1 _f	5.6	11	NS	1 _f
Benzo(a)pyrene	50-32-8	1 _f	1 _f	1 _f	1.1	2.6	22
Benzo(b) fluoranthene	205-99-2	1 _f	1 _f	5.6	11	NS	1.7
Benzo(g,h,i) perylene	191-24-2	100 _a	100 _a	500 _b	1,000 _c	NS	1,000 _c
Benzo(k) fluoranthene	207-08-9	1	3.9	56	110	NS	1.7
Chrysene	218-01-9	1 _f	3.9	56	110	NS	1 _f
Dibenz(a,h) anthracene	53-70-3	0.33 _e	0.33 _e	0.56	1.1	NS	1,000 _c
Fluoranthene	206-44-0	100 _a	100 _a	500 _b	1,000 _c	NS	1,000 _c
Fluorene	86-73-7	100 _a	100 _a	500 _b	1,000 _c	30	386
Indeno(1,2,3-cd) pyrene	193-39-5	0.5 _f	0.5 _f	5.6	11	NS	8.2
m-Cresol	108-39-4	100 _a	100 _a	500 _b	1,000 _c	NS	0.33 _e
Naphthalene	91-20-3	100 _a	100 _a	500 _b	1,000 _c	NS	12
o-Cresol	95-48-7	100 _a	100 _a	500 _b	1,000 _c	NS	0.33 _e
p-Cresol	106-44-5	34	100 _a	500 _b	1,000 _c	NS	0.33 _e
Pentachlorophenol	87-86-5	2.4	6.7	6.7	55	0.8 _e	0.8 _e
Phenanthrene	85-01-8	100 _a	100 _a	500 _b	1,000 _c	NS	1,000 _c
Phenol	108-95-2	100 _a	100 _a	500 _b	1,000 _c	30	0.33 _e
Pyrene	129-00-0	100 _a	100 _a	500 _b	1,000 _c	NS	1,000 _c

TABLE 1
Soil Cleanup Objectives

Contaminant	CAS Number	Protection of Public Health				Protection of Ecological Resources	Protection of Ground-water
		Residential	Restricted-Residential	Commercial	Industrial		
VOLATILES							
1,1,1-Trichloroethane	71-55-6	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	0.68
1,1-Dichloroethane	75-34-3	19	26	240	480	NS	0.27
1,1-Dichloroethene	75-35-4	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	0.33
1,2-Dichlorobenzene	95-50-1	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	1.1
1,2-Dichloroethane	107-06-2	2.3	3.1	30	60	10	0.02 ^d
cis-1,2-Dichloroethene	156-59-2	59	100 ^a	500 ^b	1,000 ^c	NS	0.25
trans-1,2-Dichloroethene	156-60-5	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	0.19
1,3-Dichlorobenzene	541-73-1	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	106-46-7	9.8	13	130	250	20	1.8
1,4-Dioxane	123-91-1	9.8	13	130	250	0.1 ^e	0.1 ^e
Acetone	67-64-1	100 ^a	100 ^b	500 ^b	1,000 ^c	2.2	0.05
Benzene	71-43-2	2.9	4.8	44	89	70	0.06
Butylbenzene	104-51-8	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	12
Carbon tetrachloride	56-23-5	1.4	2.4	22	44	NS	0.76
Chlorobenzene	108-90-7	100 ^a	100 ^a	500 ^b	1,000 ^c	40	1.1
Chloroform	67-66-3	10	49	350	700	12	0.37
Ethylbenzene	100-41-4	30	41	390	780	NS	1
Hexachlorobenzene	118-74-1	0.33 ^e	1.2	6	12	NS	3.2
Methyl ethyl ketone	78-93-3	100 ^a	100 ^a	500 ^b	1,000 ^c	100 ^a	0.12
Methyl tert-butyl ether	1634-04 -4	62	100 ^a	500 ^b	1,000 ^c	NS	0.93
Methylene chloride	75-09-2	51	100 ^a	500 ^b	1,000 ^c	12	0.05
n-Propylbenzene	103-65-1	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	3.9
sec-Butylbenzene	135-98-8	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	11
tert-Butylbenzene	98-06-6	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	5.9
Tetrachloroethene	127-18-4	5.5	19	150	300	2	1.3
Toluene	108-88-3	100 ^a	100 ^a	500 ^b	1,000 ^c	36	0.7
Trichloroethene	79-01-6	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	95-63-6	47	52	190	380	NS	3.6
1,3,5-Trimethylbenzene	108-67-8	47	52	190	380	NS	8.4
Vinyl chloride	75-01-4	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	1330-20 -7	100 ^a	100 ^a	500 ^b	1,000 ^c	0.26	1.6

All soil cleanup objectives (SCOs) are in parts per million (ppm). NS=Not specified. See Technical Support Document (TSD). Footnotes

a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm. See TSD section 9.3.

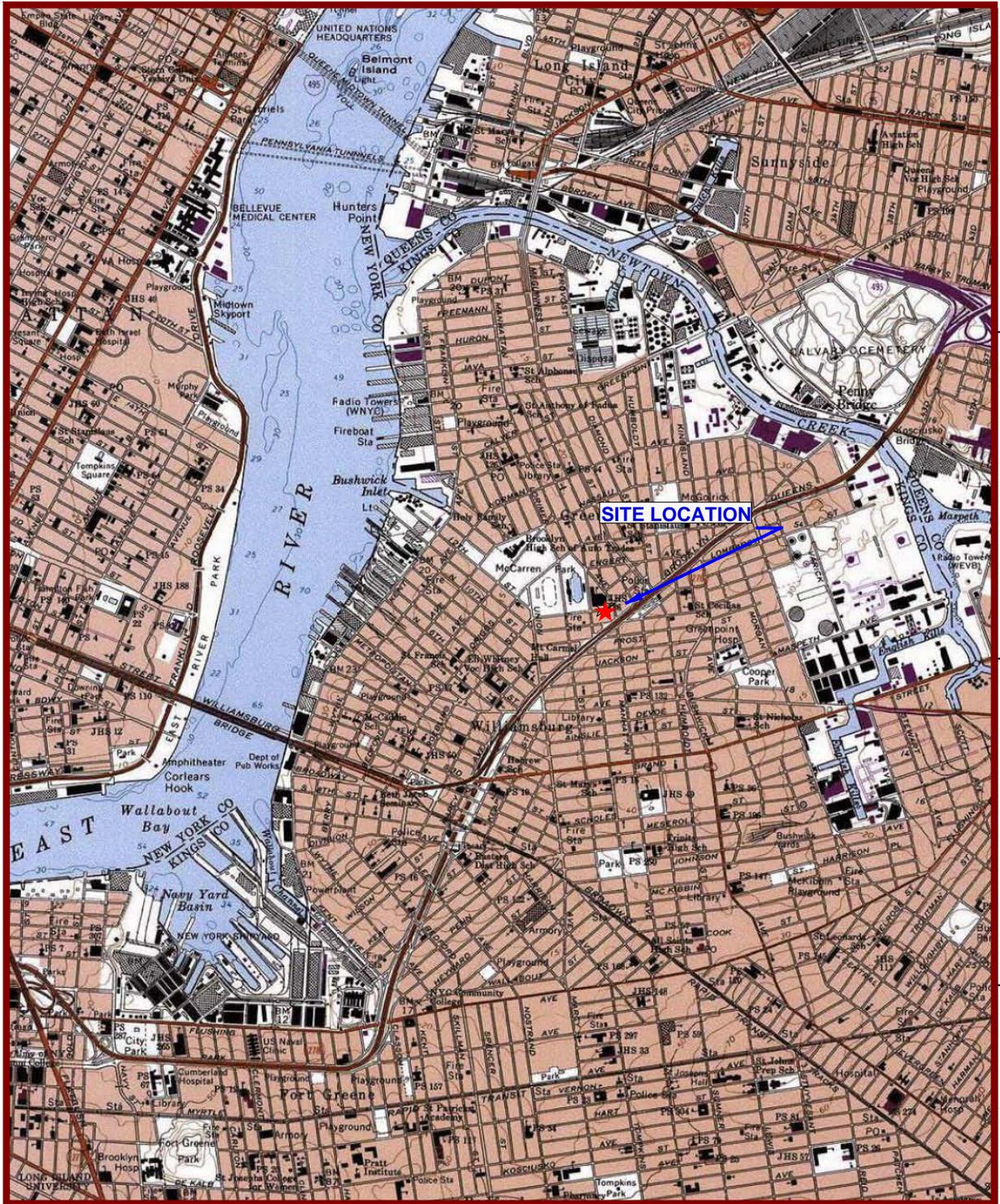
b The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

c The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm. See TSD section 9.3.

d The SCOs for metals were capped at a maximum value of 10,000 ppm. See TSD section 9.3.

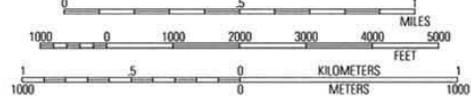
e For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.

FIGURES



40°45.000' N
40°44.000' N
40°43.000' N
40°42.000' N

73°59.000' W 73°58.000' W 73°57.000' W WGS84 73°56.000' W



MNI ↑ N
13°
06/04/11

USGS Brooklyn Quadrangle 1995, Contour Interval = 10 feet

EBC
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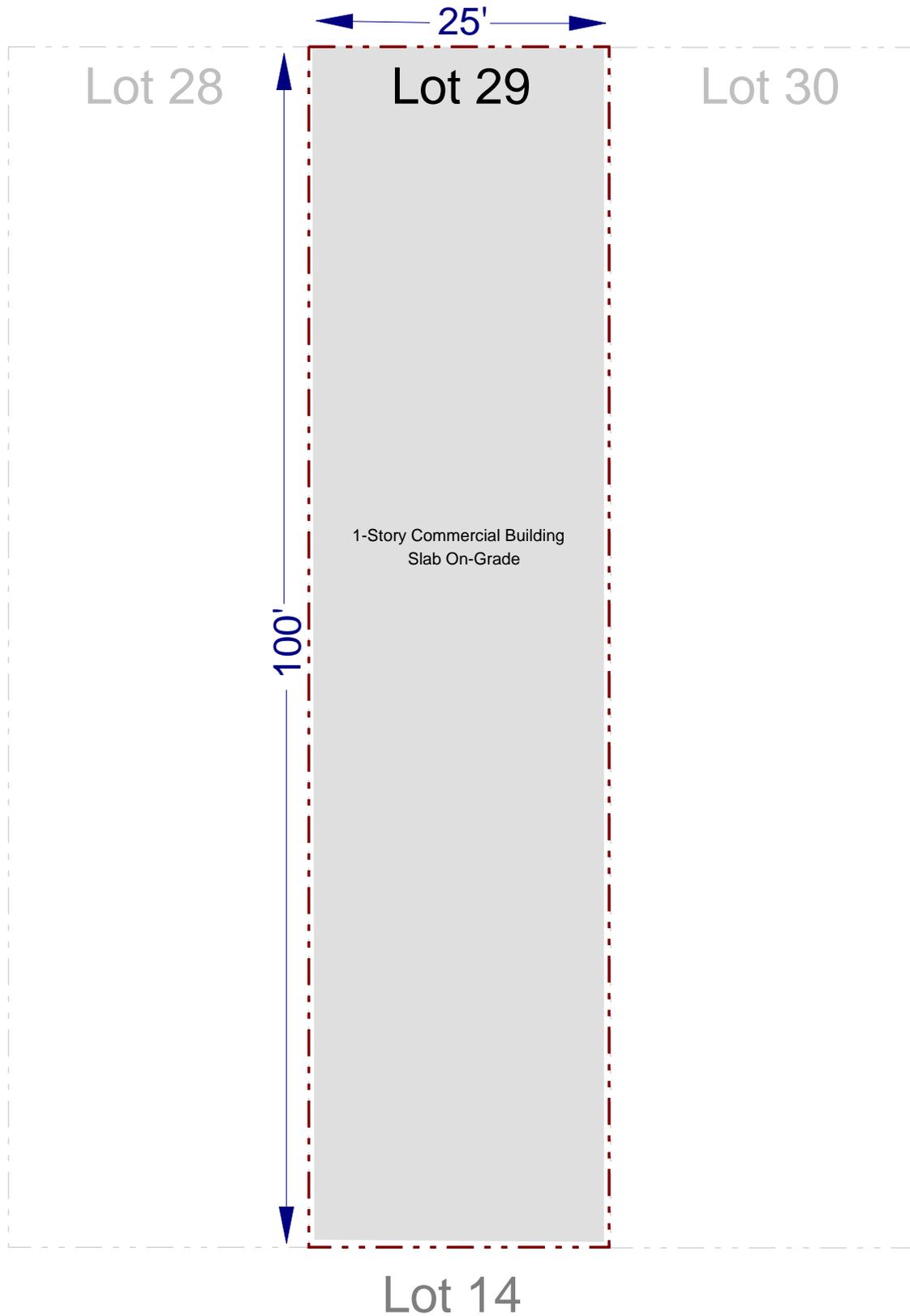
Phone 631.504.6000
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**417 MANHATTAN AVENUE, BROOKLYN NY
BLOCK 2723 LOT 29**

FIGURE 1 SITE LOCATION MAP

MANHATTAN AVENUE

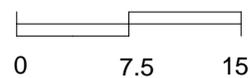
SIDEWALK



Key

-  Property Boundary
-  Surrounding Property Boundary

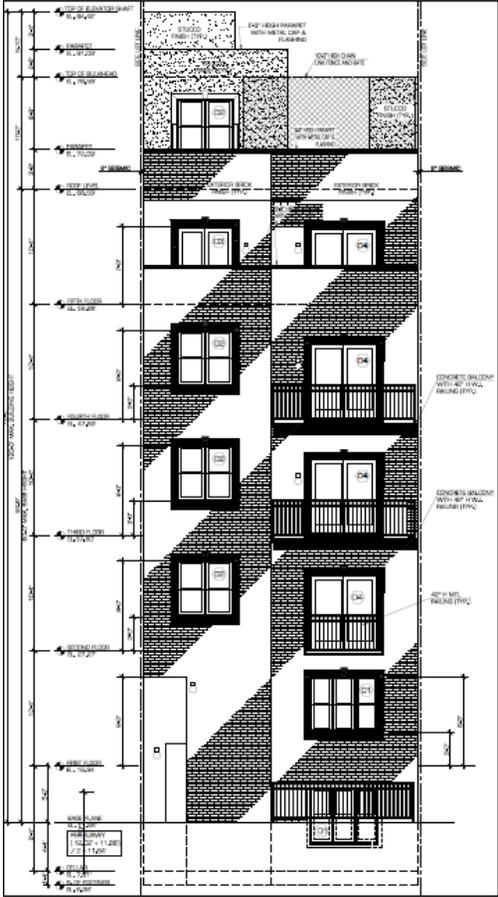
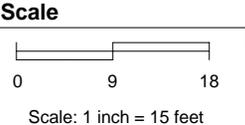
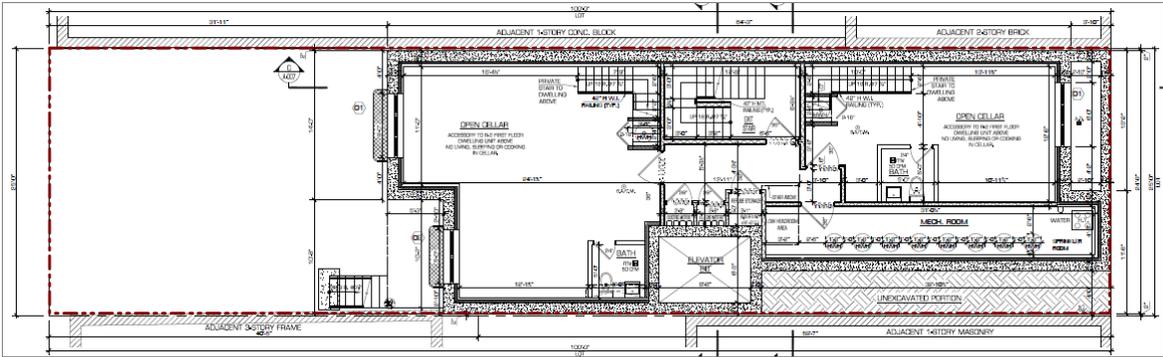
Scale



Scale: 1 inch = 15 feet

FRONT ELEVATION

CELLAR PLAN



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417 MANHATTAN AVENUE
 BROOKLYN, NY 11222

FIGURE 3 REDEVELOPMENT PLANS



FIGURE 4
SURROUNDING LAND USE MAP

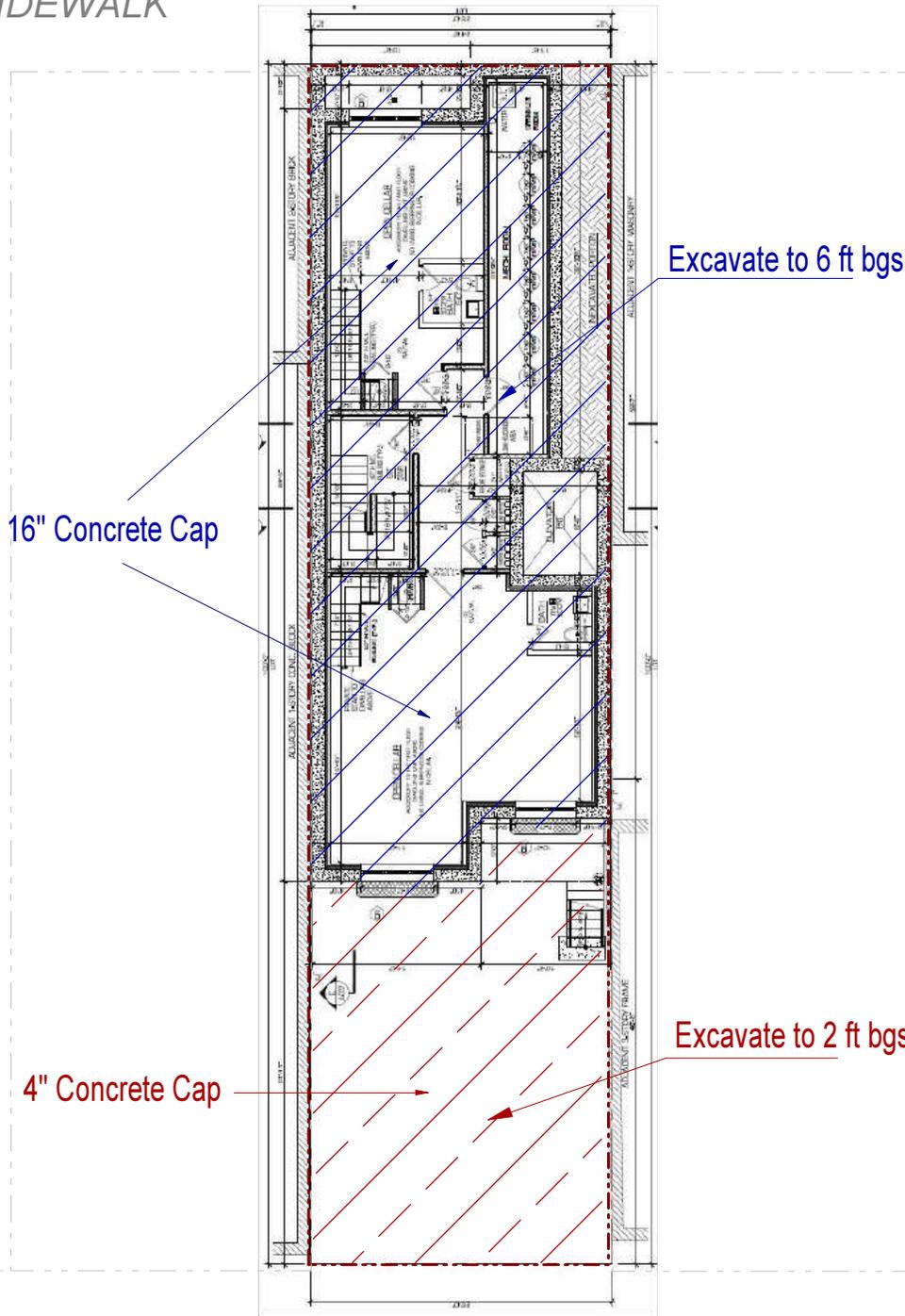
417 MANHATTAN AVENUE, BROOKLYN NY 11222
 HAZARDOUS MATERIALS REMEDIAL INVESTIGATION REPORT



ENVIRONMENTAL BUSINESS CONSULTANTS
 1808 MIDDLE COUNTRY ROAD, RIDGE, NEW YORK 11961
 PHONE: (631) 504-6000 FAX: (631) 924-2870

MANHATTAN AVENUE

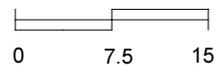
SIDEWALK



Key

-  Property Boundary
-  Surrounding Property Boundary

Scale



Scale: 1 inch = 15 feet



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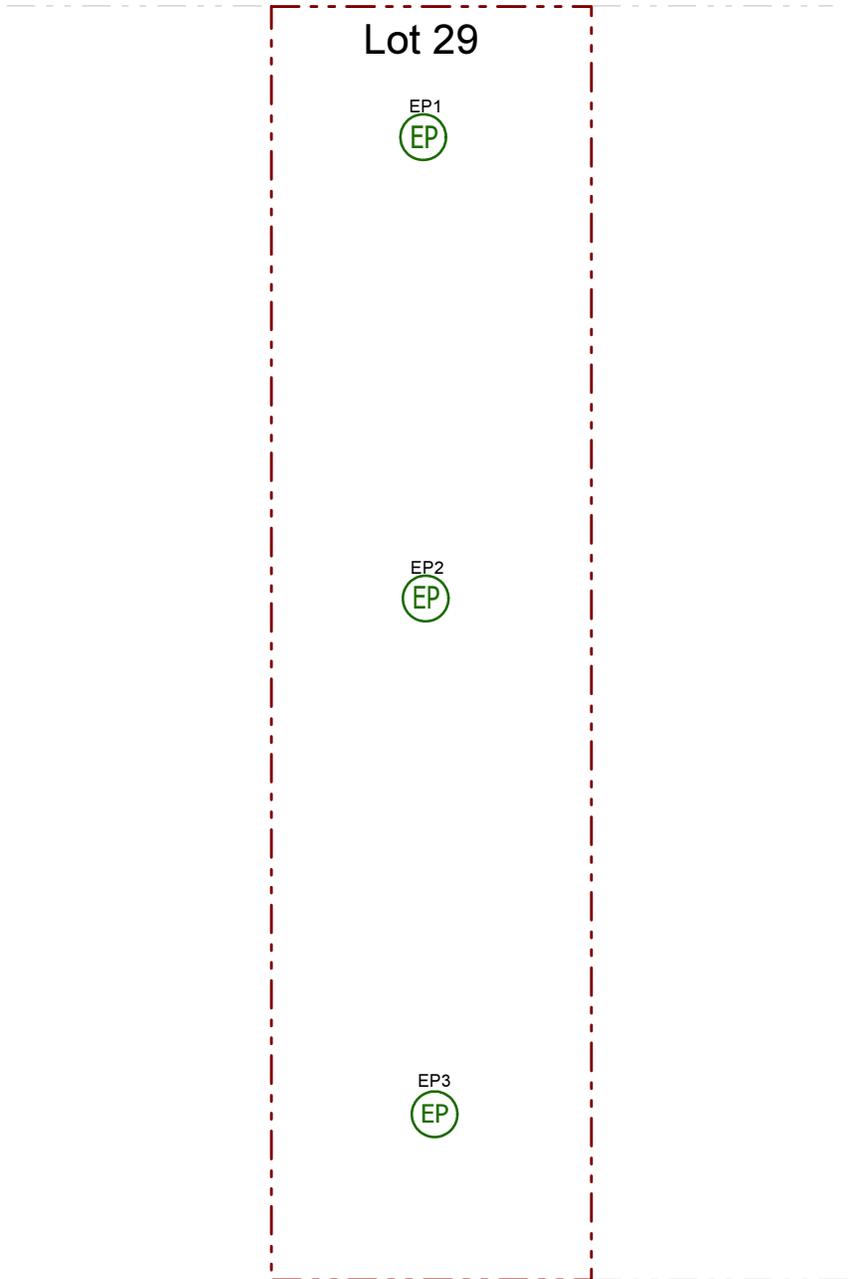
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Figure No.
5

Site Name: **REDEVELOPMENT PROJECT**
Site Address: **417 MANHATTAN AVENUE, BROOKLYN, NY**
Drawing Title: **EXCAVATION AND CAPPING PLAN**

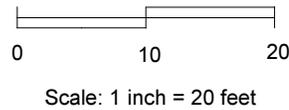
MANHATTAN AVENUE

SIDEWALK



Key

-  Property Boundary
-  Surrounding Property Boundary
-  Location of Proposed Endpoint Sample



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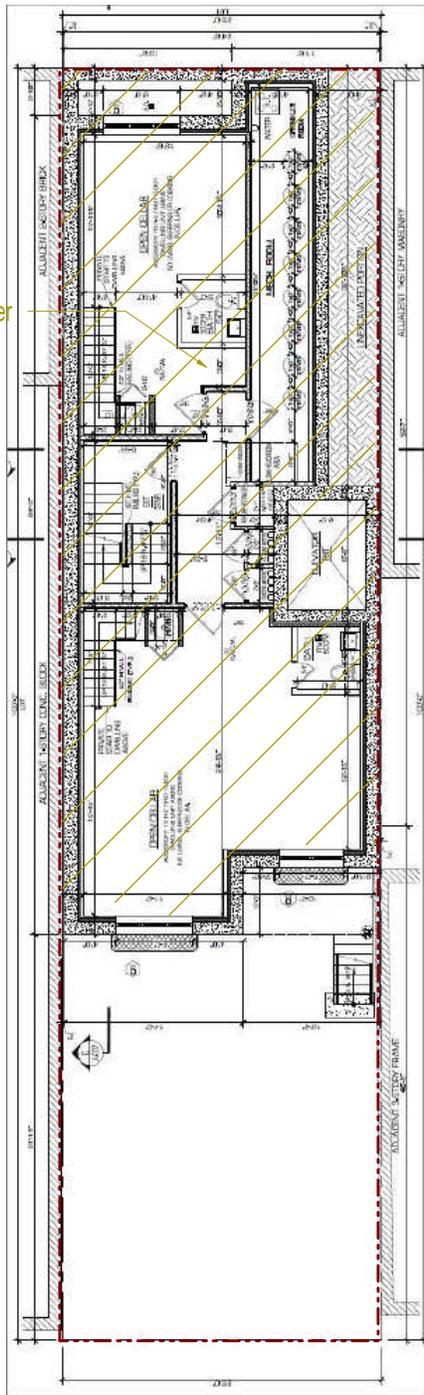
Figure No.
6

Site Name: **REDEVELOPMENT PROJECT**

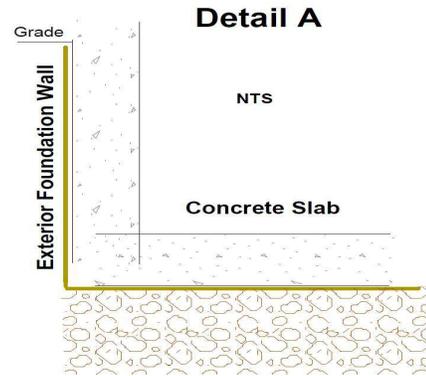
Site Address: **417 MANHATTAN AVENUE, BROOKLYN, NY**

Drawing Title: **ENDPOINT SAMPLING PLAN**

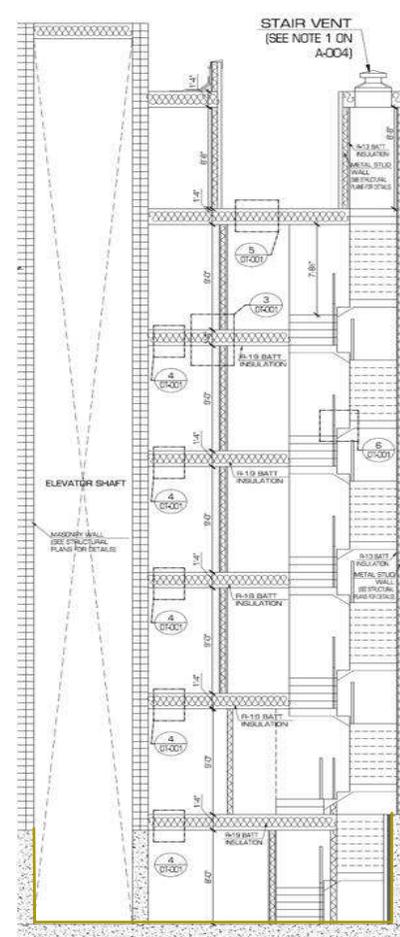
CELLAR PLAN



Grace Preprufe
Waterproofing/Vapor Barrier



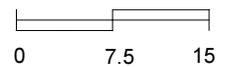
Detail B



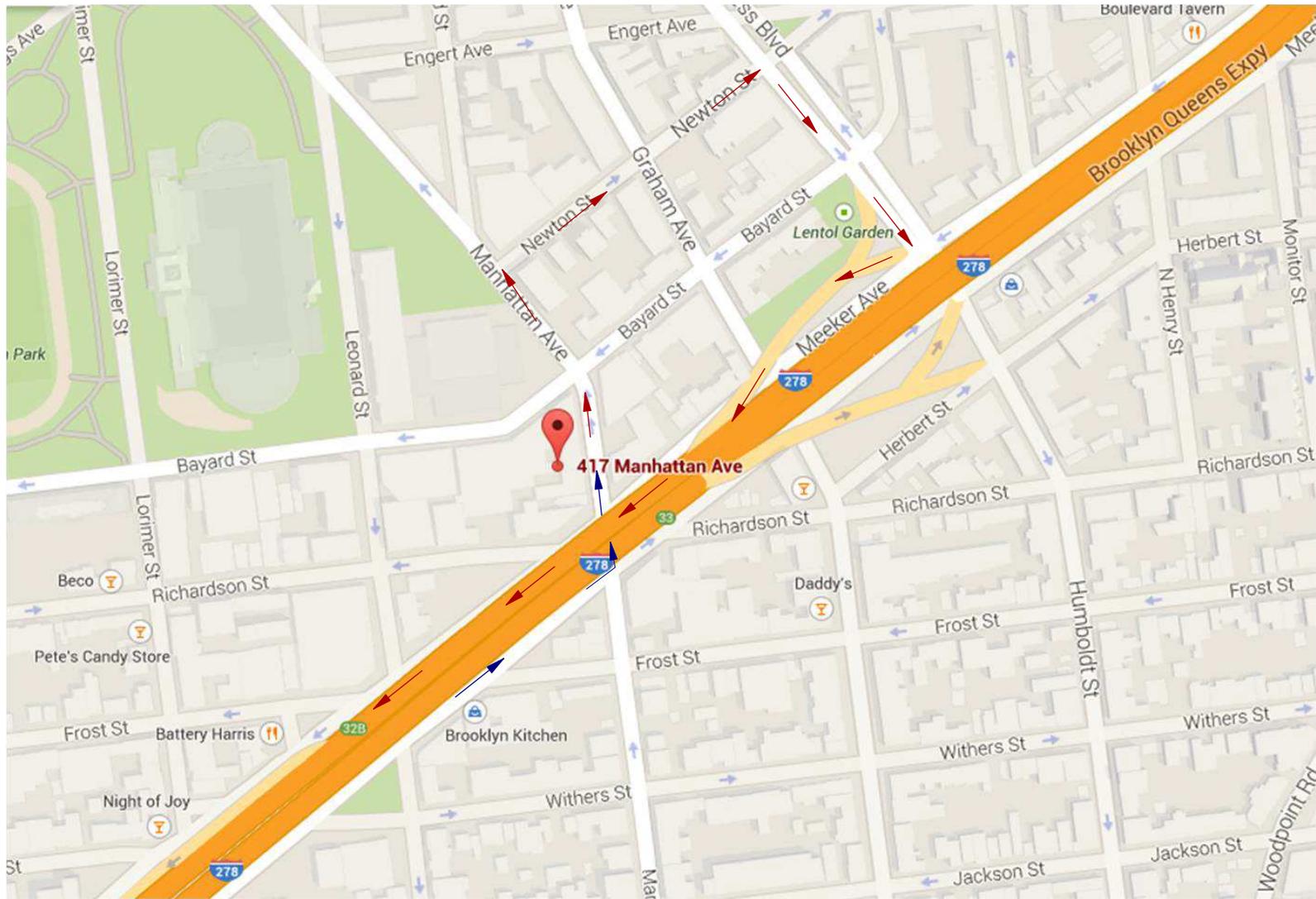
Key

-  Property Boundary
-  Surrounding Property Boundary

Scale



Scale: 1 inch = 15 feet



Key

-  Truck Route to the Site
-  Truck Route from the Site

 ENVIRONMENTAL BUSINESS CONSULTANTS	Phone 631.504.6000 Fax 631.924.2870	Figure No. 8	Site Name: REDEVELOPMENT PROJECT
		Site Address: 417 MANHATTAN AVENUE, BROOKLYN, NY	
		Drawing Title: TRUCK ROUTE MAP	

ATTACHMENT A
Redevelopment Plans

PROJECT DESCRIPTION

LOCATION: 108 FROST STREET
BROOKLYN, N.Y. 11211

SCOPE OF WORK : PROPOSED 5 STORY & CELLAR
RESIDENTIAL BUILDING

ZONING ANALYSIS

ZONE: M1-2/R6 IN MX-8, INCLUSIONARY AND QUALITY HOUSING (WIDE ST.)
MAP #: 13a BLOCK #: 2738 LOT#: 15
ZONING USE GROUP : USE GROUP: 2A - MULTIFAMILY
USE GROUP: 2B - ACCESSORY TO MULTIFAMILY

LOT AREA:	25'-0" X 100'-0" = 2500.00 SQ. FT.
ZR 23-32	MIN. LOT AREA REQ'D: 1700 SQ.FT. ACTUAL LOT AREA: 25'-0" X 100'-0" = 2500.00 SQ.FT. MIN. LOT WIDTH REQ'D: 18'-0" ACTUAL LOT WIDTH: 25'-0"

LOT COVERAGE:	
ZR 123-63 ZR 23-145	BUILDING FOOTPRINT: (see Z-002 for calculations) = 1572.91 SQ.FT. MAX LOT COVERAGE: 80% X 2500 = 2000.00 SQ.FT. PROPOSED LOT COVERAGE: (1708.05 / 2500) X 100 = 68.24% 80% > 68.24% OK

ZR 123-10, THE PROVISIONS OF CHAPTER 3, SPECIAL MIXED USE DISTRICTS, SHALL APPLY WITHIN THE SPECIAL MIXED USE DISTRICT. THE REGULATIONS OF ALL OTHER CHAPTERS OF THIS RESOLUTION ARE APPLICABLE, EXCEPT AS SUPERSEDED, SUPPLEMENTED OR MODIFIED BY THE PROVISIONS OF THIS CHAPTER.

ZR 23-144, IN DESIGNATED AREAS WHERE THE INCLUSIONARY HOUSING PROGRAM IS APPLICABLE, THE MAXIMUM PERMITTED FLOOR AREA RATIOS SHALL BE AS SET FORTH IN SECTION ZR 23-952.

MAX. ALLOWABLE F.A.R. : 2.70 X 2500.00 SQ.FT. = 6750.00 SQ.FT.
PROPOSED F.A.R. : (6746.62 S.F. / 2500) = 2.699 OK

FLOOR AREA CALCULATIONS			
FLOOR LEVEL	USE	GROSS F.A. (see Z003.4 for calc.)	NET F.A. (SQ.FT.)
CELLAR:	2B	1441.33 SQ.FT.	N/A
1st FLOOR:	2A	1538.25 SQ.FT.	(-) 276.53 SQ.FT = 1261.72 SQ.FT.
2nd FLOOR:	2A	1538.25 SQ.FT.	(-) 90.83 SQ.FT = 1447.42 SQ.FT.
3rd FLOOR:	2A	1538.25 SQ.FT.	(-) 90.83 SQ.FT = 1447.42 SQ.FT.
4th FLOOR:	2A	1538.25 SQ.FT.	(-) 90.83 SQ.FT = 1447.42 SQ.FT.
5th FLOOR:	2A	1233.47 SQ.FT.	(-) 90.83 SQ.FT = 1142.64 SQ.FT.
TOTAL AREA		8827.80 SQ.FT.	(-) 639.85 SQ.FT = 6746.62 S.F. < 6750.00 S.F. = OK.

DENSITY REGULATIONS:	
ZR 23-22	MAXIMUM ALLOWABLE # OF D.U. RESIDENTIAL F.A.R. / 680 6750 / 680 = 9.9 TOTAL PROPOSED D.U.'S = 10 OK.

YARD REQUIREMENTS:	
ZR 123-651	REQ'D. FRONT YARD: 0'-0" PROPOSED FRONT YARD: 0'-0"
ZR 123-651	REQ'D. SIDE YARDS: 0'-0" or 8'-0" PROPOSED SIDE YARDS: 0'-0"
ZR 23-47	REQ'D. REAR YARD: 30'-0" PROP. RESIDENTIAL REAR YARD : 31'-11"

HEIGHT:	
ZR 123-662 a) 1)	MAXIMUM BASE HEIGHT: 60'-0" PROPOSED BASE HEIGHT: 56'-8" MAXIMUM BUILDING HEIGHT: 110'-0" PROPOSED BUILDING HEIGHT: 72'-8" F. STEEPCREST ABOVE MAX B.HT: 10'-0" PROPOSED F. STEEPCREST: N/A

MINIMUM DISTANCE BETWEEN LEGALLY REQUIRED WINDOWS AND WALLS OR LOT LINES	
ZR 23-861	THE MINIMUM DISTANCE BETWEEN A LEGALLY REQUIRED WINDOW AND: (A) ANY WALL; (B) A #REAR LOT LINE#, OR VERTICAL PROJECTION THEREOF; OR (C) A #SIDE LOT LINE#, OR VERTICAL PROJECTION THEREOF; SHALL BE 30 FEET

PLANTING REQUIREMENTS:	
ZR 23-892 b)	FRONT PLANTING AREA REQUIRED EXCEPT AT EXITS, ENTRANCES AND DRIVEWAYS OR FOR COMMERCIAL USES FRONTING THE STREET PROPOSED FRONTAGE = 0'-0" PROPOSED PLANTING = NONE

PLANTING STRIPS REQUIREMENTS:	
ZR 123-81	NO PLANTING STRIPS REQUIRED IN MX-8

TREE REQUIREMENTS	
ZR 23-03 ZR 26-41	NEW DEVELOPMENT PROVIDE 1 TREE FOR EVERY 25 FEET OF STREET FRONTAGE OF THE ZONING LOT. SUCH TREES SHALL BE OF AT LEAST 3" CALIPER AT TIME OF PLANTING AND BE PLACED AS INDICATED ON THE SITE PLAN. ALL STREET TREES SHALL BE PLANTED, MAINTAINED AND REPLACED WHEN NECESSARY WITH THE APPROVAL OF, AND IN ACCORDANCE WITH THE STANDARDS OF, THE DEPARTMENT OF PARKS AND RECREATION AND THE DEPARTMENT OF TRANSPORTATION. 1 TREE 3" CALIPER / 25 FT OF STREET LOT LINE STREET LOT LINE = 25.00 25 / 25 = 1 TREE REQUIRED 1 TREE PROVIDED * EXACT LOCATIONS TO BE DETERMINED BY THE DPT. OF PARKS AND RECREATION. *

RESIDENTIAL PARKING REQUIREMENTS ZR 123-72	
ZR 25-23	NUMBER OF SPACES WHERE GROUP PARKING FACILITIES ARE PROVIDED 50% OF D.U. FOR QUALITY HOUSING PROPOSED 10 DWELLING UNITS MIN. SPACES REQUIRED = 5
ZR 25-261	WAIVER FOR NEW DEVELOPMENTS MAX. 5 SPACES 5 - 5 = 0 THEREFORE 0 PARKING SPACES ARE REQUIRED 0 PARKING SPACES PROVIDED

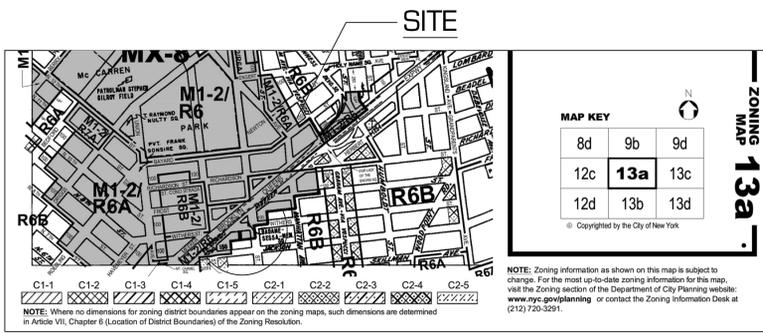
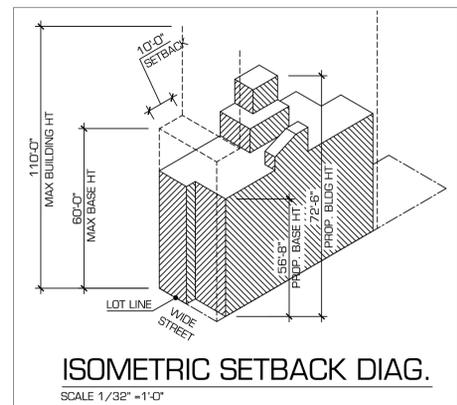
QUALITY HOUSING REQUIREMENTS	
ZR 28-21	MINIMUM AREA OF DWELLING UNIT: 400 S.F. SMALLEST PROPOSED AREA OF DWELLING UNIT: APT."A" = 502.33 S.F. (SEE AREA DIAGRAM ON Z-003)
ZR 28-22	WINDOWS SHALL BE DOUBLE GLAZED
ZR 28-23	DEVELOPMENTS, WITH NINE OR MORE DWELLING UNITS PER VERTICAL CIRCULATION CORE, AND ENLARGEMENTS, EXTENSIONS OR CONVERSIONS THAT RESULT IN NINE OR MORE DWELLING UNITS PER VERTICAL CIRCULATION CORE, SHALL COMPLY WITH THE PROVISIONS DESCRIBED BELOW: 1) A STORAGE OF REFUSE SHALL OCCUR ENTIRELY WITHIN AN ENCLOSED AREA ON THE ZONING LOT AND APPROPRIATE LOCATIONS WITHIN THE ZONING LOT SHALL BE DELINEATED FOR THIS PURPOSE: AT LEAST ONE FOR RESIDENTIAL USES AND AT LEAST ONE FOR COMMUNITY FACILITY AND COMMERCIAL USES. RESIDENTIAL STORAGE AND REMOVAL LOCATIONS SHALL BE PROVIDED AT THE RATE OF 2.9 CUBIC FEET PER DWELLING UNIT OR 1.15 CUBIC FEET PER ROOMING UNIT. 2) A REFUSE DISPOSAL ROOM OF NOT LESS THAN TWELVE SQUARE FEET WITH NO DIMENSION LESS THAN THREE FEET SHALL BE PROVIDED ON EACH STORY THAT HAS ENTRANCES TO DWELLING UNITS OR ROOMING UNITS. TWELVE SQUARE FEET OF SUCH REFUSE STORAGE ROOM SHALL BE EXCLUDED FROM THE DEFINITION OF FLOOR AREA. - PROPOSED USE IN THE BUILDING: RESIDENTIAL - PROPOSED NUMBER OF DWELLING UNITS = 10 - REQUIRED STORAGE OF REFUSE: 10 X 2.9 C.F.T. = 29.00 C.F.T. - PROPOSED STORAGE OF REFUSE AT THE CELLAR: 3'-1" X 3'-0" X 4'-0" = 37.00 C.F.T. OK - REQUIRED REFUSE DISPOSAL: 1/1 STORY, 12 SQ.FT. MIN. WITH NO DIMENSIONS LESS THAN 3'-0" - PROPOSED REFUSE DISPOSAL ON EVERY FLOOR (smallest): 3'-6" X 5'-8" = 19.83 SQ.FT. OK
ZR 28-31 ZR 28-32	DEVELOPMENTS, ENLARGEMENTS, EXTENSIONS OR CONVERSIONS, WITH 9 OR MORE DWELLING UNITS SHALL BE PROVIDED WITH 3.3% OF INDOORS OR OUTDOORS RECREATION SPACE FOR A R6. THE FLOOR SPACE OF INDOOR RECREATION SPACE PROVIDED IN ACCORDANCE WITH THE STANDARDS SET FORTH IN SECTION 28-32 (STANDARDS FOR RECREATION SPACE), NOT EXCEEDING THE AMOUNT REQUIRED FOR THE DISTRICT, SHALL BE EXCLUDED FROM THE DEFINITION OF FLOOR AREA. STANDARDS FOR RECREATION SPACE (A) ALL RECREATION SPACE SHALL BE ACCESSIBLE TO THE RESIDENTS OF THE BUILDING. IN A MIXED USE BUILDING, THE RECREATION SPACE SHALL BE ACCESSIBLE ONLY FROM THE RESIDENTIAL PORTION OF THE BUILDING. (B) THE MINIMUM DIMENSION OF ANY RECREATION SPACE SHALL BE 15 FEET. THE MINIMUM SIZE OF ANY OUTDOOR RECREATION SPACE SHALL BE 225 SQUARE FEET, AND THE MINIMUM SIZE OF ANY INDOOR RECREATION SPACE SHALL BE 300 SQUARE FEET. (C) OUTDOOR RECREATION SPACE SHALL BE OPEN TO THE SKY EXCEPT THAT BUILDING PROJECTIONS, NOT TO EXCEED SEVEN FEET IN DEPTH, MAY COVER UP TO TEN PERCENT OF THE OUTDOOR RECREATION SPACE, PROVIDED THAT THE LOWEST LEVEL OF THE PROJECTION IS AT LEAST TEN FEET ABOVE THE LEVEL OF THE OUTDOOR RECREATION SPACE. (D) ANY INDOOR RECREATION ROOM LOCATED IN A #STORY# SHALL HAVE AT LEAST ONE EXTERIOR WALL WITH WINDOWS THAT MEASURE NOT LESS THAN 9.5 PERCENT OF THE TOTAL FLOOR SPACE OF THE ROOM AND SUCH WINDOWS SHALL MEET THE APPLICABLE REQUIREMENTS OF SECTION 24-60 (COURT REGULATIONS AND MINIMUM DISTANCE BETWEEN WINDOWS AND WALLS OR LOT LINES). - PROPOSED NUMBER OF DWELLING UNITS = 10 - PROPOSED TYPE OF RECREATION SPACE: OUTDOORS - REQUIRED SIZE OF OUTDOOR RECREATION SPACE: 3.3% X 6746.62 = 2222.84 SF BUT NOT LESS THAN 225 SF AND A MIN. DIMENSION OF 15'-0" - PROPOSED RECREATION SPACE ON THE ROOF: 15'-0" X 15'-0" = 225.00 SQ.FT. OK

ENVIRONMENTAL CONDITIONS OF AN MX-8 DISTRICT	
ZR 123-32	IN SPECIAL MIXED USE DISTRICTS, ALL NEW DWELLING UNITS SHALL BE PROVIDED WITH A MINIMUM 95DB(A) OF WINDOW WALL ATTENUATION TO MAINTAIN AN INTERIOR NOISE LEVEL OF 45DB(A) OR LESS, WITH WINDOWS CLOSED, AND SHALL PROVIDE AN ALTERNATE MEANS OF VENTILATION.

CODE ANALYSIS

CONSTRUCTION CLASS: I-B	
OCCUPANCY CLASS: R-2 - RESIDENTIAL	
HANDICAP ACCESSIBILITY REGULATIONS:	
S.1107.6.1.2	MINIMUM REQUIRED # OF ADAPTABLE D.U. : IN STRUCTURES WITH FOUR OR MORE DWELLING OR SLEEPING UNITS INTENDED TO BE OCCUPIED AS A RESIDENCE, EVERY DWELLING AND SLEEPING UNIT INTENDED TO BE OCCUPIED AS A RESIDENCE SHALL BE A TYPE B UNIT. - ALL ADAPTABLE D.U.S PROVIDED.
BUILDINGS WITH 1 EXIT:	
S.1018.2	ONLY 1 EXIT IS REQUIRED IN BUILDINGS: 5) OCCUPANCY GROUP R-2 OF CONSTRUCTION TYPE I OR II NOT EXCEEDING 6 STORIES AND NOT EXCEEDING 2000 SF PER STORY. - PROPOSED NUMBER OF STORIES: 6 STORY - PROPOSED CONSTRUCTION TYPE: I-B - PROPOSED LARGEST AREA PER STORY: 1538.25 SQ.FT. THEREFORE 1 MEANS OF EGRESS IS REQUIRED
EXIT STAIR ENCLOSURE:	
S.1019.1	VERTICAL INTERIOR EXIT STAIRWAY FIRE RATING REQUIRED FOR R-2 CONNECTING 4 STORIES OR MORE = 2HRS - PROPOSED NUMBER OF STORIES: 5 STORY - PROVIDED STAIR FIRE RATING = 2HRS (SEE PARTITION LEGEND ON A-001)
S.1019.1.10	IN R-2, WHERE EXIT ENCLOSURES ARE REQUIRED TO HAVE A FIRE RATING OF 2 HRS, SUCH ENCLOSURES SHALL BE CONSTRUCTED OF MASONRY OR MASONRY EQUIVALENT.
S.1014-01 OF RCNY	MASONRY WALL EQUIVALENT CONSISTING OF METAL STUD WALL WITH 24 GAUGE 36" X 48" STEEL SHEET INSTALLED 1'-0" OF THE FLOOR SHALL BE PERMITTED IN STAIRCASES AS PER S.1014-01 OF RCNY.
EXIT DOORWAY ARRANGEMENT & SCISSOR STAIR:	
S.1014.2.1, 3)	R-2 OCCUPANCIES WHERE STAIRS ARE ENCLOSED IN WALL HAVING AT LEAST A 2HR FIRE-RESISTANCE RATING AND CONSTRUCTED OF MASONRY EQUIVALENT IN ACCORDANCE WITH DEPARTMENT RULES: 3.1) THE EXIT DOOR TO SUCH STAIR SHALL BE PLACED NOT LESS THAN 15'-0" APART. 3.2) SUCH STAIR SHALL BE PERMITTED TO SHARE A COMMON WALLS, FLOORS, CEILING, OR SCISSOR STAIRS ASSEMBLIES PROVIDED THAT THE CONSTRUCTION IS AT LEAST 2 HRS PROTECTED AND CONSTRUCTED OF MASONRY OR MASONRY EQUIVALENT.
MINIMUM STAIRWAY WIDTH:	
S.1009.1	THE WIDTH OF STAIR SHALL BE DETERMINED AS PER TABLE 1005.1 DEPENDING ON THE NUMBER OF OCCUPANTS OF THE FLOOR, HOWEVER, FOR OCCUPANCY R-2, MAXIMUM BUILDING HEIGHT OF 125'-0" AND MAXIMUM 30 OCCUPANTS PER FLOOR, IT SHALL NOT BE LESS THAN 36" OCCUPANCY PER FLOOR: 2 APARTMENTS MAX < 30 OCCUPANTS. PROPOSED STAIR WIDTH : 36"

ENERGY CODE COMPLIANCE NOTE:	
TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2011 NEW YORK CITY ENERGY CONSERVATION CODE, USING CHAPTER 5	



ZONING MAP 13a **ZONE M1-2/R6 IN MX-8**

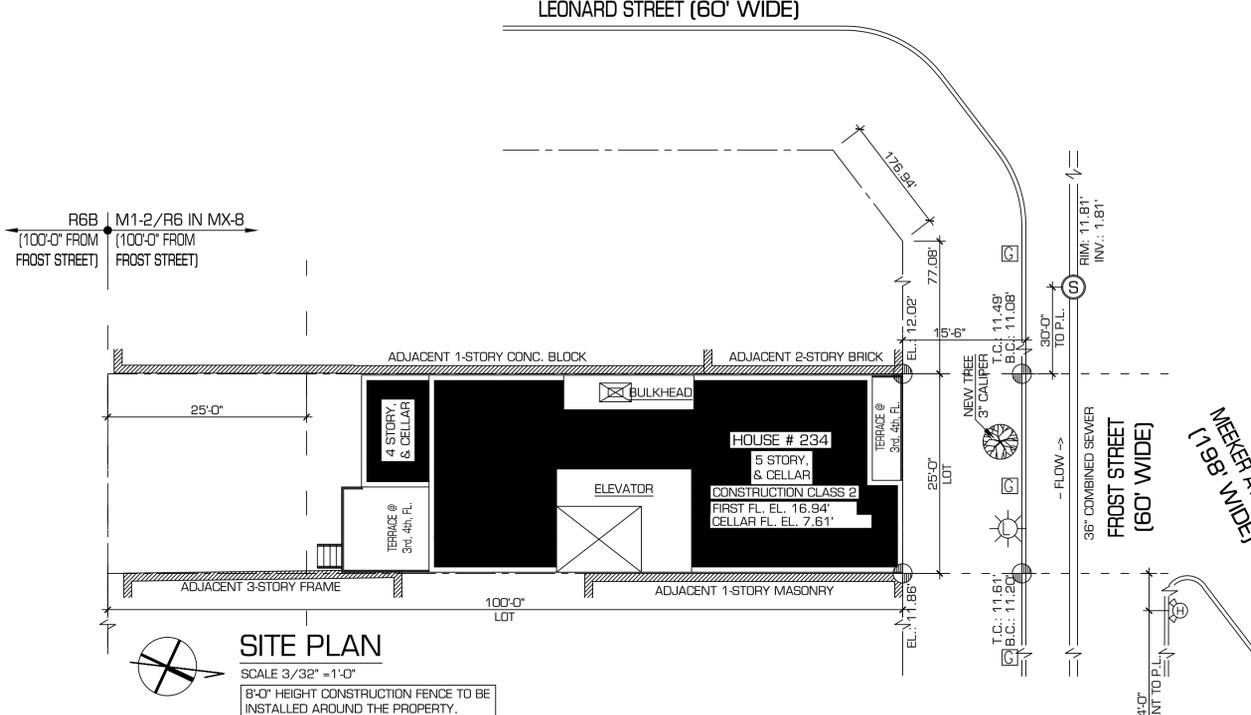


TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (hours)						
BUILDING ELEMENT	TYPE I		TYPE II		TYPE III	
	A	B	A ^a	B	A ^a	B
Structural frame ^a Including columns, girders, trusses	3 ^b	2 ^b	1	0	1	0
Bearing walls Exterior ^a / Interior	3 3 ^b	2 2 ^b	1 1	0 0	2 1	2 0
Nonbearing walls and partitions Exterior Interior ^a					See Table 602	
Floor construction ^b Including supporting beams and joists	2	2	1	0	1	0
Roof construction Including supporting beams and joists	1 1/2 ^c	1 ^c	1 ^c	0 ^c	1 ^c	0

TABLE 1014.1 SPACES WITH ONE MEANS OF EGRESS	
OCCUPANCY	MAXIMUM OCCUPANT LOAD
A, B, E, M, U	74
F	50
H-1, H-2, H-3	3
H-4, H-5, I-1, I-3, I-4	10
I-2	See Section 1013.2.2
S	20
S	30

TABLE 503—continued ALLOWABLE HEIGHT AND BUILDING AREAS ^a Height limitations shown as stories and feet above grade plane. Area limitations as determined by the definition of "Area, building," per floor.							
GROUP	Hgt (feet)	TYPE OF CONSTRUCTION					
		TYPE I		TYPE II		TYPE III	
		A	B	A	B	A	B
R-1	S	UL	UL	65	NP	65	NP
	A	UL	UL	65	NP	24,000	NP
R-2	S	UL	UL	6	NP	6	3
	A	UL	UL	6	NP	24,000	5,600

TABLE 1015.1 EXIT ACCESS TRAVEL DISTANCE ^a		
OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A	See Section 1024.7	
E, F-1, I-1, M, R, S-1	150	200 ^b
B	200	300 ^b

TABLE 706.3.7 FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES BETWEEN FIRE AREAS	
OCCUPANCY GROUP	FIRE-RESISTANCE RATING (hours)
H-1, H-2	4
F-1, H-3, S-1	3
A, B, E, F-2, H-4, H-5, I, M, R, S-2	2
U	1

LIST OF DRAWINGS	
Z-001	ZONING / CODE ANALYSIS AND SITE PLAN
Z-002	FLOOR AREA AND DEDUCTION DIAGRAMS
Z-003	TR-1 INSPECTION LIST, FL AREA AND DED. DIAGRAMS
A-001	PROPOSED CELLAR FLOOR PLAN & LEGENDS
A-002	PROPOSED FIRST AND SECOND FLOOR PLANS
A-003	PROPOSED THIRD, FOURTH & FIFTH FLOOR PLANS
A-004	PROPOSED ROOF FLOOR PLAN
A-005	PROPOSED FRONT AND REAR ELEVATIONS
A-006	SECTION A-A & B-B
A-007	SECTION C-C AND WINDOW SCHEDULE
DT-001	DETAILS
N-001	GENERAL CONSTRUCTION NOTES
N-002	HANDICAP ADAPTABILITY PROVISIONS
EN-001	ENERGY CONSERVATION COMPLIANCE CERTIFICATES
EN-002	REFLECTED CEILING PLANS FOR ENERGY COMPLIANCE

PROPOSED 5 STORY, AND
CELLAR RESIDENTIAL
BUILDING

108 FROST ST
BROOKLYN N.Y. 11211

Architects
MICHAEL AVRAMIDES
319 East 50th Street
New York, NY 10022
MCA@Avramides.com
T 212-755-5111 x200
C 917-855-8111

No.	Description	Date
REVISIONS		

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DOB BSCAN sticker:

**ZONING / CODE ANALYSIS
AND SITE PLAN**

DATE: 07.30.14
SCALE: AS SHOWN
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DOB NO. 1 OF

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**PROPOSED 5 STORY, AND
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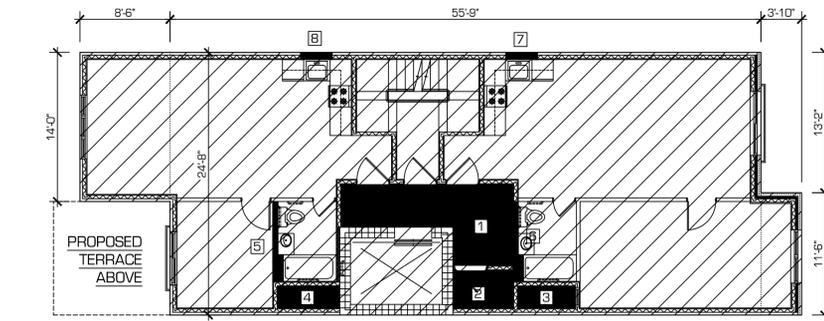
108 FROST ST
BROOKLYN N.Y. 11211

Architects

MICHAEL AVRAMIDES

319 East 50th Street
New York, NY 10022
MCA@Avramides.com
T 212-755-5111 x200
C 917-855-8111

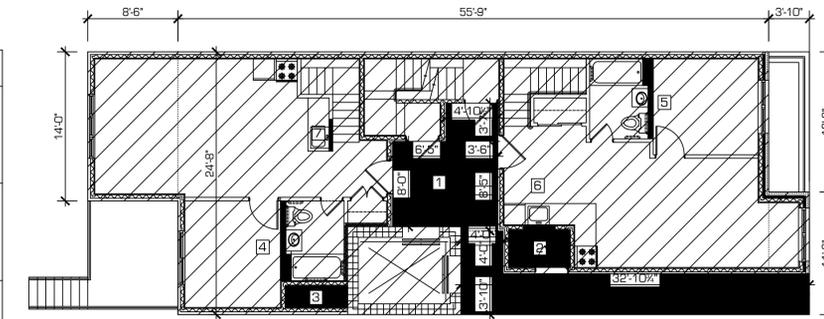
2ND FL. F.A. DEDUCTION AREA (SQ.FT)		
20.2641 DENSITY 50% OF CORRIDOR PERI.OH		84.98 / 2 = 42.49
20.2623 REUSE EXISTING 12.5% MAX. PERI.OH		12.00 MAX.
MECH SHAFT		10.67
		11.67
PLUMBING CHASE WALL		10.00
		4.00
TOTAL:		90.83



2ND FLOOR AREA DIAGRAM
SCALE 1/8" = 1'-0"

14'-0" X 8'-6" = 119.00 SQ. FT.
24'-8" X 55'-9" = 1375.17 SQ. FT.
3'-10" X 11'-6" = 44.08 SQ. FT.
TOTAL AREA = 1538.25 SQ. FT.

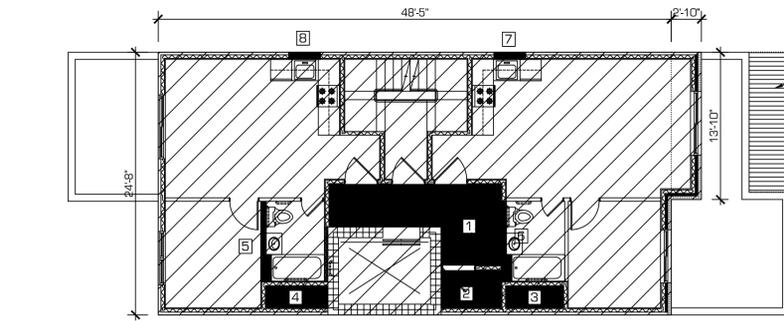
1ST FL. F.A. DEDUCTION AREA (SQ.FT)		
20.2641 DENSITY 50% OF CORRIDOR PERI.OH	4'-10 1/2" X 3'-7" = 17.47 	DENSITY = 50% X 240.36 = 120.18
	3'-6" X 8'-5" = 29.46 	DENSITY = 50% X 240.36 = 120.18
	3'-10" X 32'-10 1/2" = 126.10	
20.2623 REUSE EXISTING 12.5% MAX. PERI.OH		12.00 MAX.
MECH SHAFT		11.67
		10.00
PLUMBING CHASE WALL		2.50
TOTAL:		276.53



1ST FLOOR AREA DIAGRAM
SCALE 1/8" = 1'-0"

14'-0" X 8'-6" = 119.00 SQ. FT.
24'-8" X 55'-9" = 1375.17 SQ. FT.
3'-10" X 11'-6" = 44.08 SQ. FT.
TOTAL AREA = 1538.25 SQ. FT.

5TH FL. F.A. DEDUCTION AREA (SQ.FT)		
20.2641 DENSITY 50% OF CORRIDOR PERI.OH		84.98 / 2 = 42.49
20.2623 REUSE EXISTING 12.5% MAX. PERI.OH		12.00 MAX.
MECH SHAFT		10.67
		11.67
PLUMBING CHASE WALL		10.00
		4.00
TOTAL:		90.83



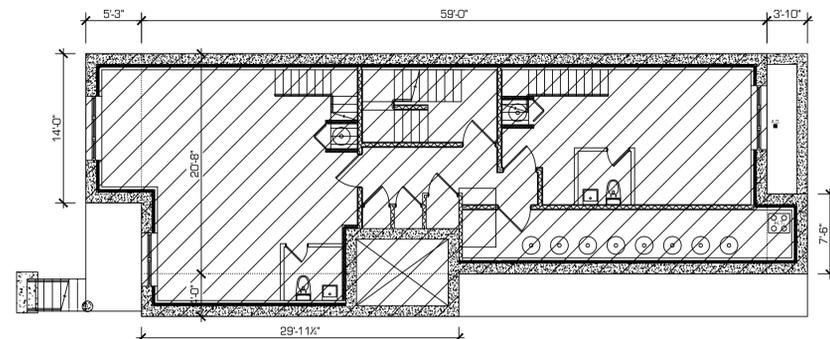
5TH FLOOR AREA DIAGRAM
SCALE 1/8" = 1'-0"

24'-8" X 48'-5" = 1194.28 SQ. FT.
2'-10" X 13'-10" = 39.19 SQ. FT.
TOTAL AREA = 1233.47 SQ. FT.

PROPOSED
OUTER
COURT

ZR.23-841 NARROW OUTER COURT
THE WIDTH OF A NARROW OUTER COURT SHALL BE AT LEAST ONE AND ONE-THIRD THE DEPTH OF SUCH OUTER COURT.

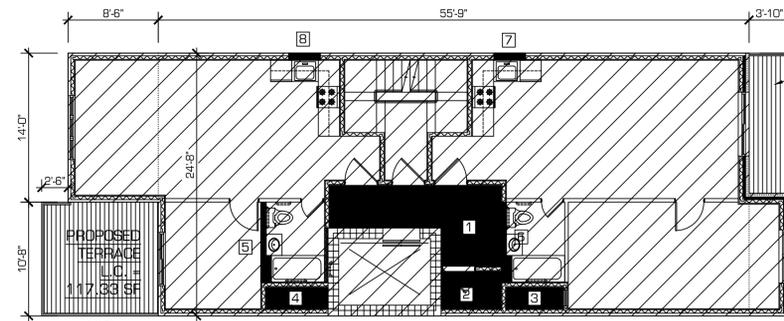
PROPOSED DEPTH = 3'-10"
MINIMUM REQUIRED WIDTH = 1.33
1.33 X 3'-10" = 5'-1 3/16"
PROPOSED WIDTH = 13'-2" OK



CELLAR FLOOR AREA DIAGRAM
SCALE 1/8" = 1'-0"

14'-0" X 5'-3" = 73.50 SQ. FT.
20'-8" X 59'-0" = 1219.33 SQ. FT.
3'-10" X 7'-6" = 28.75 SQ. FT.
4'-0" X 29'-11 1/4" = 119.75 SQ. FT.
TOTAL AREA = 1441.33 SQ. FT.

3RD & 4TH FL. F.A. DED. AREA (SQ.FT)		
20.2641 DENSITY 50% OF CORRIDOR PERI.OH		84.98 / 2 = 42.49
20.2623 REUSE EXISTING 12.5% MAX. PERI.OH		12.00 MAX.
MECH SHAFT		10.67
		11.67
PLUMBING CHASE WALL		10.00
		4.00
TOTAL:		90.83

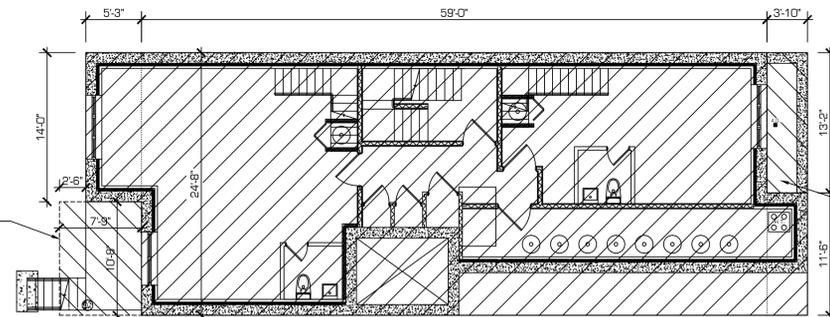


3RD & 4TH FLOOR AREA DIAGRAM
SCALE 1/8" = 1'-0"

14'-0" X 8'-6" = 119.00 SQ. FT.
24'-8" X 55'-9" = 1375.17 SQ. FT.
3'-10" X 11'-6" = 44.08 SQ. FT.
TOTAL AREA = 1538.25 SQ. FT.

PROPOSED
TERRACE
L.C. =
50.47 SF

PROPOSED
TERRACE ABOVE
L.C. = 117.33 SF



LOT COVERAGE AREA DIAGRAM
SCALE 1/8" = 1'-0"

14'-0" X 5'-3" = 73.50 SQ. FT.
24'-8" X 59'-0" = 1455.33 SQ. FT.
3'-10" X 11'-6" = 44.08 SQ. FT.
7'-9" X 10'-8" = 82.67
3'-10" X 13'-2" = 50.47
TOTAL AREA = 1706.05 SQ. FT.

No. Description Date
REVISIONS

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TITLE
**FLOOR AREA AND
DEDUCTION DIAGRAMS**

DATE: 07.30.14
SCALE: AS SHOWN
DRAWN: E.D.
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DOB NO.
2 OF

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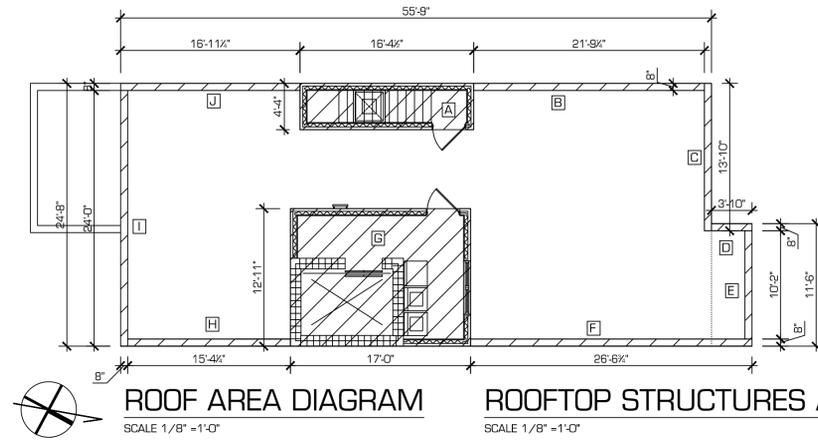
PROPOSED 5 STORY, AND
CELLAR RESIDENTIAL
BUILDING

108 FROST ST
BROOKLYN N.Y. 11211

Architects

MICHAEL AVRAMIDES

319 East 50th Street
New York, NY 10022
MCA@Avramides.com
T 212-755-5111 x200
C 917-855-8111



ROOF AREA DIAGRAM

SCALE 1/8" = 1'-0"

55'-9" X 24'-8" = 1375.17 SQ. FT.
3'-10" X 11'-6" = 44.08 SQ. FT.
TOTAL AREA = 1419.25 SQ. FT.

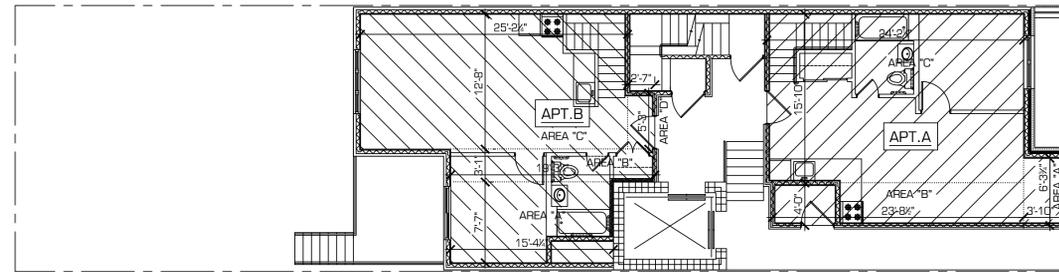
ROOFTOP STRUCTURES AREA DIAGRAM

SCALE 1/8" = 1'-0"

A = 16'-4 1/2" X 4'-4" = 70.96 SQ. FT.
B = 21'-9 1/4" X 8" = 14.51 SQ. FT.
C = 13'-10" X 8" = 9.22 SQ. FT.
D = 3'-10" X 8" = 2.55 SQ. FT.
E = 10'-2" X 8" = 6.78 SQ. FT.
F = 26'-6 3/4" X 8" = 17.71 SQ. FT.
G = 17'-0" X 12'-11" = 219.58 SQ. FT.
H = 15'-4" X 8" = 10.24 SQ. FT.
I = 24'-0" X 8" = 16.00 SQ. FT.
J = 16'-11 1/4" X 8" = 11.29 SQ. FT.
TOTAL AREA = 378.84 SQ. FT.

AREA OF ROOFTOP STRUCTURES

MAX ROOFTOP STRUCTURES AREA = 33.33%
PROP. STRUCT. / ROOF AREA = ACTUAL ROOF COVERAGE
(378.84 / 1419.25) X 100 = 26.69% OF ROOF AREA
26.69% < 33.33% = OK



1ST FLOOR DU'S AREA DIAGRAM

SCALE 1/8" = 1'-0"

APT. A
AREA A = 3'-10" x 6'-3 3/4" = 24.20
AREA B = 4'-0" x 23'-8 1/2" = 94.83
AREA C = 15'-10" x 24'-2 1/2" = 383.30
TOTAL = 502.33 SF

APT. B
AREA A = 7'-7" x 15'-4 1/4" = 116.44
AREA B = 3'-1" x 19'-3 1/4" = 59.42
AREA C = 12'-8" x 25'-2 1/4" = 319.04
AREA D = 2'-7" x 5'-3" = 13.56
TOTAL = 508.46 SF

WORK TYPES TO BE FILED SEPARATELY

WORK TYPE	SEPARATE APPLICATION	SUBSEQUENT FILING
BPP	✓	
SIDEWALK SHED & FENCE	✓	
SPRINKLERS	✓	
FIRE ALARM	✓	
MECHANICAL	✓	
PLUMBING	✓	
FOUNDATIONS	✓	
STRUCTURAL	✓	

CONTROLLED INSPECTIONS

ALL MATERIALS DESIGNATED FOR "CONTROLLED INSPECTION" SHALL BE INSPECTED AND / OR TESTED TO VERIFY COMPLIANCE WITH CODE REQUIREMENTS, UNLESS OTHERWISE SPECIFICALLY PROVIDED BY CODE PROVISIONS. ALL REQUIRED INSPECTIONS AND TESTS OF MATERIAL SHALL BE MADE AND / OR WITNESSED BY OR UNDER THE DIRECT SUPERVISION OF AN ARCHITECT OR ENGINEER RETAINED BY OR ON BEHALF OF THE OWNER OR LESSEE.

REQUIRED SPECIAL INSPECTIONS

FIRE ALARM TEST	BC 907, BC 1704.13
STRUCTURAL STEEL-WELDING	BC 1704.3.1
STRUCTURAL STEEL-ERECTION & BOLTING	BC 1704.3.2, BC 1704.3.3
STRUCTURAL COLD-FORMED STEEL	BC 1704.3.4
CONCRETE - CAST - IN - PLACE	BC 1704.4
MASONRY	BC 1704.5
EXCAVATION, SHEETING, SHORING AND BRACING	BC 1704.19, BC 3304.4.1
UNDERPINNING	BC 1704.9.1
EXTERIOR INSULATION FINISH SYSTEMS (EIFS)	BC 1704.12
MECHANICAL SYSTEMS	BC 1704.15
STRUCTURAL SAFETY - STRUCTURAL STABILITY	BC. 1704.19
SITE STORM DRAINAGE DISP. & DETEN. SYS. INSTALLATION	BC 1704.20
SPRINKLER SYSTEMS	BC 1704.21
HEATING SYSTEMS	BC 1704.23
FIRESTOP, DRAFTSTOP, AND FIREBLOCK SYSTEMS	BC 1740.25
SEISMIC ISOLATION SYSTEMS	BC 1707.8
CONCRETE TEST CYLINDERS, TR-2	BC 1905.6
CONCRETE DESIGN MIX, TR-3	BC 1905.3

REQUIRED PROGRESS INSPECTIONS

FOOTING AND FOUNDATION	BC 109.3.1
ENERGY CODE COMPLIANCE INSPECTIONS	BC. 109.3.5
FIRE-RESISTANCE RATED CONSTRUCTION	BC.109.3.4

No. Description Date

REVISIONS

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DOB BSCAN sticker:

TITLE
TR-1 INSPECTION LIST,
FLOOR AREA AND
DEDUCTION DIAGRAMS

DATE: 07.30.14
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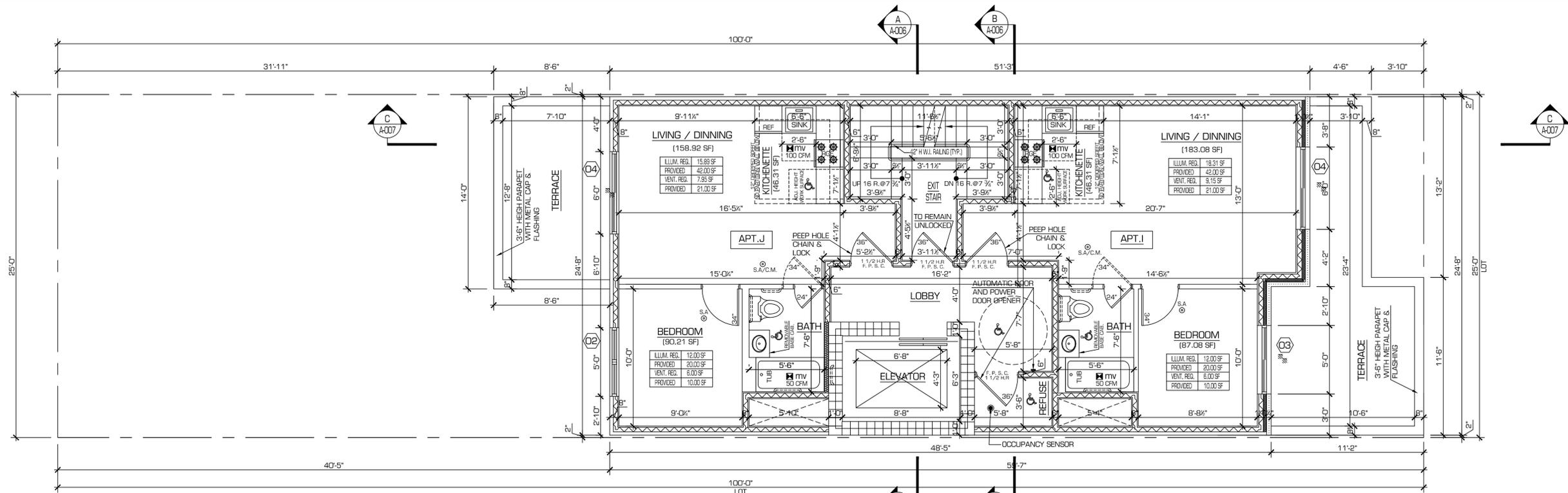
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PROPOSED 5 STORY, AND
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BUILDING

108 FROST ST
BROOKLYN N.Y. 11211

Architects

MICHAEL AVRAMIDES
319 East 50th Street
New York, NY 10022
MCA@Avramides.com
T 212-755-5111 x200
C 917-855-8111

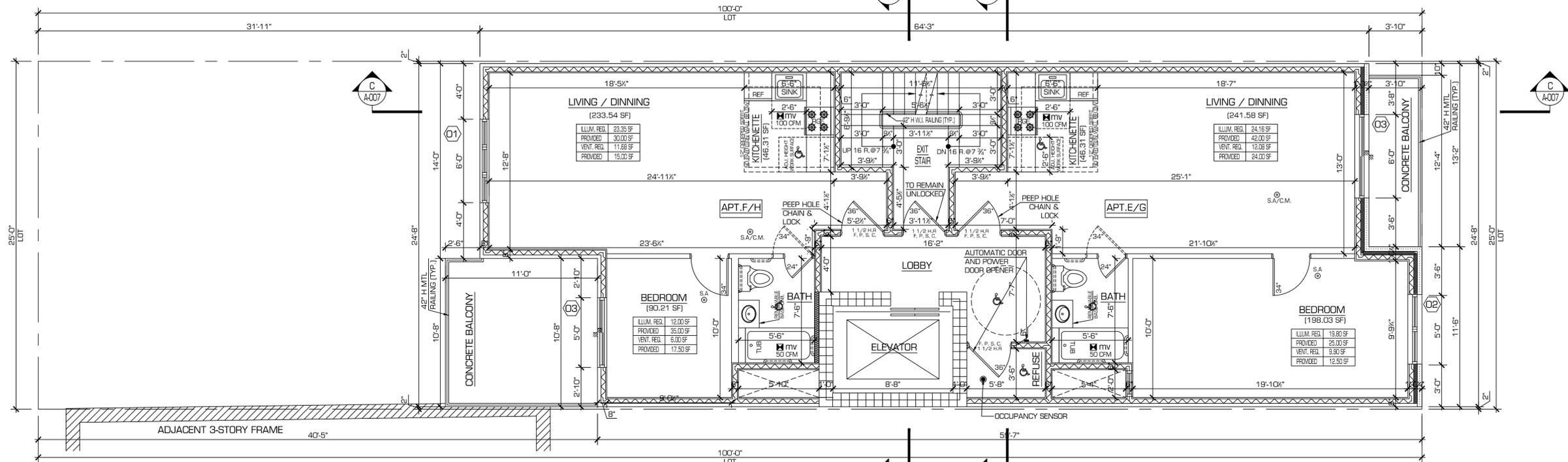


FIFTH FLOOR PLAN

SCALE 1/4" = 1'-0"

S. 903.2.7, S. 907.2.9
SPRINKLER SYSTEM AND FIRE ALARM
SHALL BE INSTALLED THROUGHOUT THIS
BUILDING.

S. 1614
BUILDING TO CONFORM WITH
EARTHQUAKE RESISTANCE DESIGN
PRESCRIBED BY THE 2008 NYC BUILDING
CODE. SEE STRUCTURAL PLANS FOR
CONSTRUCTION DETAILS.



THIRD, FOURTH FLOOR PLAN

SCALE 1/4" = 1'-0"

S. 903.2.7, S. 907.2.9
SPRINKLER SYSTEM AND FIRE ALARM
SHALL BE INSTALLED THROUGHOUT THIS
BUILDING.

S. 1614
BUILDING TO CONFORM WITH
EARTHQUAKE RESISTANCE DESIGN
PRESCRIBED BY THE 2008 NYC BUILDING
CODE. SEE STRUCTURAL PLANS FOR
CONSTRUCTION DETAILS.

S. 1107. HANDICAP ACCESSIBILITY
FACILITIES FOR PEOPLE HAVING
PHYSICAL DISABILITIES SHALL
COMPLY WITH APPENDIX "P" OF THE
2008 NYC BUILDING CODE AND
A117.1-2003 MODIFIED BY LL58/87
(SEE N-002 FOR DETAILS AND
SPECIFICATIONS)

REVISIONS

No. Description Date

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TITLE
**PROPOSED THIRD, FOURTH
AND FIFTH FLOOR PLANS**

SEAL	DATE: 07.30.14
	SCALE: AS SHOWN
	DRAWN: A.B.
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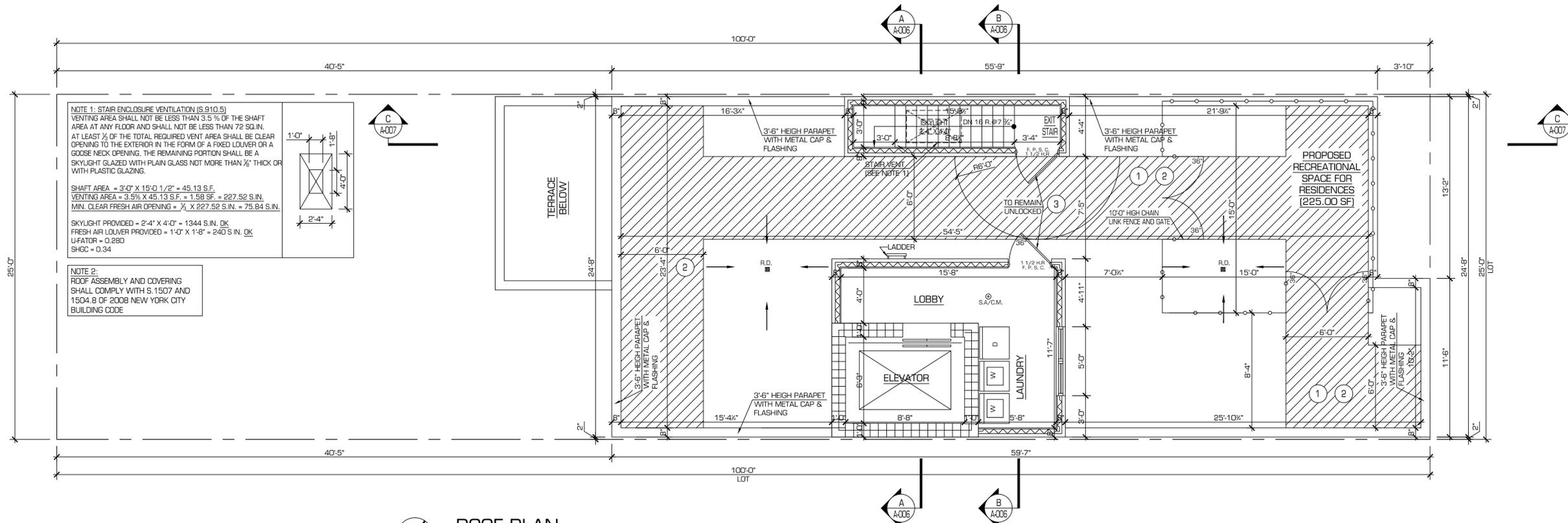
PROPOSED 5 STORY, AND
CELLAR RESIDENTIAL
BUILDING

108 FROST ST
BROOKLYN N.Y. 11211

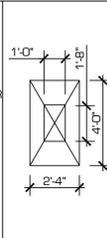
Architects

MICHAEL AVRAMIDES

319 East 50th Street
New York, NY 10022
MCA@Avramides.com
T 212-755-5111 x200
C 917-855-8111



NOTE 1: STAIR ENCLOSURE VENTILATION (S 910.5)
VENTING AREA SHALL NOT BE LESS THAN 3.5% OF THE SHAFT AREA AT ANY FLOOR AND SHALL NOT BE LESS THAN 72 SQ.IN. AT LEAST 1/2 OF THE TOTAL REQUIRED VENT AREA SHALL BE CLEAR OPENING TO THE EXTERIOR IN THE FORM OF A FIXED LOUVER OR A GOOSE NECK OPENING. THE REMAINING PORTION SHALL BE A SKYLIGHT GLAZED WITH PLAIN GLASS NOT MORE THAN 1/8" THICK OR WITH PLASTIC GLAZING.
SHAFT AREA = 3'-0" X 15'-0 1/2" = 45.13 S.F.
VENTING AREA = 3.5% X 45.13 S.F. = 1.58 SF. = 227.52 S.I.N.
MIN. CLEAR FRESH AIR OPENING = 1/4" X 227.52 S.I.N. = 75.84 S.I.N.
SKYLIGHT PROVIDED = 2'-4" X 4'-0" = 1344 S.I.N. OK
FRESH AIR LOUVER PROVIDED = 1'-0" X 1'-8" = 240 S.I.N. OK
U-FACTOR = 0.280
SHGC = 0.34



NOTE 2:
ROOF ASSEMBLY AND COVERING SHALL COMPLY WITH S.1507 AND 1504.8 OF 2008 NEW YORK CITY BUILDING CODE

ROOF PLAN
SCALE 1/4" = 1'-0"

S. 903.2.7, S.907.2.9
SPRINKLER SYSTEM AND FIRE ALARM SHALL BE INSTALLED THROUGHOUT THIS BUILDING.

S. 1614
BUILDING TO CONFORM WITH EARTHQUAKE RESISTANCE DESIGN PRESCRIBED BY THE 2008 NYC BUILDING CODE. SEE STRUCTURAL PLANS FOR CONSTRUCTION DETAILS.

- 1 UNOBSTRUCTED ROOFTOP ACCESS LOCATIONS AND LANDINGS FOR FIRE DEPARTMENT OPERATIONS
- 2 CLEAR PATH CLEARANCES FOR FIRE DEPARTMENT OPERATIONS
- 3 ROOFTOP DOOR OPENING CLEARANCES FOR FIRE DEPARTMENT OPERATIONS
- 4 FIRE ESCAPE CLEARANCES FOR FIRE DEPARTMENT OPERATIONS

REVISIONS

No.	Description	Date

DOB EXAMINER SIGNATURE:

DOB BSCAN sticker:

TITLE
PROPOSED ROOF PLAN

SEAL	DATE: 07.30.14
	SCALE: AS SHOWN
	DRAWN: A.B.
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PROPOSED 5 STORY, AND
CELLAR RESIDENTIAL
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TITLE
**FRONT AND REAR
ELEVATIONS**

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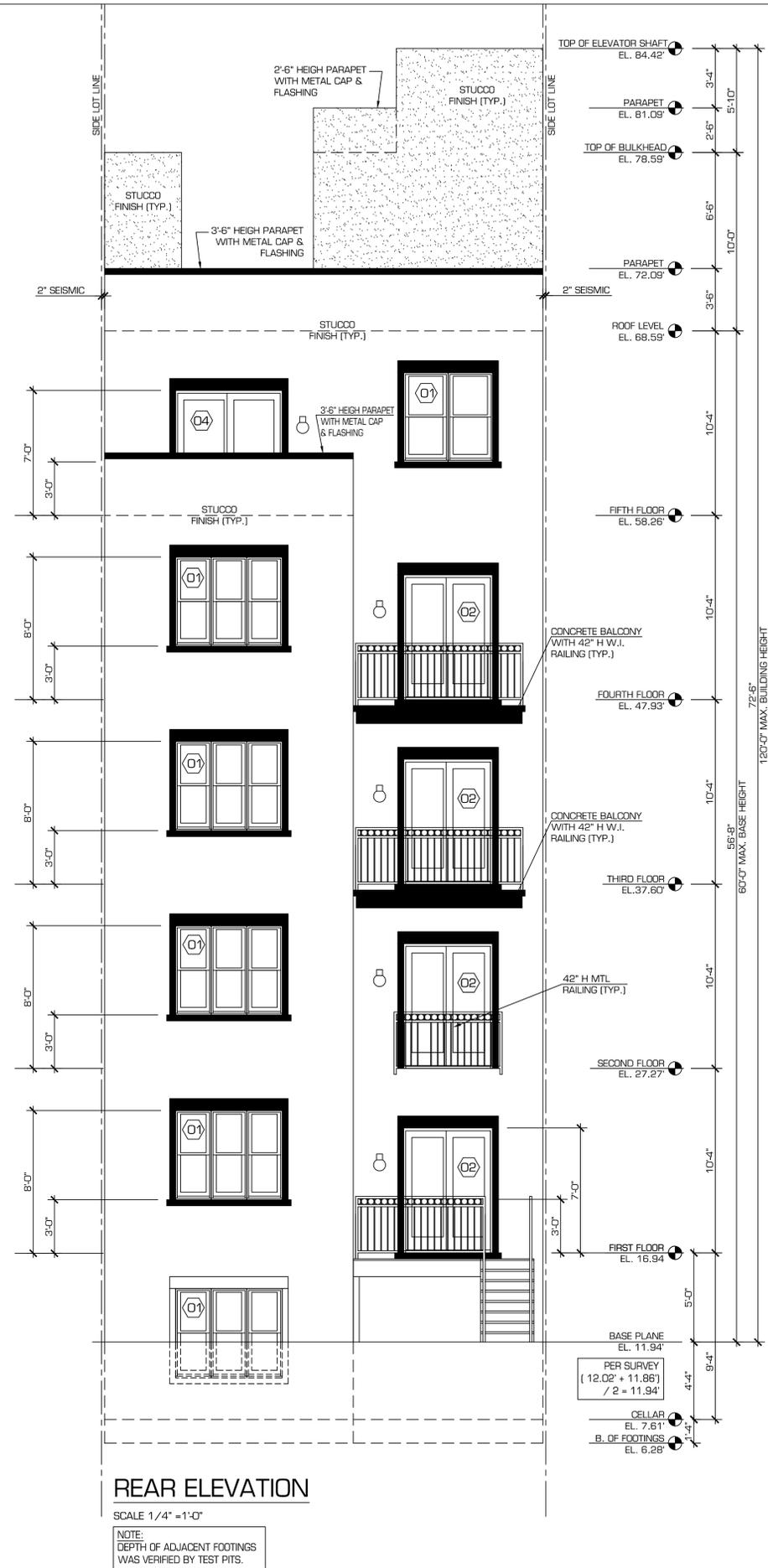
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FRONT ELEVATION

SCALE 1/4" = 1'-0"

NOTE:
DEPTH OF ADJACENT FOOTINGS
WAS VERIFIED BY TEST PITS.



REAR ELEVATION

SCALE 1/4" = 1'-0"

NOTE:
DEPTH OF ADJACENT FOOTINGS
WAS VERIFIED BY TEST PITS.

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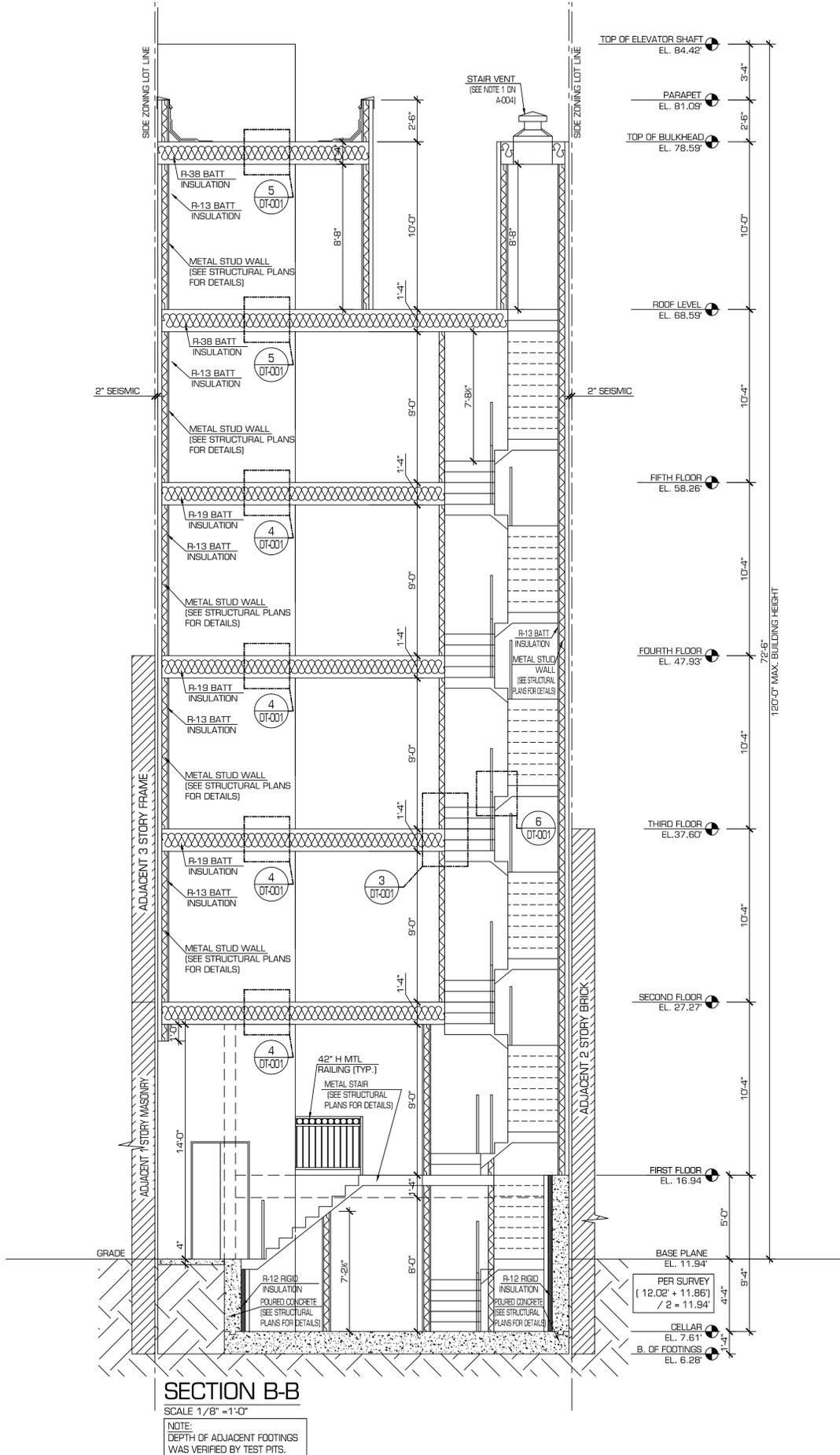
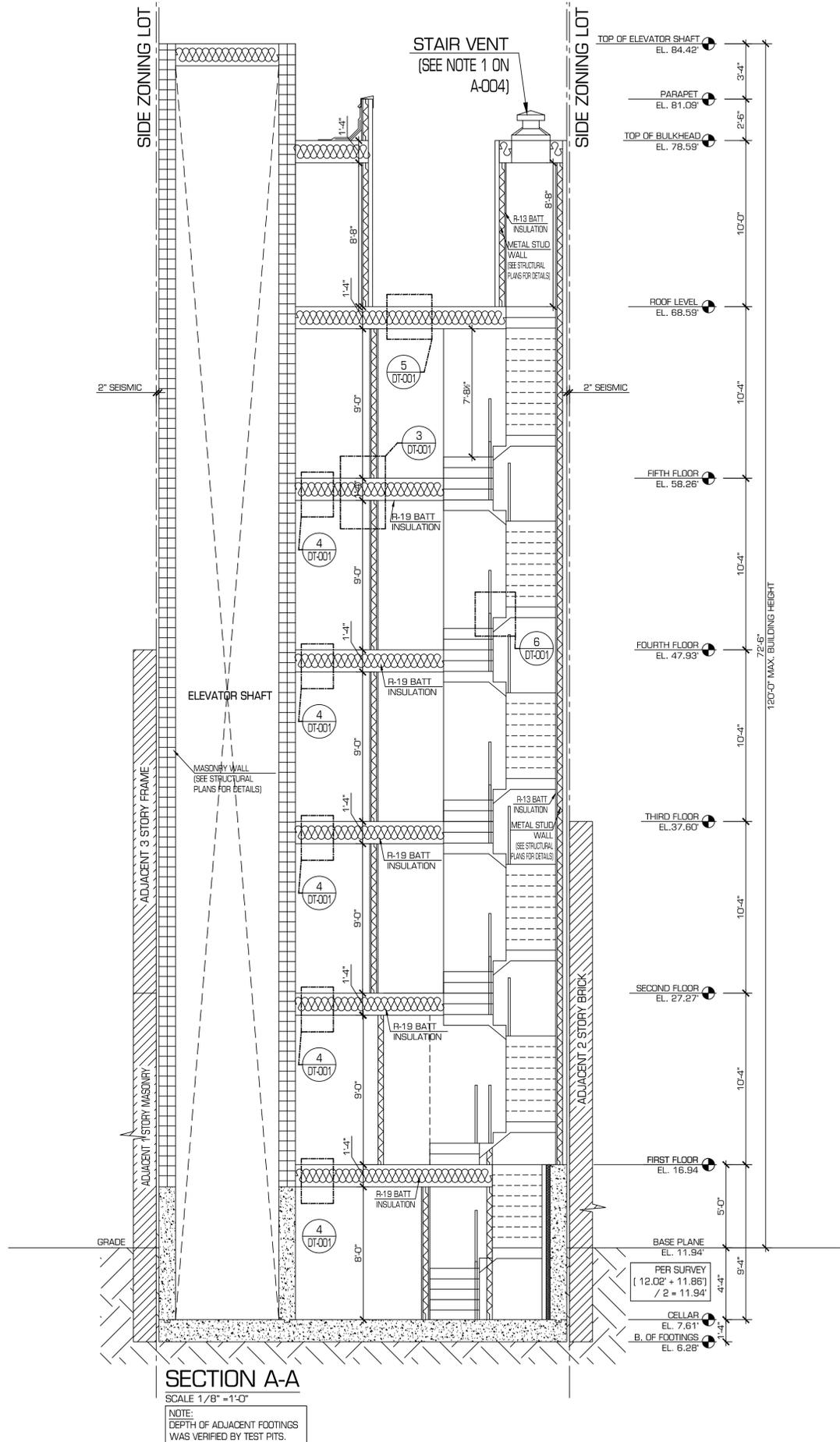
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SECTIONS A-A AND B-B

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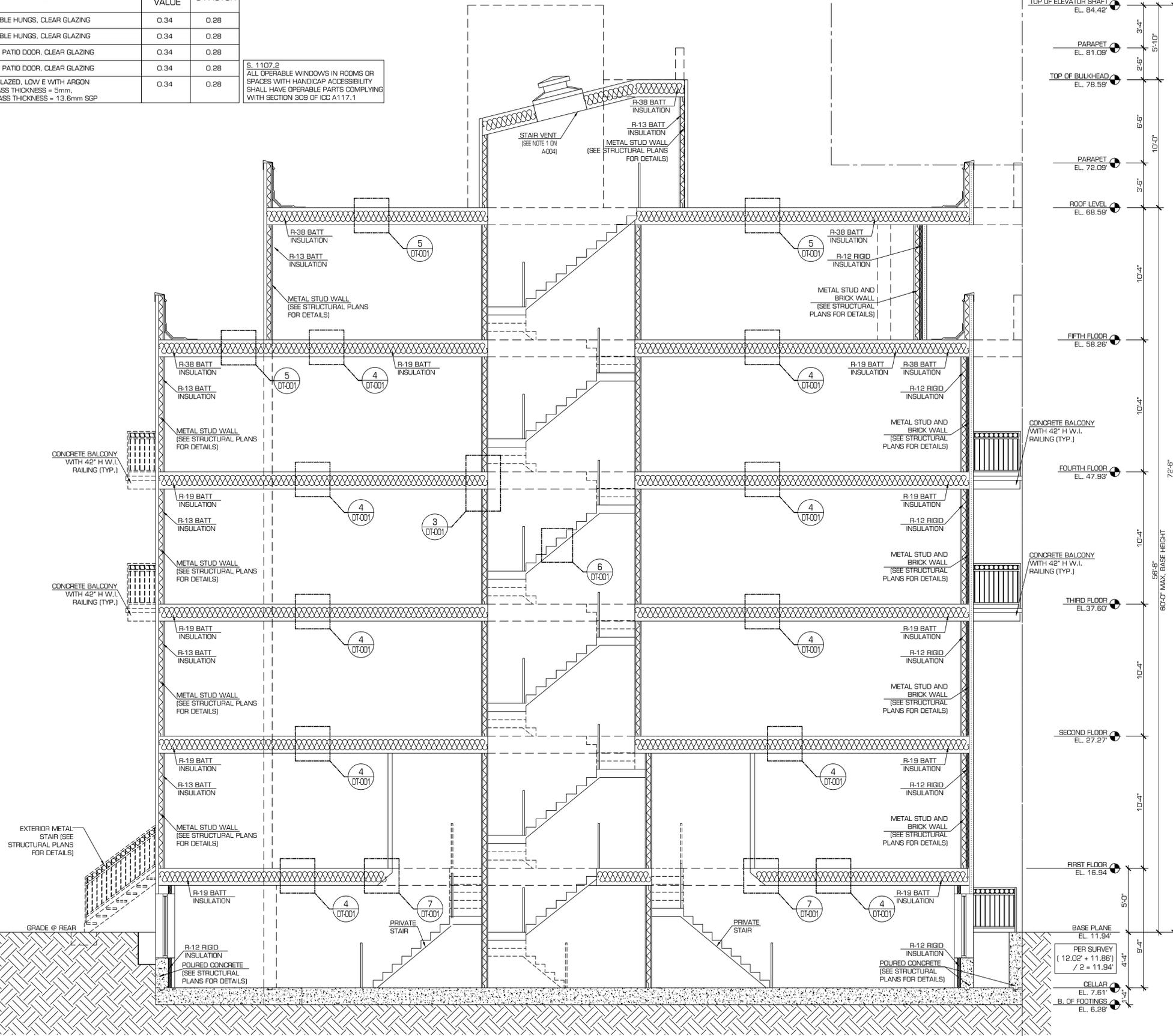


WINDOW SCHEDULE

WINDOW #	WINDOW SIZE (w x h)	COMMENTS	TYPE	SHGC VALUE	U-FACTOR
01	6'-0" x 5'-0"	DUAL GLAZED, LOW E WITH ARGON	(3) DOUBLE HUNG, CLEAR GLAZING	0.34	0.28
02	5'-0" x 5'-0"	DUAL GLAZED, LOW E WITH ARGON	(2) DOUBLE HUNG, CLEAR GLAZING	0.34	0.28
03	5'-0" x 6'-10"	DUAL GLAZED, LOW E WITH ARGON	SLIDING PATIO DOOR, CLEAR GLAZING	0.34	0.28
04	6'-0" x 6'-10"	DUAL GLAZED, LOW E WITH ARGON	SLIDING PATIO DOOR, CLEAR GLAZING	0.34	0.28
05	4'-0" x 5'-0"	RECTANGULAR CLAD FIXED PICTURE WINDOW BY PELLA, CLEAR GLAZING	DUAL GLAZED, LOW E WITH ARGON INT GLASS THICKNESS = 5mm, EXT GLASS THICKNESS = 13.6mm SGP	0.34	0.28

S. 1107.2
ALL OPERABLE WINDOWS IN ROOMS OR SPACES WITH HANDICAP ACCESSIBILITY SHALL HAVE OPERABLE PARTS COMPLYING WITH SECTION 309 OF ICC A117.1

REAR LOT LINE



SECTION C-C

PROPOSED 5 STORY, AND CELLAR RESIDENTIAL BUILDING

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TITLE
SECTION C-C AND WINDOW SCHEDULE

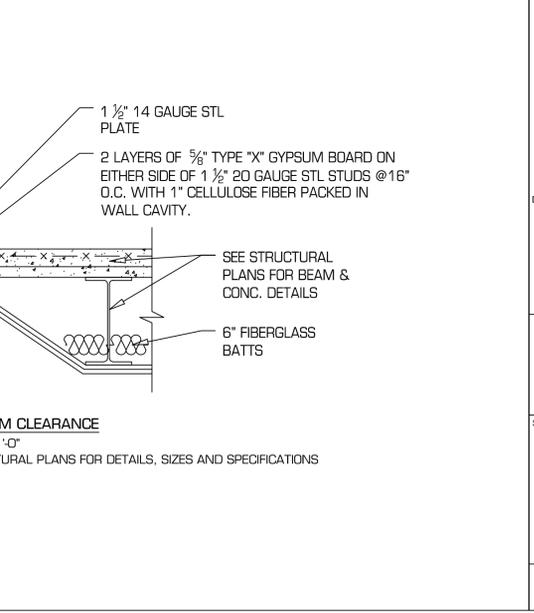
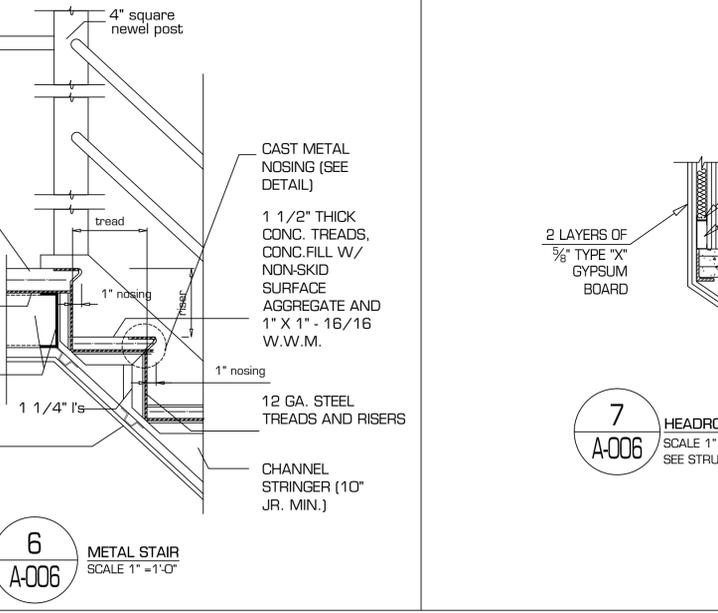
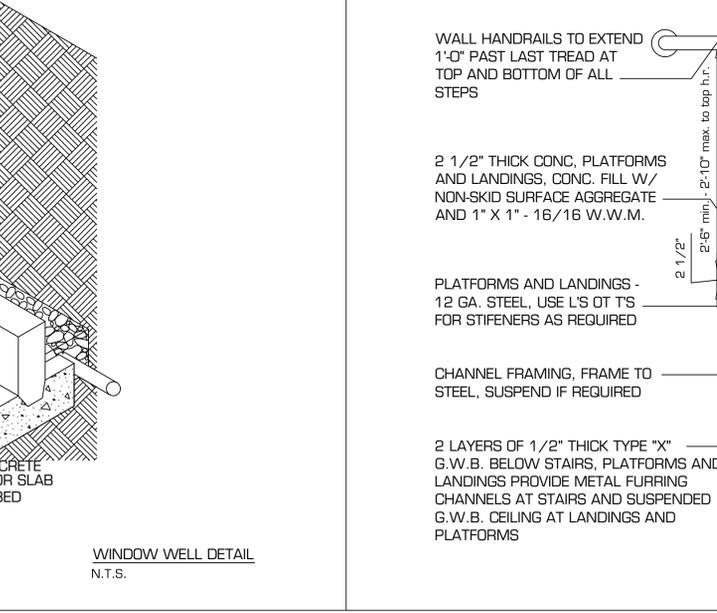
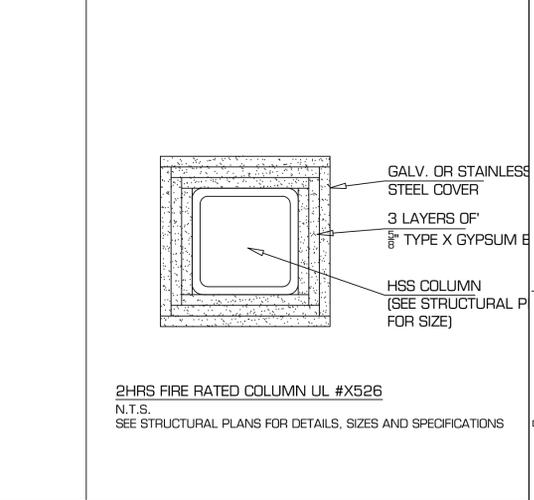
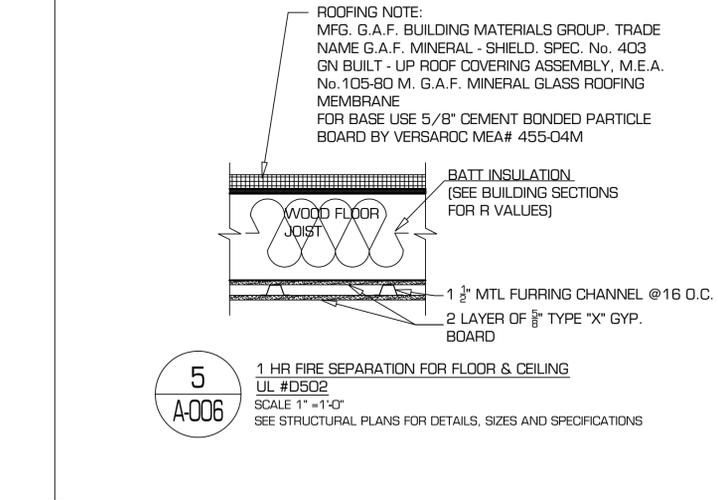
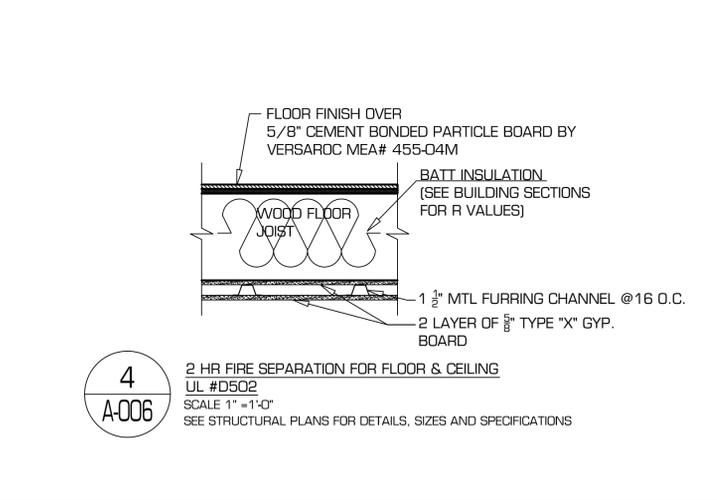
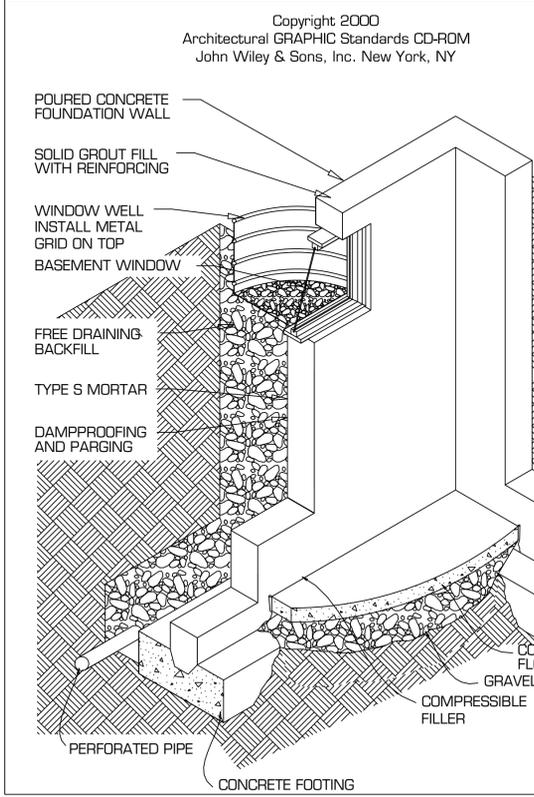
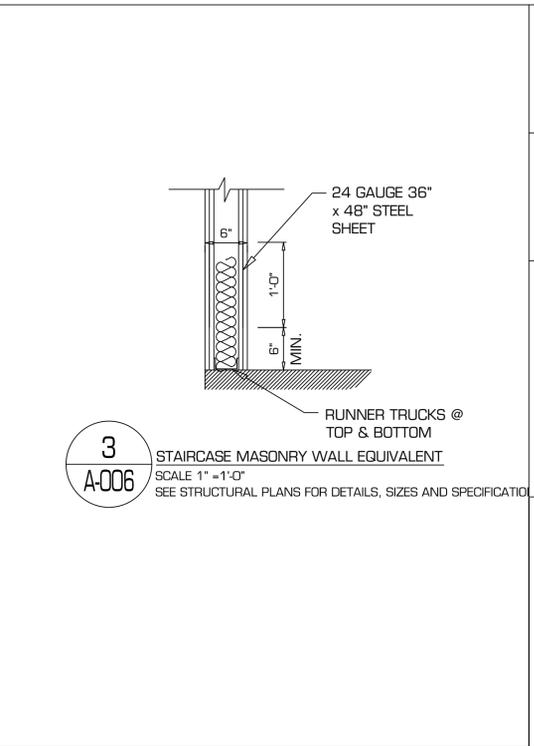
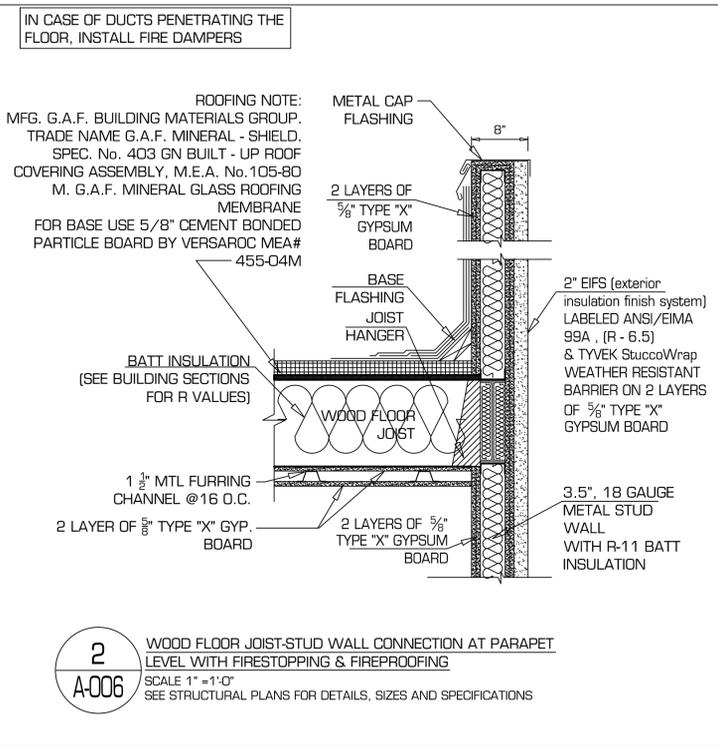
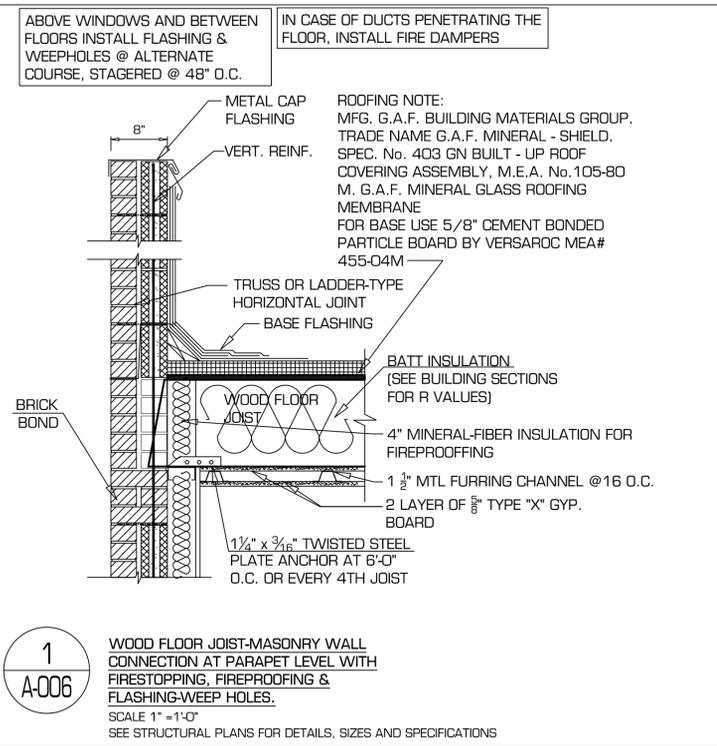
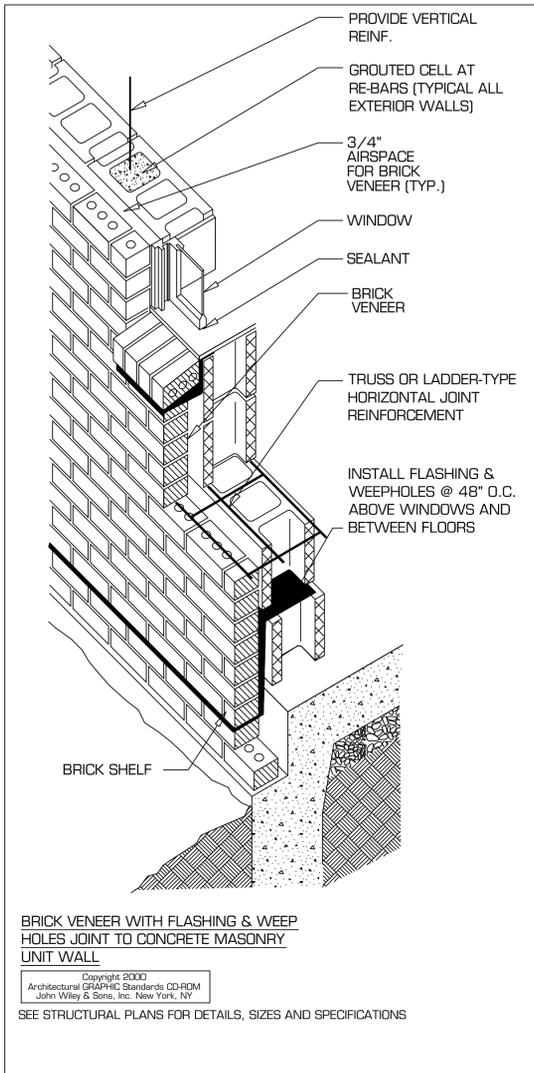
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SEE STRUCTURAL PLANS FOR DETAILS, SIZES AND SPECIFICATIONS

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GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE TO FAMILIARIZE HIMSELF THOROUGHLY WITH ALL DRAWINGS, SPECIFICATIONS, FIELD CONDITIONS AND OTHER REQUIREMENTS OF THIS PROJECT AND SHALL REPORT ANY DISCREPANCIES TO THE ARCHITECT.
2. THE DRAWINGS REFLECT CONDITIONS REASONABLY INTERPRETED FROM THE EXISTING VISIBLE CONDITIONS OR FROM DRAWINGS OR INFORMATION FURNISHED BY THE OWNER BUT CANNOT BE GUARANTEED BY THE ARCHITECT.
3. ALL CONSTRUCTION SHALL COMPLY WITH STATE AND OTHER LOCAL BUILDING CODES AND REGULATIONS AND THE BEST TRADE PRACTICES.
4. THE CONTRACTOR SHALL PROVIDE SUCH LABOR, MATERIALS AND EQUIPMENT AS REQUIRED FOR THE TIMELY COMPLETION OF HIS WORK, AND TO COMPLETE THE PROJECT AS SHOWN.
5. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR THE PROPER CONSTRUCTION, INSTALLATION OR OPERATION OR ANY PART OF THE WORK AS DETERMINED BY THE ARCHITECT SHALL BE INCLUDED IN THE WORK AS IF IT WERE SPECIFIED OR INDICATED IN THE DRAWINGS.
6. ALL MATERIALS SHALL BE INSTALLED PROPERLY, FOR THE USE INTENDED, IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS AND TO THE HIGHEST STANDARDS OF THE TRADE.
7. THE CONTRACTOR SHALL FILE FOR ALL PERMITS CONTROLLED INSPECTIONS, INSPECTIONS AND SIGN-OFFS, PAY ALL RELATED FEES AND PRESENT COPIES OF APPROVALS FOR FINAL ACCEPTANCE BY THE OWNER INCLUDING FINAL CERTIFICATE OF OCCUPANCY.
8. THE DRAWINGS ARE NOT TO BE SCALED, ONLY DIMENSIONS ARE TO BE USED. ALL DIMENSIONAL DISCREPANCIES SHALL BE CALLED TO THE ARCHITECT'S ATTENTION. ALL DIMENSIONS SHALL BE VERIFIED BEFORE STARTING WORK BY THE RESPECTIVE SUBCONTRACTOR, WHO SHALL BE HELD RESPONSIBLE FOR HIS PHASE OF THE WORK. VERIFIED EXISTING FRAMING, REVIEW WITH ARCHITECT ALL EXPOSED CONDITIONS WHERE NEW CONSTRUCTION IS SUPPORTED BY EXISTING CONSTRUCTION.
9. ALL CONSTRUCTION, DIMENSIONS AND DETAILS SHALL CONFORM WITH AND BE DETERMINED FROM THESE DRAWINGS AND REVISED DRAWINGS OR SKETCHES ISSUED BY THE ARCHITECT ONLY.
10. DIMENSIONS ON PLAN SHOWN AS PLUS OR MINUS (+, -) ARE TO BE CLARIFIED IN THE FIELD AND DISCREPANCIES OF GREATER THAN 2" ARE TO BE REPORTED TO THE ARCHITECT.
11. ALL MATERIALS, ASSEMBLIES, FORMS AND METHODS OF CONSTRUCTION AND SERVICE EQUIPMENT SHALL MEET WITH THE FOLLOWING REQUIREMENTS:
 - A. SHALL BE ACCEPTABLE PRIOR TO THE EFFECTIVE DATE OF THE N.Y.C. BUILDING CODE OR
 - B. SHALL BE ACCEPTED FOR USE UNDER THE PRESCRIBED CODE TEST METHOD BY COMMISSIONER OR
 - C. HAVE BOARD OF STANDARDS AND APPEALS APPROVAL.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY SERVICES AND UTILITIES DURING THE CONSTRUCTION PERIOD, AND SHALL PAY ALL COST INVOLVED.
13. THE CONTRACTOR SHALL CARRY BUILDER'S RISK INSURANCE WITH BROAD FORM EXTENDED COVERAGE COVERING THE VALUE OF HIS COMPLETED WORK.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY PROTECTION, SECURITY AND SAFETY OF THE SITE DURING CONSTRUCTION.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATELY BRACING AND PROTECTING ALL WORK DURING CONSTRUCTION AGAINST DAMAGE, BREAKAGE, COLLAPSE, DISTORTION AND MISALIGNMENT ACCORDING TO APPLICABLE CODE STANDARDS AND GOOD PRACTICE.
16. THE CONTRACTOR SHALL PROVIDE A REFUSE CONTAINER AT THE SITE AND SHALL CLEAN UP HIS DEBRIS AT THE TIME OF COMPLETION OF EACH WORK DAY.
17. ALL CONSTRUCTION SHALL BE AS PER PLANS AND SPECIFICATIONS UNLESS OTHERWISE AGREED IN WRITING BY THE OWNER.
18. NO CHANGES ARE TO BE MADE WITHOUT THE CONSULTATION AND APPROVAL BY THE ARCHITECT.
19. ARCHITECT HAS NOT BEEN RETAINED TO SUPERVISE ANY CONSTRUCTION OR INSTALLATION OF ANY EQUIPMENT AT BUILDING SITE.
20. CONTRACTOR SHALL BE RESPONSIBLE TO THE OWNER FOR ALL ACTS AND OMISSIONS OF HIS EMPLOYEES, AND ALL SUB-CONTRACTORS, THEIR AGENTS AND EMPLOYEES AND ALL OTHER PERSONS PERFORMING ANY OF THE WORK TO BE DONE.
21. IT IS THE INTENTION OF THIS CONTRACT TO COMPLETELY FINISH AND READY FOR OCCUPANCY THIS BUILDING IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND ALL REQUIREMENTS OF LAWS. ALTHOUGH NECESSARY WORK MAY NOT BE ITEMIZED IN THE DRAWINGS THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS AND INCLUDE ALL WORK SPECIFIED OR IMPLIED FOR THE COMPLETE REPAIR OF THIS BUILDING.

CONSTRUCTION NOTES

1. PROVIDE FLASHING AT HEADS AND SILLS OF ALL WINDOWS AND EXTERIOR DOOR OPENINGS.
2. STEEL LINTELS OVER 4'-0" SUPPORTING MASONRY SHALL BE FIREPROOFED WITH WIRE LATH AND 1" VERMICULITE PLASTER OR CEMENT PLASTER.
3. PLUMBING FIXTURES: WATER CLOSET - VITREOUS CHINA WITH MAX. 1 3/5 GAL. FLUSH, WITH AN APPROVED VACUUM BREAKER. ALL FIXTURES TO MEET WATER SAVING PERFORMANCE STANDARDS. (L.L. 29-89) FIXTURES TO BE AS SELECTED BY THE OWNER AND/OR CONTRACTOR.
4. ELECTRICAL: ALL WIRING TO COMPLY WITH THE MINIMUM REQUIREMENTS OF THE NEW YORK CITY ELECTRICAL CODE. LOCATION OF ALL OUTLETS, SWITCHES, RECEPTACLES, CEILING LIGHTS, BELL SYSTEM, AS DIRECTED BY THE OWNER AND/OR CONTRACTOR.
5. HEATING SYSTEM TO BE CAPABLE OF MAINTAINING A MINIMUM TEMPERATURES PER CHAPTER 13 OF 2008 NYC B.C.O.D.E. AND SHALL ALSO MEET THE REQUIREMENTS OF THE NEW YORK STATE ENERGY CONSERVATION CONSTRUCTION CODE, THE MORE STRINGENT SHALL APPLY.
6. MECHANICAL VENTILATION: BATHROOMS WHICH ARE TO BE MECHANICALLY VENTILATED SHALL BE PROVIDED WITH AT LEAST 50 C.F.M. EXHAUST. VENT SHAFT TO GO 3'-0" ABOVE ROOF.
7. STAIRS TO HAVE A MAXIMUM RISER HEIGHT OF 7.5". TREAD TO BE A MINIMUM OF 9 1/5" PLUS NOSING. THE SUM OF TWO RISERS PLUS TREAD (EXCLUSIVE OF NOSING) SHALL BE NOT LESS THAN 24" NOR MORE THAN 25-1/2". INTERIOR STAIRS SHALL COMPLY WITH CHAPTER 10 OF 2008 NYC B. CODE.
8. A FINAL SURVEY WILL BE FILED TO COMPLY WITH 2008 NYC B. CODE
9. LOT GRADING TO BE REGULATED AS FOLLOWS: WHEN PITCH OF LOT DOES NOT EXCEED 5% ALL UNPAVED AREAS TO BE SEEDD. WHEN PITCH OF LOT EXCEEDS 5%, ALL UNPAVED AREAS TO BE SODDED. THIS GRADING WILL BE DESIGNED SO AS NOT TO RESULT IN PONDING OR UNSTABLE GRADES IN THE SURROUNDING AREA.
10. INTERIOR FINISHES SHALL CONFORM TO CHAPTER 8 OF 2008 NYC BUILDING CODE.
11. SMOKE DETECTORS TO BE PROVIDED WHERE INDICATED ON PLANS.

HOUSING MAINTENANCE CODE & MULTIPLE DWELLING NOTES

- A. PAINTING - (SEC. 29 M.D.L. AND ART. 12 H.M.C.)
1. PAINTING OF PUBLIC PARTS AND WITHIN DWELLINGS SHALL COMPLY WITH SEC. D26-12.02 H.M.C.
 2. PAINTING OF WINDOW FRAMES SHALL COMPLY WITH SEC. D26-12.03 H.M.C.
 3. WALLS OF COURTS AND SHAFTS SHALL BE OF A LIGHT COLORED SURFACE.
- B. EXTERMINATION AND RAT PROOFING - (SEC. 80 M.D.L. AND ART. 13 H.M.C.)
1. DWELLINGS SHALL BE SO CONSTRUCTED AS TO BE RAT-PROOF
 2. PREMISES SHALL BE MAINTAINED AND KEPT FREE OF RODENT AND INSECT INFESTATION.
- C. RECEPTACLES FOR AND COLLECTION OF WASTE MATTER - (SEC. 81 M.D.L. AND ART. 14 H.M.C.)
1. PROPER AND SUITABLE CONVENIENCES OR RECEPTACLES SHALL BE PROVIDED FOR COLLECTION OF WASTE MATTER.
- D. PLUMBING AND DRAINAGE - (SEC. 77 M.D.L. AND ART. 16 H.M.C.)
1. ENTIRE PLUMBING AND DRAINAGE SYSTEM INCLUDING ALL PLUMBING FIXTURES SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD REPAIR AT ALL TIMES.
 2. ALL ROOFS, TERRACES, SHAFTS, COURTS, AREAS AND YARDS SHALL BY PROPERLY GRADED AND DRAINED (SEE SITE PLAN)
- E. HEAT AND HOT WATER - (SEC. 79 M.D.L. AND ART. 17 H.M.C.)
1. YEARLY INSPECTIONS OF CENTRAL HEATING PLANTS SHALL BE MADE BY A QUALIFIED PERSON.
 2. MINIMUM TEMPERATURES FOR HEATING AND HOT WATER SHALL BE MAINTAINED.
- F. GAS METERS AND GAS APPLIANCES - (SEC. 64 M.D.L. AND ART. 18 H.M.C.)
1. GAS METERS SHALL COMPLY WITH SEC. 64 M.D.L.
 2. GAS APPLIANCES SHALL, IN ADDITION TO THESE SECTIONS, COMPLY WITH THE BOARD OF STANDARDS AND APPEALS.
 3. YEARLY INSPECTION OF GAS APPLIANCES BY QUALIFIED PERSON SHALL BE MADE IN "OLD LAW TENEMENTS" OR "ROOMING UNITS".
- G. ARTIFICIAL LIGHTING AND ENTRANCE DOORS - (SEC. 26 & 35 M.D.L. AND ART. 19 H.M.C.)
1. PROPER ELECTRIC LIGHTING AND EQUIPMENT SHALL BE PROVIDED AND MAINTAINED WITHIN ALL DWELLINGS.
 2. PROPER ELECTRIC LIGHTS SHALL BE INSTALLED AND MAINTAINED AT OR NEAR THE OUTSIDE OF FRONT ENTRANCE WAY AND MIN. OR 50 WATTS INCANDESCENT ILLUMINATION OR EQUIVALENT AND MIN. OR 40 WATTS IN YARDS AND COURTS AND SHALL BE KEPT BURNING FROM SUNSET EACH DAY TO SUNRISE ON THE DAY FOLLOWING.
 3. MAIN ENTRANCE AND VESTIBULE DOORS SHALL HAVE NOT LESS THAN FIVE (5)SQ.FT. OF GLAZED SURFACE.
- H. ENTRANCE DOORS - (SEC. 50-A M.D.L. AND ART. 20 H.M.C.)
1. BLDG. ENTRANCES AND ALL OTHER EXTERIOR ENTRANCES SHALL BE EQUIPPED WITH APPROVED TYPE AUTOMATIC SELF-CLOSING AND SELF-LOCKING DOORS.
 2. ENTRANCE DOORS TO EACH DWELLING UNIT SHALL HAVE KEY LOCK WITH AT LEAST ONE KEY TO BE PROVIDED BY OWNER, HEAVY DUTY LATCH SET WITH DEAD BOLT, THUMB TURN INSIDE AND DOOR CHAIN GUARD, STC 35.
- J. PEEP HOLES - (SEC. 51-A M.D.L. AND ART. 20 H.M.C.)
1. PEEP-HOLES SHALL BE PROVIDED IN ENTRANCE DOORS OR EACH DWELLING UNIT, LOCATED AS PRESCRIBED BY THE DEPARTMENT.
- K. BELLS AND MAIL SERVICE - (SEC. 57 M.D.L. AND ART. 21 H.M.C.)
1. BELL OR BUZZER SYSTEM SHALL BE APPROVED TYPE AND SHALL BE KEPT IN ORDER.
 2. PROVIDE AND MAINTAIN APPROVED TYPE MAIL RECEPTACLES AND DIRECTORIES OF PERSONS LIVING IN THE DWELLING AS PROVIDED BY FEDERAL LAW AND AS PER REGULATIONS OF THE POST OFFICE DEPARTMENT.
- L. LIGHTING AND VENTILATION - (SEC. 30 M.D.L. AND ART. 30 H.M.C.)
1. WINDOWS IN ALL ROOMS, EXCEPT BATHROOM AND KITCHENETTES, SHALL BE AT LEAST ONE-TENTH THE AREA OF THE ROOM AND BE AT LEAST 12 SQ.FT. IN AREA
- M. WATER CLOSET AND BATH ACCOMMODATIONS - (SEC. 76 M.D.L. AND ART.31 H.M.C.)
1. FLOORS SHALL BE CERAMIC TILE WITH 6" BASE.
 2. WALLS AND FLOORS IN WATER CLOSET COMPARTMENT, BATHROOMS AND LAVATORIES SHALL COMPLY WITH REQUIREMENTS OF THESE SECTIONS.
 3. EVERY WATER CLOSET COMPARTMENT, BATHROOM AND LAVATORY SHALL HAVE A WINDOW OF AT LEAST 3 SQ.FT. IN AREA AND ONE HALF THE AREA SHALL OPEN.
 4. IN LIEU OF A WINDOW, MECHANICAL VENTILATION MAY BE INSTALLED WHICH WILL PROVIDE AT LEAST FOUR CHANGES OF AIR PER HR. OR A MIN. OF 30 CFM OF EXHAUST FOR EACH SUCH WATER CLOSET COMPARTMENT, BATHROOM OR LAVATORY AND SHALL BE PROVIDED WITH APPROVED TYPE REGISTER WITH FUSIBLE LINK DAMPER B.S. & A. CAL. # 678.41-SM.

- O. KITCHENS AND KITCHENETTES - (SEC. 33 M.D.L. AND ART. 32 H.M.C.)
1. EVERY KITCHEN AND KITCHENETTE SHALL BE PROVIDED WITH FACILITIES FOR COOKING AND SHALL BE EQUIPPED FOR ARTIFICIAL LIGHTING.
 2. EVERY KITCHEN AND KITCHENETTE SHALL BE PROVIDED WITH A SINK HAVING A MIN. 2" WASTE AND TRAP.
 3. LIGHTING AND VENTILATION OF KITCHENS SHALL BE AS PROVIDED UNDER SEC.30 M.D.L. AND ART. 30 H.M.C.
 4. CEILING AND WALLS, EXCLUSIVE OF DOORS, OF ALL KITCHENETTES SHALL BE FIRE RETARDED WITH MATERIALS HAVING A ONE HR. FIRE RATING OR IN LIEU THEREOF SHALL BE EQUIPPED WITH A SPRINKLER.
 5. KITCHENETTES SHALL BE PROVIDED WITH A WINDOW AT LEAST ONE FT. WIDE 3 SQ. FT. IN AREA AND BE AT LEAST 10% OF THE FL. AREA IN LIEU OF WINDOW MECHANICAL VENTILATION MAY BE INSTALLED WHICH WILL PROVIDE AT LEAST 6 CHANGES OF AIR PER HOUR.
 6. ALL COMBUSTIBLE MATERIALS IMMEDIATELY UNDERNEATH AND WITHIN ONE FOOT OF COOKING APPARATUS SHALL BE PROPERLY FIRE RETARDED. A MINIMUM OF TWO FEET CLEARANCE SHALL BE MAINTAINED ABOVE EXPOSED COOKING SURFACES. COMBUSTIBLE MATERIALS BETWEEN 2 AND 3 FEET ABOVE EXPOSED COOKING SURFACE SHALL BE FIRE RETARDED.
- P. BOILER ROOMS - (SEC. 65 M.D.L.)
1. BOILER ROOMS SHALL COMPLY WITH REQUIREMENTS OF THIS SECTION.
- R. SECURITY REQUIREMENTS (804.4)
1. BLDG. ENTRANCE DOORS AND OTHER EXTERIOR DOORS SHALL BE PROVIDED WITH HEAVY DUTY LOCK SETS WITH AUXILIARY LATCH BOLTS TO PREVENT THE LATCH FROM BEING MANIPULATED BY OTHER THAN A KEY.
 2. DOORS TO DWELLING UNITS SHALL BE EQUIPPED WITH A HEAVY DUTY LOCKSET; A DEAD BOLT WITH INTERIOR THUMB TURN AND A CHAIN DOOR GUARD.
 3. ALL OPENABLE WINDOWS SHALL BE EQUIPPED WITH SASH LOCKS DESIGNED TO BE OPENABLE FROM THE INSIDE ONLY.
 4. BLDGS. CLASSIFIED IN OCCUPANCY GROUP J-2 CONTAINING 8 OR MORE DWELLING UNITS SHALL BE PROVIDED WITH AN INTERCOMMUNICATION SYSTEM LOCATED AT THE DOOR GIVING ACCESS TO THE MAIN ENTRANCE HALL OR LOBBY.
- S. MISCELLANEOUS NOTES:
1. RADIATORS SHALL NOT OBSTRUCT STAIRS OR PUBLIC HALLS.
 2. ALL F.P.S.C. DOORS AND TRIM SHALL HAVE FIRE RATING AS SPECIFIED ON PLAN OR DOOR SCHEDULE.
 3. CARPENTER SHALL PROVIDE RECESS FOR MEDICINE CABINETS IN BATHROOMS AND LAVATORIES.
 4. ALL BATH-TUBS, RECESSED OR OTHERWISE, SHALL BE PROVIDED WITH SUFFICIENT SHOWER CURTAIN RODS.
 5. PROVIDE AND SET WOOD SHELVES AND A 1-1/2" DIAMETER HORIZONTAL WOOD OR METAL POLE IN EACH CLOSET. LINEN CLOSETS SHALL HAVE FIVE SHELVES.

EARTHQUAKE LOADS

1614.1 SCOPE: EVERY STRUCTURE, AND PORTION THEREOF, SHALL AT A MINIMUM, BE DESIGNED AND CONSTRUCTED TO RESIST THE EFFECTS OF EARTHQUAKE MOTIONS AND ASSIGNED A SEISMIC DESIGN CATEGORY AS SET FORTH IN SECTION 1616.3.

EXCEPTIONS:

1. STRUCTURES DESIGNED IN ACCORDANCE WITH THE PROVISIONS OF SECTIONS 9.1 THROUGH 9.6, 9.13 AND 9.14 OF ASCE 7 SHALL BE PERMITTED.
2. ONE- AND TWO-FAMILY DWELLINGS NOT MORE THAN THREE STORIES IN HEIGHT ARE EXEMPT FROM THE REQUIREMENTS OF SECTIONS 1613 THROUGH 1622.
3. THE SEISMIC-FORCE-RESISTING SYSTEM OF WOOD FRAME BUILDINGS THAT CONFORM TO THE PROVISIONS OF SECTION 2308 ARE NOT REQUIRED TO BE ANALYZED AS SPECIFIED IN SECTION 1616.1.
4. AGRICULTURAL STORAGE STRUCTURES INTENDED ONLY FOR INCIDENTAL HUMAN OCCUPANCY ARE EXEMPT FROM THE REQUIREMENTS OF SECTIONS 1613 THROUGH 1623.

1614.4 QUALITY ASSURANCE: A QUALITY ASSURANCE PLAN SHALL BE PROVIDED WHERE REQUIRED BY CHAPTER 17.

1614.5 SEISMIC AND WIND: WHEN THE CODE-PRESCRIBED WIND DESIGN PRODUCES GREATER EFFECTS, THE WIND DESIGN SHALL GOVERN, BUT DETAILING REQUIREMENTS AND LIMITATIONS PRESCRIBED IN THIS AND REFERENCED SECTIONS SHALL BE FOLLOWED.

1" BUILDING SEPARATION IS REQUIRED FOR EACH 50'-0" OF BUILDING HEIGHT AS PER TYPN 2/96

ENERGY CONSERVATION NOTES:

BUILDING TO COMPLY WITH 2007 NEW YORK ENERGY CONSERVATION CONSTRUCTION CODE, ARCHITECTURAL PLANS & COMPLIANCE-REPORT CERTIFICATE FROM COMcheck software Version 3.5.1 or 3.7.0. ALL DISCREPANCIES SHALL BE REPORTED IN WRITING TO THE ARCHITECT IN CHARGE.

BUILDING ENVELOPE REQUIREMENTS:

1. ALL JOINTS AND PENETRATIONS IN THE BUILDING ENVELOPE THAT ARE POTENTIAL SOURCES OF AIR LEAKAGE MUST BE CAULKED, GASKETED, OR COVERED WITH A MOISTURE VAPOR-PERMEABLE WRAPPING MATERIAL.
2. RECESSED LIGHTING FIXTURES MUST BE GASKETED AND IC RATED; I.E., RATED FOR DIRECT CONTACT WITH INSULATION.
3. THE FOLLOWING AREAS MUST BE SEALED:
 - EXTERIOR JOINTS AROUND WINDOW AND DOOR FRAMES
 - BETWEEN WALL SOLE PLATES, FLOORS, AND EXTERIOR-WALL PANELS
 - OPENINGS FOR PLUMBING, ELECTRICITY, AND REFRIGERANT AND GAS LINES IN EXTERIOR WALLS, FLOORS, AND ROOFS
 - OPENINGS IN ATTIC FLOORS (SUCH AS WHERE CEILING PANELS MEET INTERIOR AND EXTERIOR WALLS AND MASONRY FIREPLACES)
 - SERVICE AND ACCESS DOORS OR HATCHES
 - ALL OTHER SIMILAR OPENINGS IN THE BUILDING ENVELOPE.
4. FOLLOW ARCHITECTURAL PLANS FOR INSULATION R-VALUES AND GLAZING SHGC & U-FACTORS.
5. EXCEPT AS NOTED BELOW, VAPOR RETARDERS MUST BE INSTALLED IN ALL NONVENTED FRAMED AREAS IN CEILINGS, WALLS, AND FLOORS. THE VAPOR RETARDER MUST HAVE A PERM RATING OF 1.0 OR LESS AND MUST BE INSTALLED ON THE WARM-IN-WINTER SIDE OF THE INSULATION (BETWEEN THE INSULATION AND CONDITIONED SPACE).

EXCEPTION : VAPOR RETARDERS ARE NOT REQUIRED WHERE MOISTURE OR ITS FREEZING WILL NOT DAMAGE MATERIALS.

6. FIELD CERTIFICATION OF INSTALLED COMPONENTS IS REQUIRED AND CAN BE PROVIDED THROUGH PRODUCT LABELS PRINTED ON DIFFERENT MATERIALS.

BUILDING MECHANICAL REQUIREMENTS:

1. ALL EQUIPMENT AND SYSTEMS MUST BE SIZED TO BE NO GREATER THAN PROPOSED ON MECHANICAL PLANS.
2. EACH HEATING OR COOLING SYSTEM SERVING A SINGLE ZONE MUST HAVE ITS OWN TEMPERATURE CONTROL DEVICE.
3. THERMOSTATS CONTROLLING BOTH HEATING AND COOLING MUST BE CAPABLE OF HAVING A 5 DEG. F DEADBAND, OR RANGE OF TEMPERATURE WHERE NO HEATING OR COOLING IS AVAILABLE.
4. THE SYSTEM MUST SUPPLY OUTSIDE VENTILATION AIR AS REQUIRED BY CHAPTER 4 OF THE INTERNATIONAL MECHANICAL CODE. IF THE VENTILATION SYSTEM IS DESIGNED TO SUPPLY OUTDOOR AIR QUANTITIES EXCEEDING MINIMUM REQUIRED LEVELS, THE SYSTEM MUST BE CAPABLE OF REDUCING OUTDOOR-AIR FLOW THE THE MINIMUM REQUIRED LEVELS. SEE MECHANICAL PLANS.
5. OUTDOOR-AIR SUPPLY SYSTEMS WITH DESIGN AIR FLOW RATES GREATER THAN 3000 CU FT PER MINUTE OF OUTDOOR AIR AND ALL EXHAUST SYSTEMS MUST HAVE DAMPERS THAT AUTOMATICALLY CLOSE WHILE THE EQUIPMENT IS NOT OPERATING.
6. SUPPLY AND RETURN AIR DUCTS FOR CONDITIONED AIR, LOCATED IN UNCONDITIONED SPACE MUST BE INSULATED WITH A MINIMUM OF R-5.
7. SUPPLY AND RETURN AIR DUCTS AND PLENUMS MUST BE INSULATED TO A MIN. OF R-8 WHEN LOCATED OUTSIDE THE BUILDING ENVELOPE.
8. ALL JOINTS, LONGITUDINAL AND TRANSVERSE SEAMS AND CONNECTIONS IN DUCTWORK MUST BE SECURELY SEALED USING WELDMENTS, MECHANICAL FASTENERS WITH SEALS OR GASKETS OR MASTICS, MESH AND MASTIC SEALING SYSTEMS OR TAPES. TAPES AND MASTICS MUST BE LISTED AND LABELED IN ACCORDANCE WITH UL 181A OR UL 181B.
9. DUCTS MUST BE CONNECTED TO FANS AND OTHER AIR DISTRIBUTION EQUIPMENT, INCLUDING MULTI-ZONE TERMINAL UNITS, USING MECHANICAL FASTENERS WITH SEALS, MASTICS OR GASKETS.
10. EACH SUPPLY AIR OUTLET OR DIFFUSER AND EACH ZONE TERMINAL DEVICE (SUCH AS VAV OR MIXING BOXES) MUST HAVE ITS OWN BALANCING DEVICE. ACCEPTABLE BALANCING DEVICES INCLUDE ADJUSTABLE DAMPERS LOCATED WITHIN THE DUCTWORK, TERMINAL DEVICES OR SUPPLY AIR DIFFUSER.
11. ALL PIPES SERVING SPACE CONDITIONING SYSTEMS MUST BE INSULATED TO THE FOLLOWING LEVELS:

FLUID	PIPE DIAMETER	
	<= 1.5"	> 1.5"
HOT WATER	1.0"	2.0"
STEAM	1.5"	3.0"
CHILLED WATER, BRINE, REFRIGERANT	1.0"	1.5"

12. UPON PURCHASE OF MECHANICAL EQUIPMENT, THE OWNER SHALL BE PROVIDED WITH OPERATION AND MAINTENANCE DOCUMENTATION THAT PROVIDES THE FOLLOWING INFORMATION:

- EQUIPMENT INPUT AND OUTPUT CAPACITY AND REQUIRED MAINTENANCE ACTIONS.
- EQUIPMENT OPERATION AND MAINTENANCE MANUALS.
- HVAC SYSTEM CONTROL MAINTENANCE AND CALIBRATION INFORMATION, INCLUDING WIRING DIAGRAMS, SCHEMATICS, AND CONTROL SEQUENCE DESCRIPTIONS. DESIRED OR FIELD DETERMINED SET POINTS MUST BE PERMANENTLY RECORDED ON CONTROL DRAWINGS.
- AT CONTROL DEVICES, OR, FOR DIGITAL CONTROL SYSTEMS, IN PROGRAMMING COMMENTS.
- A NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE.

PROPOSED 5 STORY, AND CELLAR RESIDENTIAL BUILDING

108 FROST ST
BROOKLYN N.Y. 11211

Architects

MICHAEL AVRAMIDES

319 East 50th Street
New York, NY 10022
MCA@Avramides.com
T 212-755-5111 x200
C 917-855-8111

No. Description Date

REVISIONS

DOB EXAMINER SIGNATURE:

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DOB BSCAN sticker:

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TITLE GENERAL CONSTRUCTION NOTES

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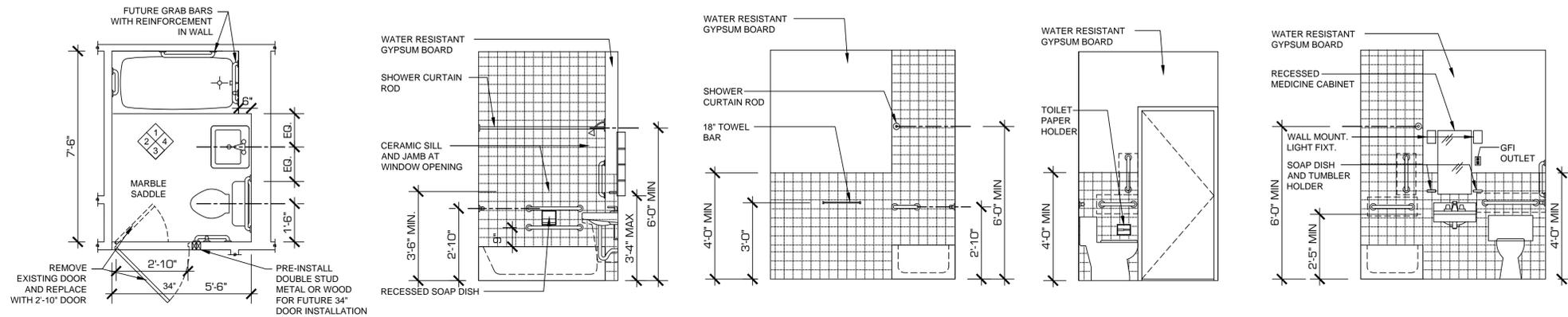
**PROPOSED 5 STORY, AND
CELLAR RESIDENTIAL
BUILDING**

**108 FROST ST
BROOKLYN N.Y. 11211**

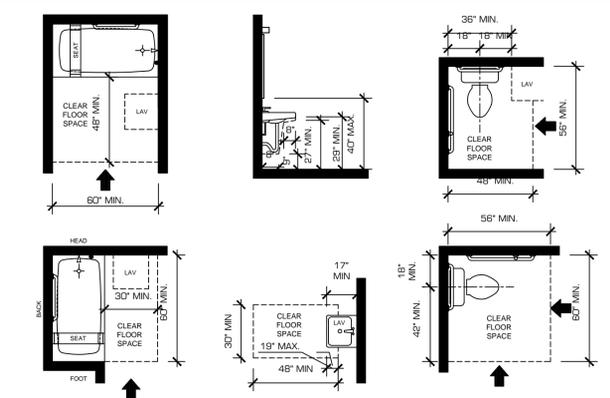
Architects

MICHAEL AVRAMIDES

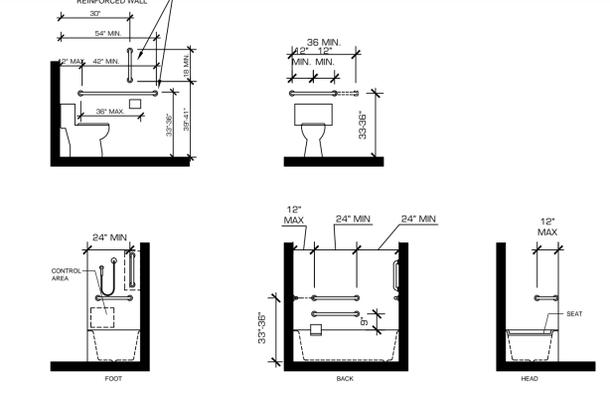
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T 212-755-5111 x200
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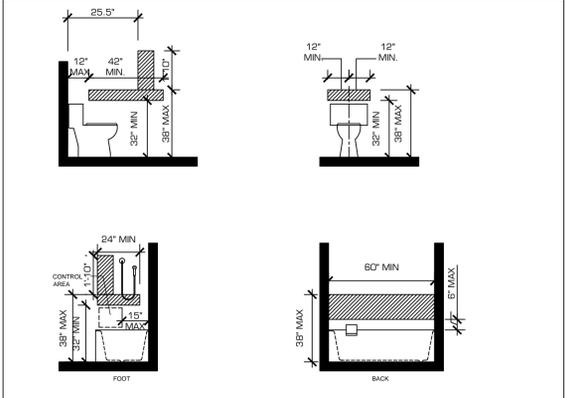
1 TYPE "B" BATHROOM PLANS (ADAPTABLE FOR FUTURE ACCESS)
Scale: 3/8"=1'-0"



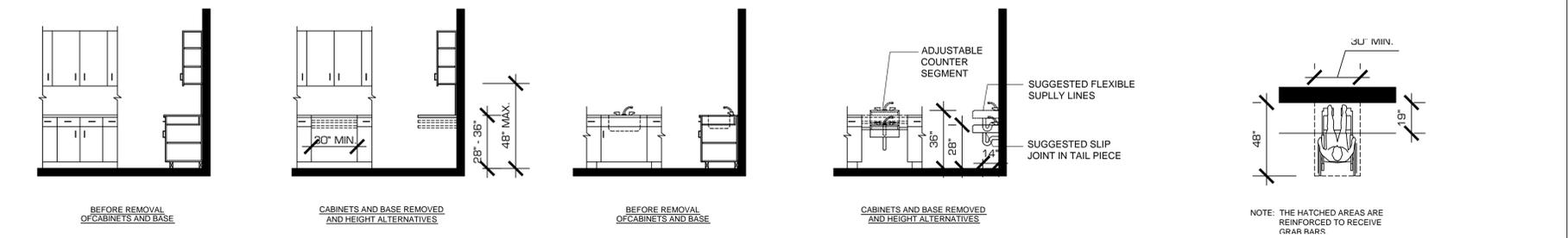
3 BATHROOM CLEAR FLOOR SPACE
NOT TO SCALE



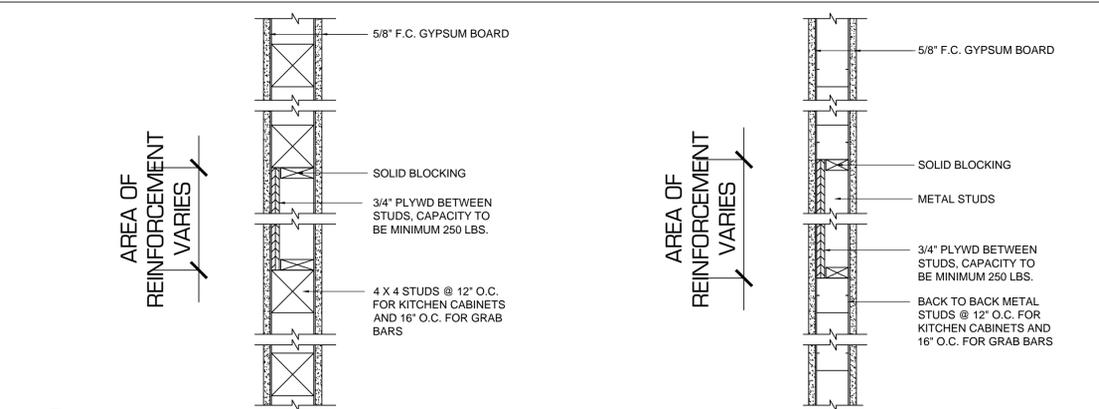
4 GRAB BAR CLEARANCE (ADAPTABLE FOR FUTURE ACCESS)
NOT TO SCALE



5 REINFORCEMENT ELEVATIONS FOR FUTURE GRAB BAR INSTALLATION
NOT TO SCALE



6 KITCHEN ADAPTABLE CABINETS (ADAPTABLE FOR FUTURE ACCESS)
NOT TO SCALE



7 REINFORCEMENT SECTIONS FOR FUTURE GRAB BAR INSTALLATION
Scale: 1-1/2\"/>

FACILITIES FOR PEOPLE HAVING PHYSICAL DISABILITIES SHAL COMPLY WITH APPENFIX "P" OF THE 2008 NYC BUILDING CODE AND A117.1-2003 MODIFIED BY LL58/87

ADAPTABLE DWELLING UNITS: RESIDENTIAL UNITS CONSTRUCTED ON AN ACCESSIBLE ROUTE AND EQUIPPED TO ALLOW CONVERSION, WITH A MINIMUM OF CHANGE, FOR USE BY PEOPLE WITH PHYSICAL DISABILITIES.

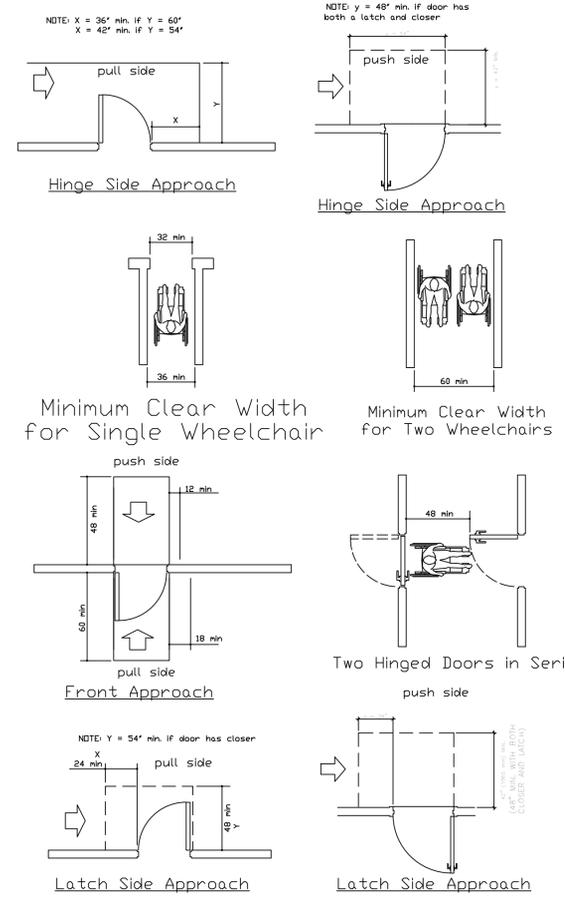
A. ADAPTABLE BATHROOMS, KITCHENS AND KITCHENETTES, ADAPTABLE BATHROOMS, KITCHENS AND KITCHENETTES WITHIN ADAPTABLE DWELLING UNITS SHALL BE CONSTRUCTED AND EQUIPPED IN ACCORDANCE WITH REQUIREMENTS SET FORTH IN APPENDIX "P" FOR TYPE "B" APARTMENTS OF THE 2008 NYC BUILDING CODE WITH RESPECT TO THE FOLLOWING:

- ACCESS DOORWAY OR OPENING
- CLEAR FLOOR SPACE
- FLOOR SURFACE
- BATHROOMS, KITCHEN AND KITCHENETTE FACILITIES AND CONTROLS CAPABLE OF BEING MADE USABLE.
- SPACE AND UTILITIES FOR USABLE RANGE, (OR COOK TOP OF OVEN) REFRIGERATOR/FREEZER, (DISHWASHER IF AVAILABLE)

B. SUCH ITEMS SHALL INCLUDE WATER CLOSET AND TOILET PAPER DISPENSER, LAVATORY AND REMOVABLE BASE CABINET, MIRRORS, MEDICINE CABINET, BATHTUB AND CONTROLS, BATHTUB AND SHOWER ENCLOSURE, REINFORCED AREAS FOR GRAB BARS, CLEARANCE BETWEEN OPPOSING BASE CABINETS, COUNTER TOPS, APPLIANCES AND WALLS, ADJUSTABLE OR REPLACEABLE SINK AND REMOVABLE BASE CABINET, AS WELL AS STORAGE CABINETS, DRAWERS AND SHELVES.

C. WASHING MACHINES AND CLOTHES DRYERS WITHIN ADAPTABLE DWELLING UNITS, WHERE WASHING MACHINES AND CLOTHES DRYERS ARE LOCATED WITHIN ADAPTABLE DWELLING UNITS, SHALL COMPLY WITH OR BE CAPABLE OF BEING CONVERTED TO THE REQUIREMENTS SET FORTH IN APPENDIX "P" OF THE 2008 NYC BUILDING CODE.

D. WINDOWS WITHIN TYPE B DWELLING UNITS SHALL HAVE OPERABLE PARTS COMPLYING WITH SECTION 309 OF ICC A117.1.



DOOR CLEARANCES IN HC ADAPTABLE AND/OR ACCESSIBLE UNIT

No.	Description	Date
REVISIONS		

DOB EXAMINER SIGNATURE:

DOB BSCAN sticker:

HANDICAP ADAPTABILITY PROVISIONS

SEAL	DATE: 07.30.14
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502.4 Air leakage (Mandatory).

502.4.1 Window and door assemblies. The air leakage of window and sliding or swinging door assemblies that are part of the building envelope shall be determined in accordance with AAMA/WDMA/CSA 101/1.S.2/A44D, or NFRC 400 by an accredited, independent laboratory, and labeled and certified by the manufacturer and shall not exceed 0.3 cfm per square foot (1.5 L/s/m²), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m²).

Exception: Site-constructed windows and doors that are weatherstripped or sealed in accordance with Section 502.4.3.

502.4.2 Curtain wall, storefront glazing and commercial entrance doors. Curtain wall, storefront glazing and commercial-glazed swinging entrance doors and revolving doors shall be tested for air leakage at 1.57 pounds per square foot (psf) (75 Pa) in accordance with ASTM E 283. For curtain walls and storefront glazing, the maximum air leakage rate shall be 0.3 cubic foot per minute per square foot (cfm/ft²) (5.5 m³/h x m²) of fenestration area. For commercial glazed swinging entrance doors and revolving doors, the maximum air leakage rate shall be 1.00 cfm/ft² (18.3 m³/h x m²) of door area when tested in accordance with ASTM E 283.

502.4.3 Continuous air barrier. Except in unheated structures and as permitted by this section, a continuous air barrier shall be installed; sealing all seams, openings, and penetrations of the building and shall be sealed with caulking materials or closed with gasketing systems compatible with the construction materials and location. Joints and seams shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials spanning joints between construction materials shall allow for expansion and contraction of the construction materials. Such air barrier shall have all the following characteristics:

1. Continuous throughout the envelope with all joints and seams sealed and with sealed connections between all transitions in planes and changes in materials and at all penetrations.
2. Joined and sealed in a flexible manner to the air barrier component of adjacent assemblies, allowing for the relative movement of these assemblies and components with the manufacturer's instructions and in such a manner as to achieve the performance requirements.
3. Installed in accordance with the manufacturer's instructions and in such a manner as to achieve the performance requirements.
4. Penetrations of the continuous air barrier shall be made in a way such that the integrity of the continuous air barrier is maintained.

502.4.3.1 Compliance. Compliance for continuous air barriers may be demonstrated using any one of the following three methods:

1. Materials. Using individual materials that have an air permeability not to exceed 0.02 L/s · m² under a pressure differential of 75 Pa [0.004 cfm/ft² under a pressure differential of 0.3 in. water (1.57 lb/ft²)] when tested in accordance with ASTM E 2178.
2. Assemblies. Assemblies of materials and components shall have an average air leakage not to exceed 0.2 L/s·m² under a pressure differential of 75 Pa [0.04 cfm/ft² under a pressure differential of 0.3 in. water (1.57 lb/ft²)] when tested in accordance with ASTM E 2357 or ASTM E 1677. In addition these assemblies must meet the requirement for joints per Section 502.4.3.
3. Building. Testing the completed building and demonstrating that the air leakage rate of the building envelope does not exceed 2.0 L/s·m² under a pressure differential of 75 Pa [0.4 cfm/ft² at a pressure differential of 0.3 in. water (1.57 psf)] in accordance with ASTM E 779 or an equivalent approved method.

502.4.4 Outdoor air intakes and exhaust openings. Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a maximum leakage rate of 4 cfm per square foot (6.8 L/s · m²) at 1.0 inch water gauge (w.g.) (1250 Pa) when tested in accordance with AMCA 5000.

Exception: Gravity (nonmotorized) dampers are permitted to be used in buildings less than three stories in height above grade.

502.4.5 Loading dock weatherseals. Cargo doors and loading dock doors shall be equipped with weatherseals to restrict infiltration when vehicles are parked in the doorway.

502.4.6 Vestibules. A door that separates conditioned space from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time.

Exceptions:

1. Doors not intended to be used as a building entrance door, such as doors to mechanical or electrical equipment rooms.
2. Doors opening directly from a sleeping unit, or dwelling unit.
3. Doors that open directly from a space less than 3,000 square feet (279 m²) in area.
4. Revolving doors.
5. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

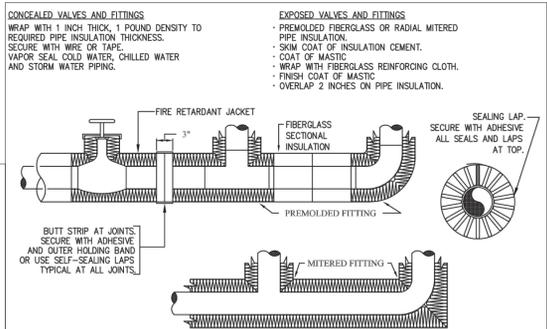
502.4.7 Recessed lighting. Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and labeled as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. All recessed luminaires shall be sealed with a gasket or caulk between the housing and interior wall or ceiling covering.

TABULAR ENERGY ANALYSIS
CODE CHAPTER 5, CLIMATE ZONE 4

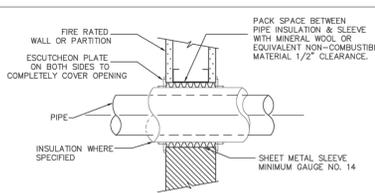
BUILDING ENVELOPE REQUIREMENTS ECC 502			
ITEM DESCRIPTION	PROPOSED DESIGN VALUE	CODE-PRESCRIBED VALUE & CITATION	DWG. REFERENCE
ROOF	R-38 BATT	R-38 BATT, TABLE 502.2(1)	A-004, 6, DT-001
FLOORS	R-19 BATT	R-19, TABLE 502.2(1)	A-004, 6, DT-001
MASONRY WALL	R-12 RIGID	R-11.4c), TABLE 502.2(1)	A-001, 6, DT-001
METAL FRAMED	R-13 BATT + 8 RIGID	R-13 + 7.5G), TABLE 502.2(1)	A-001, 6, DT-001
WINDOWS	METAL FRAME, DUAL GLAZED, LOW E WITH ARGON, U-factor = 0.28 SHGC = 0.34	TABLE 502.3, METAL FRAME, WITH OR WITHOUT THERMAL BREAK, U-factor = 0.55 SHGC = 0.40	A-006, DT-001
DOORS	METAL FRAME, INSULATED, U-factor = 0.60	TABLE 502.3, METAL FRAME, INSULATED, U-factor = 0.85	A-002, DT-001
SKYLIGHTS	METAL FRAME, DUAL GLAZED, LOW E WITH ARGON, U-factor = 0.28 SHGC = 0.34	TABLE 502.3, METAL FRAME, WITH OR WITHOUT THERMAL BREAK, U-factor = 0.60 SHGC = 0.40	A-004, 6, DT-001

ELECTRICAL POWER AND LIGHTING SYSTEMS ECC 505

ITEM DESCRIPTION	PROPOSED DESIGN VALUE	CODE-PRESCRIBED VALUE & CITATION	DWG. REFERENCE
INTERIOR LIGHTING POWER	MULTI FAMILY + 98 incandescent bulbs X 40W + 3920	TABLE 505.5.2, MULTI FAMILY ALLOWANCE = 0.7 X 8827.80 = 6179.46	Z-001, EN-002
EXTERIOR LIGHTING POWER	20 W X 1 FT OF MAIN ENTRY + 20 W 20 WATTS = 620 DK 20 W X 15 FT OF OTHER DOORS = 240 W 300 WATTS = 620 DK	TABLE 505.6.2 (2), LIGHT ZONE 2, TRABLE SURFACES MAIN ENTRIES = 600 W-20 W /LINEAR FOOT OF DOOR WIDTH OTHER DOORS = 600 W-20 W /LINEAR FOOT OF DOOR WIDTH	EN-002



INSULATION OF PIPING, VALVES AND FITTINGS FOR EXPOSED AND CONCEALED LOCATIONS
N.T.S.



PIPE SLEEVE THRU INTERIOR WALL
N.T.S.

ENERGY CODE COMPLIANCE NOTE:

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2011 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE, USING CHAPTER 5

TR8: ENERGY CODE PROGRESS INSPECTIONS

NOTE #1:
IN ACCORDANCE WITH SECTION 109.9 OF 2008 BC AND ECC 104.2.3, WHERE AN INSPECTION OR TEST FAILS, THE CONSTRUCTION SHALL BE CORRECTED AND MUST BE MADE AVAILABLE FOR REINSPECTION AND/OR RETESTING BY THE PROGRESS INSPECTOR UNTIL IT COMPLETES.

NOTE #2:
IN ACCORDANCE WITH ARTICLE 116 OF TITLE 28 AND SECTION 109.9 OF 2008 BC, CONSTRUCTION SHALL BE SCHEDULED TO ALLOW REQUIRED PROGRESS INSPECTIONS TO TAKE PLACE, AND THAT ROOFS, CEILINGS, EXTERIOR WALLS, INTERIOR WALLS, FLOORS, FOUNDATIONS, BASEMENTS AND ANY OTHER CONSTRUCTION SHALL NOT BE COVERED OR ENCLOSED UNTIL REQUIRED PROGRESS INSPECTION ARE COMPLETED OR THE PROGRESS INSPECTOR INDICATED THAT SUCH COVERING OR ENCLOSURE MAY PROCEED, AT EACH STAGE OF CONSTRUCTION, AS APPLICABLE.

REQUIRED PROGRESS INSPECTIONS

Inspection/Test	Periodic (minimum)	Reference Standard (see ECC Chapter 6) or Other Criteria	ECC or Other Citation
IIA Envelope Inspections			
IIA1	As required during construction	Approved construction documents	303.2.1, ASHRAE 90.1 - 5.8.1.7
IIA2	As required to verify continuous enclosure while walls, ceilings and floors are	Approved construction documents	303.1, 303.1.1, 303.1.2, 502.1, 502.2, ASHRAE 90.1 - 5.5.4 or 11, 5.8.1
IIA3	As required during construction	Approved construction documents; NFRC 100, NFRC 200	303.1, 303.1.1, 303.1.2, 502.1, 502.2, ASHRAE 90.1 - 5.5.5 or 11; 5.8.2
IIA4	As required during construction	NFRC 600, AAMA WDMA/CSA 1011.5, 2.0A40 ASTM E283; ANS/ASMA 105	502.4, ASHRAE 90.1 - 5.4.2.2
IIA5	Prior to final construction inspection	Approved construction documents	502.3, ASHRAE 90.1 - 5.5.4, 5.6 or 11
IIA6	As required during construction	Approved construction documents; ASTM E178, ASTM E2357, ASTM E1677, ASTM E779, ASTM E283.	502.4.3, ASHRAE 90.1 - 5.4.2.1
IIA9	Prior to final construction inspection	Approved construction documents	502.4.6, ASHRAE 90.1 - 5.4.3.4
IIIB Mechanical and Service Water Heating Inspections			
IIIB1	Prior to final plumbing and construction inspection	Approved construction documents	503.2, 504.2, 504.7, ASHRAE 90.1 - 6.3.6.4.1, 6.4.2.6, 7.4, 7.8
IIIB4	After installation and prior to final electrical and construction inspection, except that for controls with seasonally dependent functionality, such testing shall be performed before sign-off for issuance of a Final Certificate of Occupancy	Approved construction documents, including control system narratives; ASHRAE Guideline 1: The HVAC Commissioning Process where applicable	503.2.4, 503.2.5.1, 503.2.11, 503.3, 503.4, 504.3, 504.7, ASHRAE 90.1 - 6.3.6.4, 6.5, 6.7.2.4, 7.4.4, 7.4.5
IIIC Electrical Power and Lighting Systems			
IIIC1	Prior to final electrical and construction inspection	Approved construction documents	505.7
IIIC2	Prior to final electrical and construction inspection	Approved construction documents	505.5.3
IIIC3	Prior to final electrical and construction inspection	Approved construction documents	505.5, ASHRAE 90.1 - 9.4, 9.4.5, 9.6, IRCNY 101-07(6)(3)(C)(C4)
IIIC4	Prior to final electrical and construction inspection	Approved construction documents	505.6, ASHRAE 90.1 - 9.4, 9.4.5, 9.6, IRCNY 101-07(6)(3)(C)(C4)
IIIC5	Prior to final electrical and construction inspection	Approved construction documents, including control	505.2, 505.2.2.2 (as modified by section ECC A102)
IIID Other			
IIID1	Prior to sign-off or issuance of Final Certificate of Occupancy	Approved construction documents, including electrical drawings where applicable;	303.3, 303.2.9, ASHRAE 90.1 - 4.2.2.3, 6.7.2.2, 8.7.2
<p>(i) Energy Analysis of Constructed Conditions. In accordance with Section 28-104.3 of the Administrative Code and section ECC 103.4, if contracted work differs from the last-approved full energy analysis, an as-built energy analysis shall be submitted to the Department, listing the actual values used in the building for all applicable Energy Code-regulated items and demonstrating that the building complies with the Energy Code. Such energy analysis shall be signed and sealed by a registered design professional. The progress inspector shall certify that to the best of his or her knowledge and belief the building as built complies with such signed and sealed energy analysis and construction drawings for energy code compliance, where no trade-offs have been used among disciplines, more than one registered design professional may sign and seal the elements of the energy analysis. The energy analysis shall be approved or accepted by the Department prior to sign-off.</p>			

PROPOSED 5 STORY, AND CELLAR RESIDENTIAL BUILDING

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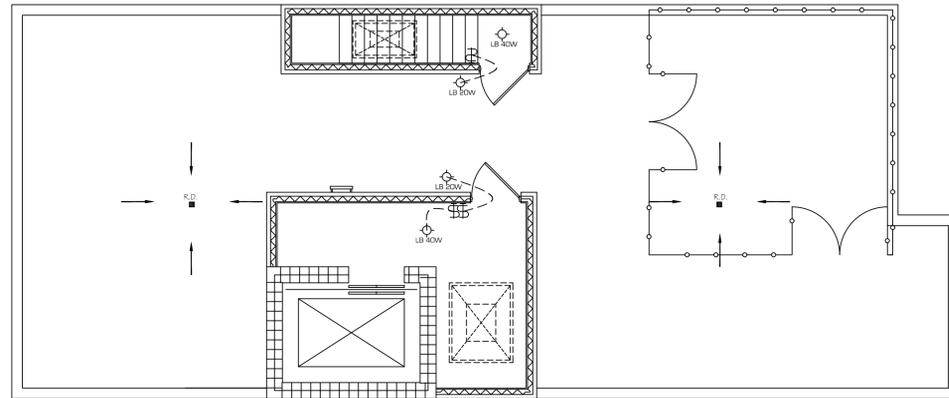
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ENERGY CONSERVATION COMPLIANCE CERTIFICATES

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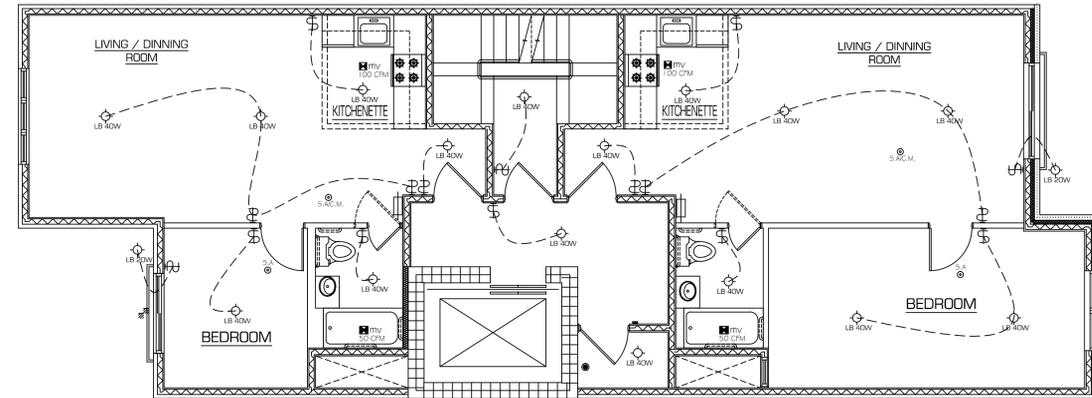
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SYMBOL LEGEND

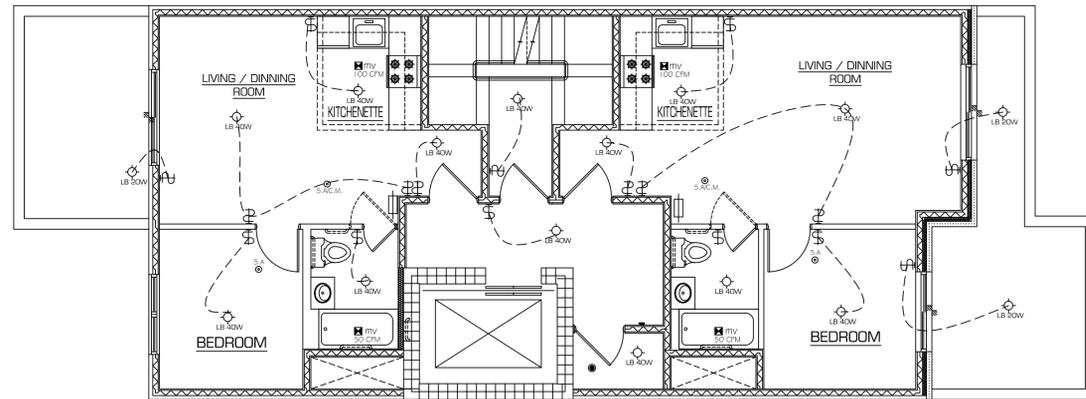
-  INCANDESCENT LIGHT BULB, 20W
-  INCANDESCENT LIGHT BULB, 40W
-  LIGHT SWITCH
-  SELF PROGRAMMABLE THERMOSTAT
-  DENOTES HARD-WIRED SMOKE ALARM / CARBON MONOXIDE DETECTOR
-  DENOTES HARD-WIRED SMOKE ALARM
-  MECHANICAL VENTILATION
-  DIRECTIONAL EXIT SIGN
-  NON-DIRECTIONAL EXIT SIGN
-  E.M.



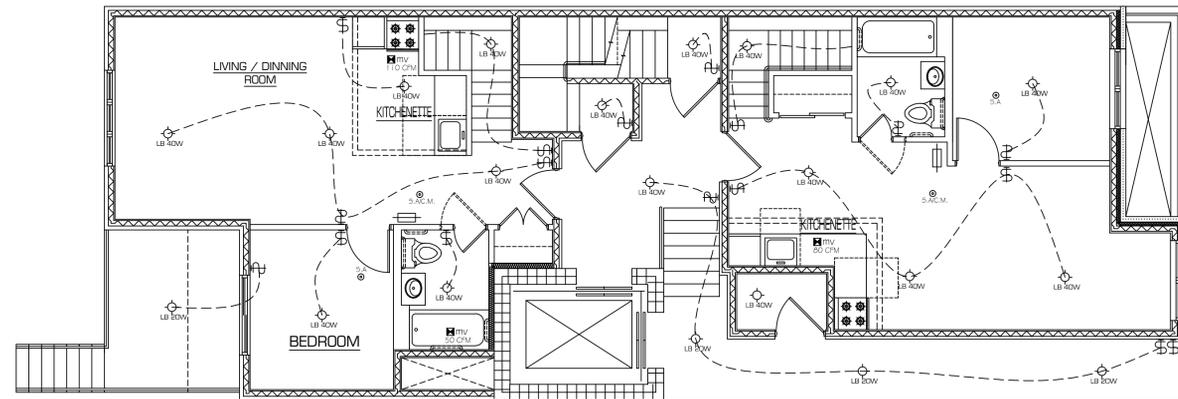
BULKHEAD CEILING PLAN
SCALE 3/16" = 1'-0"



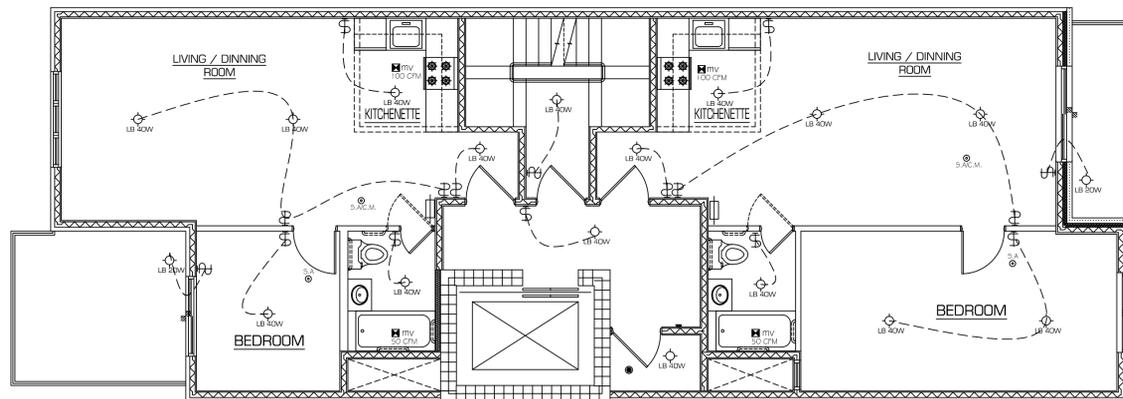
SECOND FLOOR CEILING PLAN
SCALE 3/16" = 1'-0"



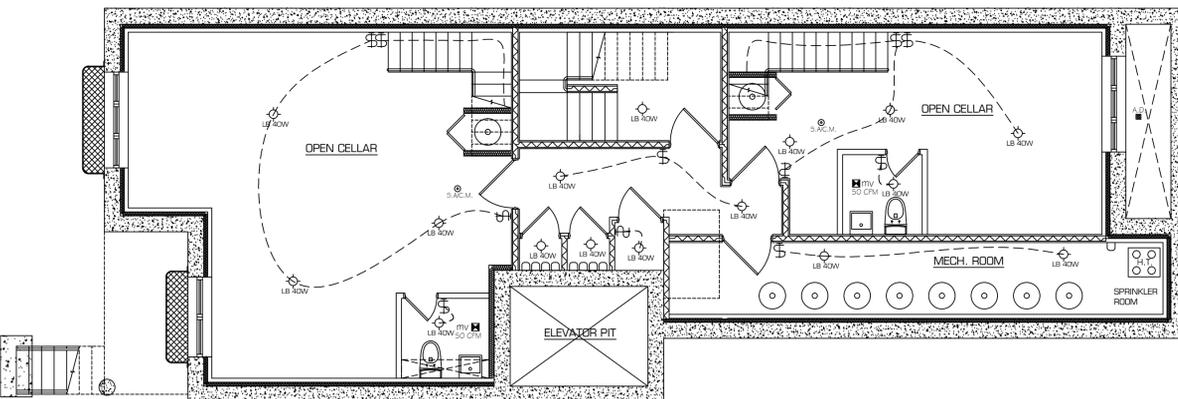
FIFTH FLOOR CEILING PLAN
SCALE 3/16" = 1'-0"



FIRST FLOOR CEILING PLAN
SCALE 3/16" = 1'-0"



THIRD & FOURTH FLOOR CEILING PLAN
SCALE 3/16" = 1'-0"



CELLAR FLOOR CEILING PLAN
SCALE 3/16" = 1'-0"

PROPOSED 5 STORY, AND
CELLAR RESIDENTIAL
BUILDING

108 FROST ST
BROOKLYN N.Y. 11211

Architects

MICHAEL AVRAMIDES
319 East 50th Street
New York, NY 10022
MCA@Avramides.com
T 212-755-5111 x200
C 917-855-8111

No.	Description	Date
REVISIONS		

DOB EXAMINER SIGNATURE:

DOB BSCAN sticker:

TITLE
**REFLECTED CEILING
PLANS FOR ENERGY
COMPLIANCE**

DATE:	07.30.14
SCALE:	AS SHOWN
DRAWN:	A.B.
REVIEWED:	CR
SHEET NO.	
DOB NO.	1 OF

EN-002.00

ATTACHMENT B
Citizen Participation Plan

ATTACHMENT B

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and 434 Manhattan Avenue 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, 434 Manhattan Avenue 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, Samantha Morris, 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 in the nearest public library that maintains evening and weekend hours. This document repository is intended to provide access for community review of 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 repository for this project is:

Repository Name: Brooklyn Public Library – Greenpoint Branch

Repository Address: 107 Norman Avenue, Brooklyn, Brooklyn NY 11211

Repository Telephone Number: 718-349-8504

Repository Hours of Operation:

Mon	10:00AM - 6:00PM
Tue	1:00 AM – 8:00 PM
Wed	10:00 AM - 6:00 PM
Thu	10:00 PM - 6:00 PM
Fri	10:00 AM - 6:00 PM
Sat	10:00AM – 5:00PM
Sun	closed

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. The major issues of concern to the public will be potential impacts of nuisance odors and dust during the disturbance of historic fill soils at the Site. This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to

monitor the potential for exposure including a Construction Health and Safety Plan and a Community Air Monitoring Plan are required components of the remedial program. Implementation of these plans will be under the direct oversight of the New York City Department of Environmental Remediation (NYCOER).

These plans will specify the following worker and community health and safety activities during remedial activity at the Site:

- On-Site air monitoring for worker protection,
- Perimeter air monitoring for community protection.

The Health and Safety Plan and the Community Air Monitoring Plan prepared as part of the Remedial Action Work Plan will be available for public review at the document repository.

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 434 Manhattan Avenue LLC, reviewed and approved by OER prior to distribution and mailed by 434 Manhattan Avenue 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.

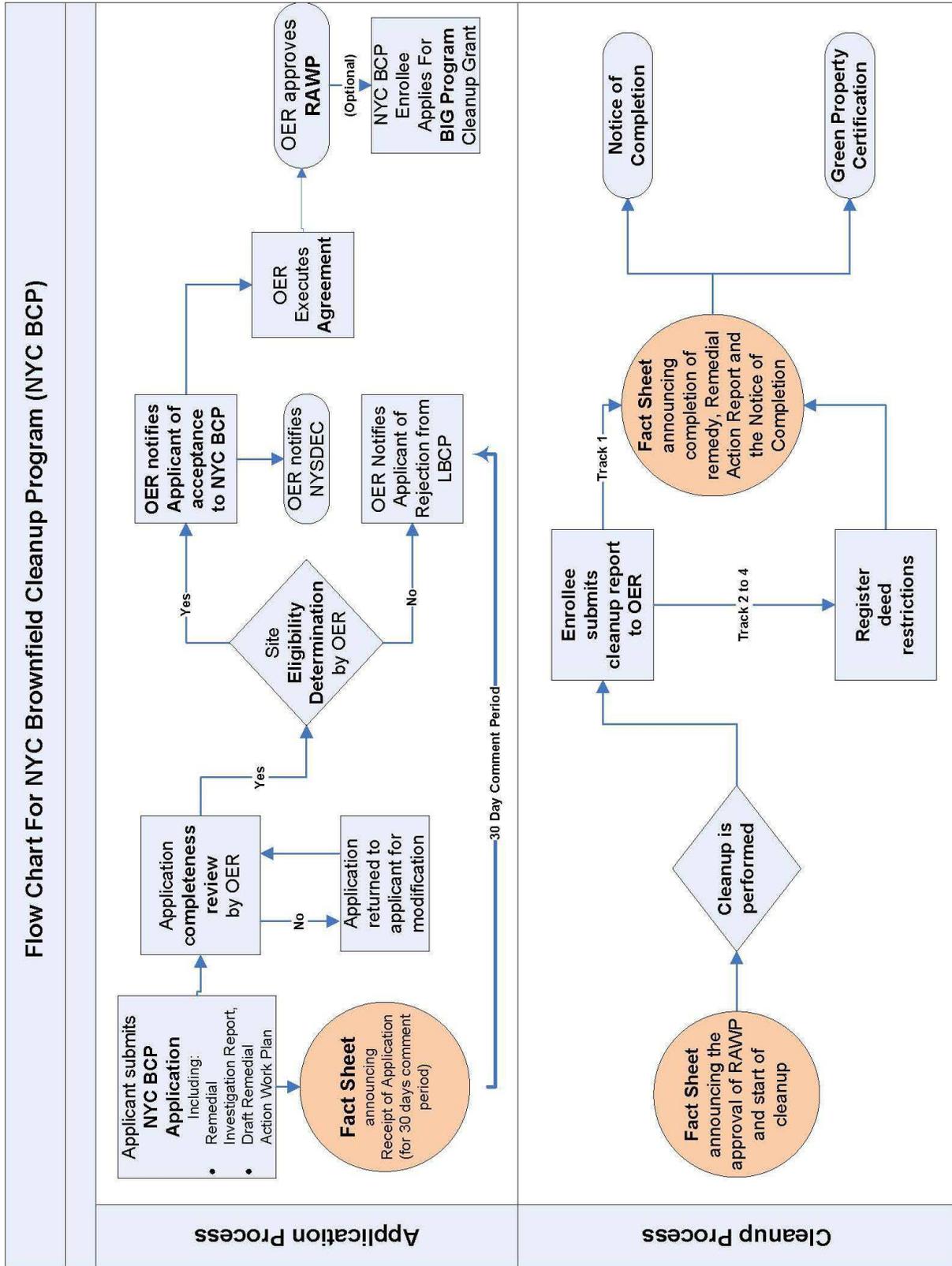
- **Public Notice announcing the approval of the RAWP and the start of remediation**

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

Flow Chart For NYC Brownfield Cleanup Program (NYC BCP)



ATTACHMENT C
Sustainability Statement

ATTACHMENT C 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.

This project intends to use recycled concrete aggregate wherever possible in grading and backfilling the Site. 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.

The project will reduce the consumption of virgin materials by substituting recycled concrete aggregate for mined gravel and/or sand backfill whenever possible. 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.

Recycled concrete materials and other backfill materials will be locally sourced reducing the energy consumption associated with transporting these materials to the Site. 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.



Paperless Voluntary Cleanup Program. 434 Manhattan Avenue LLC is participating in OER's Paperless Voluntary 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. 434 Manhattan Avenue 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.

ATTACHMENT D
Soil/Materials Management Plan

ATTACHMENT D

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; and
- 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 as follows:

- a) Continue north on Manhattan Avenue to Newton Street
- b) Turn right on Newton Street continue east to McGuinness Boulevard
- c) Turn right on McGuinness Boulevard and follow signs to Brooklyn Queens Expressway

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. The truck route is depicted in Figure 8.

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 Brooklyn, 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.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed 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.

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 Table 1.

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.

If project plans change, the imported uncontaminated, clean soil cover will be from an approved source/facility and will be evaluated by the PE to ensure:

1. That the material is properly maintained at the source and will not be comingled with any other material prior to importing and grading the clean soil material at the Site;
2. That the material does not include any solid waste, including construction and demolition material, as it's prohibited;
3. That screening for evidence of contamination by visual, olfactory and PID soil screening practices prior to testing at the source as well as upon importing to the Site for grading is completed; and
4. That a maximum five-part composite sample will be collected from the segregated stockpile at the source at a minimum frequency of one sample per 250 cubic yards and analyzed for the following 6 NYCRR Part 375 parameters:
 - VOCs by EPA Method 8260C (rev. 2006)
 - SVOCs by EPA Method 8270D (rev. 2007)
 - Pesticides by EPA Method 8081B (rev. 2000)
 - PCBs by EPA Method 8082A (rev. 2000)
 - TAL Metals by EPA Method 6010C (rev. 2007)

The following documentation will be presented in the RAR:

1. Confirmation of OER approved clean soil cover material imported and graded at the site on top of highly visible demarcation barrier;
2. Site plan depicting all areas where the OER approved clean soil cover has been placed; and
3. Photographs documenting the importing and grading of the OER approved clean soil cover across the site with the underlying highly visible demarcation barrier (i.e. orange geo-synthetic material or equivalent).

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 STORM-WATER POLLUTION PREVENTION

Applicable laws and regulations pertaining to storm-water 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.

ATTACHMENT E
Site-Specific Construction
Health & Safety Plan
(CHASP)

**417 MANHATTAN AVENUE
BROOKLYN, NEW YORK
Block 2723, Lot 29**

**CONSTRUCTION
HEALTH AND SAFETY PLAN**

APRIL 2015

Prepared By:

EBC

ENVIRONMENTAL BUSINESS CONSULTANTS

1808 Middle Country Road
Ridge, NY 11961

TABLE OF CONTENTS
CONSTRUCTION HEALTH AND SAFETY PLAN
53 GRAND STREET, BROOKLYN, NY

STATEMENT OF COMMITMENTSC-1

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS..... 1

 1.1 Training Requirements 1

 1.2 Medical Monitoring Requirements..... 2

 1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments..... 2

 1.4 Key Personnel - Roles and Responsibilities 2

2.0 SITE BACKGROUND AND SCOPE OF WORK 4

 2.1 Previous Investigations 4

 2.1.1 Phase II Subsurface Investigation, (EBC, September 2014) 4

 2.2 Redevelopment Plans 7

 2.3 Description of Remedial Action 7

3.0 HAZARD ASSESSMENT 8

 3.1 Physical Hazards..... 8

 3.1.1 Tripping Hazards 8

 3.1.2 Climbing Hazards 8

 3.1.3 Cuts and Lacerations 8

 3.1.4 Lifting Hazards 8

 3.1.5 Utility Hazards..... 8

 3.1.6 Traffic Hazards 8

 3.2 Work in Extreme Temperatures..... 8

 3.2.1 Heat Stress 9

 3.2.2 Cold Exposure..... 10

 3.3 Chemical Hazards..... 10

 3.3.1 Respirable Dust..... 10

 3.3.2 Dust Control and Monitoring During Earthwork 10

 3.3.3 Organic Vapors 11

4.0 PERSONAL PROTECTIVE EQUIPMENT 12

 4.1 Level D 12

 4.2 Level C 12

 4.3 Activity-Specific Levels of Personal Protection..... 13

5.0 AIR MONITORING AND ACTION LEVELS 14

 5.1 Air Monitoring Requirements 14

 5.2 Work Stoppage Responses 14

 5.3 Action Levels During Excavation Activities 14

6.0 SITE CONTROL..... 16

 6.1 Work Zones 16

TABLE OF CONTENTS
CONSTRUCTION HEALTH AND SAFETY PLAN
123-125 FRANKLIN AVENUE, BROOKLYN, NY

7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN..... 17

- 7.1 Emergency Equipment On-site..... 17
- 7.2 Emergency Telephone Numbers..... 17
- 7.3 Personnel Responsibilities During an Emergency..... 17
- 7.4 Medical Emergencies..... 18
- 7.5 Fire or Explosion..... 18
- 7.6 Evacuation Routes 18
- 7.7 Spill Control Procedures..... 19
- 7.8 Vapor Release Plan..... 19

FIGURES

Figure 1 Route to Hospital (Appendix D)

APPENDICES

APPENDIX A SITE SAFETY ACKNOWLEDGMENT FORM
APPENDIX B SITE SAFETY PLAN AMENDMENTS
APPENDIX C CHEMICAL HAZARDS
APPENDIX D HOSPITAL INFORMATION, MAP AND FIELD ACCIDENT REPORT

STATEMENT OF COMMITMENT

This Construction Health and Safety Plan (CHASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Action at 417 Manhattan Avenue, Brooklyn, NY.

This CHASP, which applies to persons present at the site actually or potentially exposed to hazardous materials, describes emergency response procedures for actual and potential chemical hazards. This CHASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees.

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for the planned Remedial Action at 417 Manhattan Avenue, New York, NY to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during remedial activities. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards related to excavation, loading and other soil disturbance activities and is based on the best information available. The CHASP may be revised by EBC at the request of the developer and/or a regulatory agency upon receipt of new information regarding site conditions. Changes will be documented by written amendments signed by EBC's project manager, site safety officer and/or the EBC health and safety consultant.

1.1 Training Requirements

Personnel entering the exclusion zone or decontamination zone are required to be certified in health and safety practices for hazardous waste site operations as specified in the Federal OSHA Regulations CFR 1910.120e (revised 3/6/90).

Paragraph (e - 3) of the above referenced regulations requires that all on-site management personnel directly responsible for or who supervise employees engaged in hazardous waste operations, must initially receive 8 hours of supervisor training related to managing hazardous waste work.

Paragraph (e - 8) of the above referenced regulations requires that workers and supervisors receive 8 hours of refresher training annually on the items specified in Paragraph (e-1) and/or (e-3).

Additionally all on-site personnel must receive adequate site-specific training in the form of an on-site Health and Safety briefing prior to participating in field work with emphasis on the following:

- Protection of the adjacent community from hazardous vapors and / or dust which may be released during intrusive activities.
- Identification of chemicals known or suspected to be present on-site and the health effects and hazards of those substances.
- The need for vigilance in personnel protection, and the importance of attention to proper use, fit and care of personnel protective equipment.
- Decontamination procedures.
- Site control including work zones, access and security.
- Hazards and protection against heat or cold.
- The proper observance of daily health and safety practices, such as entry and exit of work zones and site. Proper hygiene during lunch, break, etc.
- Emergency procedures to be followed in case of fire, explosion and sudden release of hazardous gases.

Health and Safety meetings will be conducted on a daily basis and will cover protective clothing and other equipment to be used that day, potential and chemical and physical hazards, emergency procedures, and conditions and activities from the previous day.

1.2 Medical Monitoring Requirements

Field personnel and visitors entering the exclusion zone or decontamination zone must have completed appropriate medical monitoring required under OSHA 29 CFR 1910.120(f) if respirators or other breathing related PPE is needed. Medical monitoring enables a physician to monitor each employee's health, physical condition, and his fitness to wear respiratory protective equipment and carry out on-site tasks.

1.3 Site Safety Plan Acceptance, Acknowledgment and Amendments

The project superintendent and the site safety officer are responsible for informing personnel (EBC employees and/or owner or owners representatives) entering the work area of the contents of this plan and ensuring that each person signs the safety plan acknowledging the on-site hazards and procedures required to minimize exposure to adverse effects of these hazards. A copy of the Acknowledgement Form is included in **Appendix A**.

Site conditions may warrant an amendment to the CHASP. Amendments to the HASP are acknowledged by completing forms included in **Appendix B**.

1.4 Key Personnel - Roles and Responsibilities

Personnel responsible for implementing this Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Kimberly Somers	EBC – Project Manager	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000
Kimberly Somers	Health & Safety Manager	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000
Kevin Waters	Site Safety Officer	1808 Middle Country Rd Ridge, NY 11961	(631) 504-6000

The project manager is responsible for overall project administration and, with guidance from the site safety officer, for supervising the implementation of this CHASP. The site safety officer will conduct daily (tail gate or tool box) safety meetings at the project site and oversee daily safety issues. Each subcontractor and supplier (defined as an OSHA employer) is also responsible for the health and safety of its employees. If there is any dispute about health and safety or project activities, on-site personnel will attempt to resolve the issue. If the issue cannot be resolved at the site, then the project manager will be consulted.

The site safety officer is also responsible for coordinating health and safety activities related to hazardous material exposure on-site. The site safety officer is responsible for the following:

1. Educating personnel about information in this CHASP and other safety requirements to

be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.

2. Coordinating site safety decisions with the project manager.
3. Designating exclusion, decontamination and support zones on a daily basis.
4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.
5. Maintaining the work zone entry/exit log and site entry/exit log.
6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

The person who observes safety concerns and potential hazards that have not been addressed in the daily safety meetings should immediately report their observations/concerns to the site safety officer or appropriate key personnel.

2.0 SITE BACKGROUND AND SCOPE OF WORK

The Site is located at 417 Manhattan Avenue in the Williamsburg section of Brooklyn, New York, and is currently identified as Block 2723, Lot 29 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 2,500 square feet in size and is located on the west side of Manhattan Avenue, between Bayard Street to the north and Brooklyn-Queens Expressway to the south. The area surrounding the Site consists of a mix of residential, mixed-use and industrial properties. A map of the site boundary is shown in Figure 2. Currently, the Site is developed with a single-story, slab on-grade commercial building which is in use as a light industrial use consisting of a warehouse and offices.

The proposed future use of the Site will consist of redeveloping the lot with a 5-story residential building cover approximately 65% of the lot with a full cellar. The cellar will contain two accessory spaces to the apartments above on the 1st floor, each with a bathroom. The cellar will also contain the mechanical room, sprinkler room, stairwell, elevator, and refuse storage. The first floor will consist of two apartments, the residential lobby, the elevator, staircases and a metal grid deck. The second, third, fourth and fifth floors will consist of apartments. The third and fourth floors will each have two balconies and the fifth floor will have two terraces. The sixth floor (rooftop) will consist of an elevator, and small lobby containing a space for laundry.

The cellar level will require excavation to a depth of approximately 6 feet below grade across approximately 65% of the Site (the building footprint). The remaining portion of the Site will be used as a rear at-grade courtyard, and will be excavated to 2 feet below grade. An estimated 361 cubic yards (542 tons) of soil will require excavation for the new building's cellar, with additional excavations of 65 cubic yards (97 tons) for the rear courtyard and 24 cubic yards (35 tons) for the cellar windows, for a total of 450 cubic yards (674 tons). The building will not be equipped with any parking areas. The water table is present at a depth of approximately 5 feet below grade, and therefore will be encountered during excavation.

Layout of the proposed site development is presented in Figure 3. The current zoning designation is M1-2; manufacturing and residential R6A. The proposed use is consistent with existing zoning for the property.

2.1 Previous Investigations

2.1.1 Phase II Subsurface Investigation Report (EBC September 2014)

A Phase I screening was completed by EBC in 2014. The following Site history was established based on historic Sanborn maps:

Lot 29 was developed by 1905 with a small 1-story garage-like structure situated along the southern property boundary. The existing 1-story commercial building was developed sometime between 1905 and 1916. The Site was identified as a garage on the 1942 Sanborn map (no underground gasoline storage tanks identified on map). The Site was used for manufacturing for the years 1940 through 2007, including a potential printing use (“Bicentennial Publishing Corp” for 1992) and a coal company (1940).

The Site has been assigned and E-designation (E-138) for Hazmat and Air, as part of the Greenpoint-Williamsburg rezoning action completed by the City in May 2005.

Based on the subject site's history and surrounding properties, and review of historical records and regulatory agency databases, No Recognized Environmental Conditions (RECs) were identified for the property.

The properties are not listed on any of the Federal, State or City (with exception of the E) environmental databases. There is no record of tanks being registered to the properties.

A RIR investigation was completed for the site and consisted of:

1. Installed three soil borings across the Site, and collected six soil samples for chemical analysis from the soil borings and the soil excavated in the installation of one monitoring well to evaluate soil quality; and
2. Installed three groundwater monitoring wells throughout the Site to establish groundwater flow and collected three groundwater samples and one duplicate groundwater sample for chemical analysis to evaluate groundwater quality; and
3. Installed three soil gas implants and collected three soil gas samples for chemical analysis.

Summary of Environmental Findings

1. Elevation of the property is approximately 14 feet.
2. The stratigraphy of the Site, from the surface down, consists of 4 feet of historic fill underlain by brown to gray silty sand.
3. Soil/fill samples results were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted Residential Soil Cleanup Objectives (RRSCO) as presented in 6NYCRR Part 375-6.8 and CP51. No pesticides or PCBs were found exceeding Unrestricted Use or Restricted Residential SCOs. Data collected during the RI showed trace concentrations of VOCs, including 1,2,4-Trimethylbenzene, (maximum 1.5 µg/Kg), 1,3,5-Trimethylbenzene (maximum 1.7 µg/Kg), acetone (maximum 23 µg/Kg) carbon disulfide (maximum 1.8 µg/Kg), methyl ethyl ketone (6.8 µg/Kg), methylene chloride (maximum 1.8 µg/Kg), p-isopropyltoluene (100 µg/Kg) and toluene (1.1 µg/Kg), all below Unrestricted Use SCOs. Five SVOCs consisting of the polycyclic aromatic hydrocarbons (PAHs), benz(a)anthracene (maximum 1,400 µg/kg), benzo(a)pyrene (maximum 1,200 µg/kg), benzo(b)fluoranthene (maximum 1,300 µg/kg), chrysene (maximum 1,400 µg/kg), and indeno(1,2,3-cd)pyrene (740 µg/kg), were found exceeding Unrestricted Use SCOs and Restricted Residential SCOs, with the exception of chrysene. Five metals including cadmium (maximum of 6.45 mg/Kg), copper (maximum of 4,510 mg/Kg), lead (maximum of 676 mg/Kg), mercury (maximum 26.4 mg/Kg), and zinc (maximum of 6,940 mg/Kg), exceeded both Unrestricted Use SCOs and Restricted Residential Use SCOs in both shallow and deep soils. Overall, the soil results were consistent with data identified at sites with historic fill material in NYC. Soil exceedances extend to approximately 12 feet below grade across the site.
4. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the investigation showed no pesticides detected. Seven VOCs were detected in trace

amounts, including 1,2,4-trimethylbenzene (0.23 µg/L), 1,3,5-trimethylbenzene (0.27 µg/L) acetone (maximum of 7.7 µg/L), carbon disulfide (maximum 0.31 µg/L), chloromethane (maximum of 0.34 µg/L), methyl ethyl ketone (maximum 0.81 µg/L), methyl t-butyl ether (MTBE) (maximum 8.9 µg/L), none of which exceeded their respective GQSs. Five SVOCs, including benz(a)anthracene (maximum 0.37 µg/L), benzo(b)fluoranthene (maximum 0.43 µg/L), benzo(k)fluoranthene (maximum 0.16 µg/L), chrysene (maximum 0.35 µg/L), and indeno(1,2,3-cd)pyrene (maximum 0.16 µg/L) were found exceeding GQS. One PCB, PCB-1254 (maximum 0.095 µg/L), was found exceeding GQS in one sample. Four metals, iron (maximum 15.7 mg/L), magnesium (maximum of 44.9 mg/L), manganese (maximum of 0.952 mg/L) and sodium (maximum of 147 mg/L) (dissolved) exceeded their respective GQS.

1. Soil vapor results collected during the RI were compared to the compounds listed in the New York State Department of Health (NYSDOH) Vapor Intrusion Matrices located in the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006. Soil vapor samples collected during the RI showed petroleum related VOCs were present at low concentrations. Total concentrations of petroleum-related VOCs (BTEX) were detected at a maximum of 46.91 µg/m³. Chlorinated VOCs including carbon tetrachloride were detected at 0.42 µg/m³ and tetrachloroethene (PCE) detected between 0.41 µg/m³ and 7.32 µg/m³ were both reported at concentrations below guidance matrix established by NYSDOH. Trichloroethane (TCE) and 1,1,1-trichloroethane were not detected in any soil gas samples.

The report recommended specific management and handling of soils excavated during construction and proper off-site disposal of this material including:

- Visual separation of the historic fill and native soil layer while excavating for the new building(s).
- Proper disposal of excavated fill materials at a permitted disposal facility.
- Pre-classified in-situ sampling or excavated stockpile sampling as required to properly classify the materials and at intervals specified by the disposal facility.
- Installation of a waterproofing/vapor barrier beneath the proposed building's slab.

2.2 Redevelopment Plans

The proposed future use of the Site will consist of a new 5-story apartment building with a cellar the full size of the building footprint. The cellar will contain two accessory spaces to the apartments above on the 1st floor, each with a bathroom. The cellar will also contain the mechanical room, sprinkler room, stairwell, elevator, and refuse storage. The first floor will consist of two apartments, the residential lobby, the elevator, staircases and a metal grid deck. The second, third, fourth and fifth floors will consist of apartments. The third and fourth floors will each have two balconies and the fifth floor will have two terraces. The sixth floor (rooftop) will consist of an elevator, and small lobby containing a space for laundry.

The cellar level will require excavation to a depth of approximately 6 feet below grade across approximately 65% of the Site (the building footprint). The remaining portion of the Site will be used as a rear at-grade courtyard, and will be excavated to 2 feet below grade. An estimated 361 cubic yards (542 tons) of soil will require excavation for the new building's cellar, with additional excavations of 65 cubic yards (97 tons) for the rear courtyard and 24 cubic yards (35 tons) for the cellar windows, for a total of 450 cubic yards (674 tons). The building will not be equipped with any parking areas. The water table is present at a depth of approximately 5 feet below grade, and therefore will be encountered during excavation.

The current zoning designation is M1-2/R6A. The proposed use is consistent with existing zoning for the property.

2.3 Description of Remedial Action

Site activities included within the Remedial Action that are included within the scope of this HASP include the following:

- Visual separation of the historic fill and native soil layer while excavating for the new building(s).
- Proper disposal of excavated fill materials at a permitted disposal facility.
- Pre-classified in-situ sampling or excavated stockpile sampling as required to properly classify the materials and at intervals specified by the disposal facility.

3.0 HAZARD ASSESSMENT

This section identifies the hazards associated with the proposed scope of work, general physical hazards that can be expected at most sites; and presents a summary of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate these hazards. Those that cannot be eliminated must be guarded against using engineering controls and/or personal protective equipment.

3.1 Physical Hazards

3.1.1 Tripping Hazards

An area of risk associated with on-site activities are presented by uneven ground, concrete, curbstones or equipment which may be present at the site thereby creating a potential tripping hazard. During intrusive work, care should be taken to mark or remove any obstacles within the exclusion zone.

3.1.2 Climbing Hazards

During site activities, workers may have to work on excavating equipment by climbing. The excavating contractor will conform with any applicable NIOSH and OSHA requirements or climbing activities.

3.1.3 Cuts and Lacerations

Field activities that involve excavating activities usually involve contact with various types of machinery. A first aid kit approved by the American Red Cross will be available during all intrusive activities.

3.1.4 Lifting Hazards

Improper lifting by workers is one of the leading causes of industrial injuries. Field workers in the excavation program may be required to lift heavy objects. Therefore, all members of the field crew should be trained in the proper methods of lifting heavy objects. All workers should be cautioned against lifting objects too heavy for one person.

3.1.5 Utility Hazards

Before conducting any excavation, the excavation contractor will be responsible for locating and verifying all existing utilities at each excavation.

3.1.6 Traffic Hazards

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state and federal agency regulations regarding such traffic and in accordance with NYCDOT guidelines. The excavation contractor shall carry on his operations without undue interference or delays to traffic. The excavation contractor shall furnish all labor, materials, guards, barricades, signs, lights, and anything else necessary to maintain traffic and to protect his work and the public, during operations.

3.2 Work in Extreme Temperatures

Work under extremely hot or cold weather conditions requires special protocols to minimize the chance that employees will be affected by heat or cold stress.

3.2.1 Heat Stress

The combination of high ambient temperature, high humidity, physical exertion, and personal protective apparel, which limits the dissipation of body heat and moisture, can cause heat stress.

The following prevention, recognition and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress and to apply the appropriate treatment.

1. Prevention

- a. Provide plenty of fluids. Available in the support zone will be a 50% solution of fruit punch and water or plain water.
- b. Work in Pairs. Individuals should avoid undertaking any activity alone.
- c. Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing and/or act as a quick-drench shower in case of an exposure incident.
- d. Adjustment of the work schedule. As is practical, the most labor-intensive tasks should be carried out during the coolest part of the day.

2. Recognition and Treatment

a. Heat Rash (or prickly heat):

Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.

Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.

Treatment: Remove source of irritation and cool skin with water or wet cloths.

b. Heat Cramps (or heat prostration)

Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

Treatment: Perform the following while making arrangement for transport to a medical facility. Remove the worker to a contamination reduction zone. Remove protective clothing. Lie worker down on back in a cool place and raise feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of salt-water solution, using one teaspoon of salt in 12 ounces of water. Transport to a medical facility.

c. Heat Stroke

Cause: Same as heat exhaustion. This is also an extremely serious condition.

Symptoms: Dry hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.

Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

3.2.2 Cold Exposure

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and /or frostbite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on-site field personnel should be closely monitored. Personnel and supervisors working on-site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light and numbing of the toes and fingers.

3.3 Chemical Hazards

“Urban fill” materials, present throughout the New York City area typically contain elevated levels of semi-volatile organic compounds and metals. These “contaminants” are not related to a chemical release occurring on the site, but are inherent in the reworked fill material in the area which contains ash and bits of tar and asphalt. Considering the previous sampling results and the past and present use of the site, the following compounds are considered for the site as potential contaminants: benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-c,d)pyrene, cadmium, chromium, copper, lead, mercury and zinc.

The primary routes of exposure to these contaminants are inhalation, ingestion and absorption.

Appendix C includes information sheets for suspected chemicals that may be encountered at the site.

3.3.1 Respirable Dust

Dust may be generated from vehicular traffic and/or excavation activities. If visible observation detects elevated levels of dust, a program of wetting will be employed by the site safety officer. If elevated dust levels persist, the site safety office will employ dust monitoring using a particulate monitor (Miniram or equivalent). If monitoring detects concentrations greater than 150 µg/m³ over daily background, the site safety officer will take corrective actions as defined herein, including the use of water for dust suppression and if this is not effective, requiring workers to wear APRs with efficiency particulate air (HEPA) cartridges.

Absorption pathways for dust and direct contact with soils or groundwater will be mitigated with the implementation of latex gloves, hand washing and decontamination exercises when necessary.

3.3.2 Dust Control and Monitoring During Earthwork

Dust generated during excavation activities or other earthwork may contain contaminants identified in soils at the site. Dust will be controlled by wetting the working surface with water. Calcium chloride may be used if the problem cannot be controlled with water. Air monitoring and dust control techniques are specified in a site specific Dust Control Plan (if applicable). Site workers will not be required to wear APR's unless dust concentrations are consistently over 150 µg/m³ over site-specific background in the breathing zone as measured by a dust monitor unless the site safety officer directs workers to wear APRs. The site safety officer will use visible dust as an indicator to implement the dust control plan.

3.3.3 Organic Vapors

Elevated levels of VOCs were detected in both soil and soil vapor samples collected during previous investigations at the site. Therefore, excavation activities may cause the release of organic vapors to the atmosphere. The site safety officer will periodically monitor organic vapors with a Photoionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be selected in accordance with the site air monitoring program, OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection. **It is anticipated that work will be performed in Level D PPE.**

4.1 Level D

Level D PPE shall be donned when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of, or contact with, hazardous concentrations of harmful chemicals. Level D PPE consists of:

- standard work uniform, coveralls, or tyvek, as needed;
- steel toe and steel shank work boots;
- hard hat;
- gloves, as needed;
- safety glasses;
- hearing protection;
- equipment replacements are available as needed.

4.2 Level C

Level C PPE shall be donned when the concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), but are less than 5 ppm. The specifications on the APR filters used must be appropriate for contaminants identified or expected to be encountered. Level C PPE shall be donned when the identified contaminants have adequate warning properties and criteria for using APR have been met. Level C PPE consists of:

- chemical resistant or coated tyvek coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves (surgical gloves);
- disposable outer gloves;
- full face APR fitted with organic vapor/dust and mist filters or filters appropriate for the identified or expected contaminants;
- hard hat;
- splash shield, as needed; and,
- ankles/wrists taped with duct tape.

The site safety officer will verify if Level C is appropriate by checking organic vapor concentrations using compound and/or class-specific detector tubes.

- chemical resistant coveralls;
- steel-toe and steel-shank workboots;
- chemical resistant overboots or disposable boot covers;
- disposable inner gloves;
- disposable outer gloves;
- hard hat; and,
- ankles/wrists taped.

The exact PPE ensemble is decided on a site-by-site basis by the Site Safety Officer with the intent to provide the most protective and efficient worker PPE.

4.3 Activity-Specific Levels of Personal Protection

The required level of PPE is activity-specific and is based on air monitoring results (Section 4.0) and properties of identified or expected contaminants. **It is expected that site work will be performed in Level D.** If air monitoring results indicate the necessity to upgrade the level of protection engineering controls (i.e. Facing equipment away from the wind and placing site personnel upwind of drilling locations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

5.0 AIR MONITORING AND ACTION LEVELS

29 CFR 1910.120(h) specifies that monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

5.1 Air Monitoring Requirements

If excavation work is performed, air will be monitored for VOCs with a portable ION Science 3000EX photoionization detector, or the equivalent. If necessary, Lower Explosive Limit (LEL) and oxygen will be monitored with a Combustible Gas Indicator (CGI). If appropriate, fugitive dust will be monitored using a MiniRam Model PDM-3 aerosol monitor. Air will be monitored when any of the following conditions apply:

- initial site entry;
- during any work where a potential IDLH condition or flammable atmosphere could develop;
- excavation work begins on another portion of the site;
- contaminants, other than those previously identified, have been discovered;
- each time a different task or activity is initiated;
- during trenching and/or excavation work.

The designated site safety officer will record air monitoring data and ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. Instruments will be zeroed daily and checked for accuracy. Monitoring results will be recorded in a field notebook and will be transferred to instrument reading logs.

5.2 Work Stoppage Responses

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage are exceeded:

- 1 The SSO will be consulted immediately
- 2 All personnel (except as necessary for continued monitoring and contaminant migration, if applicable) will be cleared from the work area (eg from the exclusion zone).
- 3 Monitoring will be continued until intrusive work resumes.

5.3 Action Levels During Excavation Activities

Instrument readings will be taken in the breathing zone above the excavation pit unless otherwise noted. Each action level is independent of all other action levels in determining responses.

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	<ul style="list-style-type: none"> • Continue excavating • Level D protection • Continue monitoring every 10 minutes
1-5 ppm Above Background, Sustained Reading	1-10%	<ul style="list-style-type: none"> • Continue excavating • Go to Level C protection or employ engineering controls • Continue monitoring every 10 minutes
5-25 ppm Above Background, Sustained Reading	10-20%	<ul style="list-style-type: none"> • Discontinue excavating, unless PID is only action level exceeded. • Level C protection or employ engineering controls • Continue monitoring for organic vapors 200 ft downwind • Continuous monitoring for LEL at excavation pit
>25 ppm Above Background, Sustained Reading	>20%	<ul style="list-style-type: none"> • Discontinue excavating • Withdraw from area, shut off all engine ignition sources. • Allow pit to vent • Continuous monitoring for organic vapors 200 ft downwind.

Notes: Air monitoring will occur in the breathing zone 30 inches above the excavation pit. Readings may also be taken in the excavation pit but will not be used for action levels.

If action levels for any one of the monitoring parameters are exceeded, the appropriate responses listed in the right hand column should be taken. If instrument readings do not return to acceptable levels after the excavation pit has been vented for a period of greater than one-half hour, a decision will then be made whether or not to seal the pit with suppressant foam.

If, during excavation activities, downwind monitoring PID readings are greater than 5 ppm above background for more than one-half hour, excavation will stop until sustained levels are less than 5 ppm (see Community Air Monitoring Plan).

6.0 SITE CONTROL

6.1 Work Zones

The primary purpose of site controls is to establish the perimeter of a hazardous area, to reduce the migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by unauthorized persons. When operations are to take place involving hazardous materials, the site safety officer will establish an exclusion zone, a decontamination zone, and a support zone. These zones "float" (move around the site) depending on the tasks being performed on any given day. The site safety officer will outline these locations before work begins and when zones change. The site safety officer records this information in the site log book.

Due to the dimensions of the Site and the work area, it is expected that an exclusion zone will include the entire fenced area with the exception of the construction entrance area, which will serve as the decontamination zone. A support zone if needed will be located outside of the fenced area. All onsite workers engaged in the excavation of hazardous or contaminated materials must provide evidence of OSHA 24 or 40-hour Hazardous Waste Operations and Emergency Response Operations training to conduct work within the exclusion zone established by the site safety officer. Gross decontamination (as determined by the site Health and Safety Officer) is conducted in the exclusion zone; all other decontamination is performed in the decontamination zone or trailer.

Protective equipment is removed in the decontamination zone. Disposable protective equipment is stored in receptacles staged in the decontamination zone, and non-disposable equipment is decontaminated. All personnel and equipment exit the exclusion zone through the decontamination zone. If a decontamination trailer is provided the first aid equipment, an eye wash unit, and drinking water are kept in the decontamination trailer.

The support zone is used for vehicle parking, daily safety meetings, and supply storage. Eating, drinking, and smoking are permitted only in the support zone. When a decontamination trailer is not provided, the eye wash unit, first aid equipment, and drinking water are kept at a central location designated by the site safety officer.

7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

Site personnel must be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency telephone numbers and a map to the hospital will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment.

7.1 Emergency Equipment On-site

Private telephones:	Site personnel.
Two-way radios:	Site personnel where necessary.
Emergency Alarms:	On-site vehicle horns*.
First aid kits:	On-site, in vehicles or office.
Fire extinguisher:	On-site, in office or on equipment.

* Horns: Air horns will be supplied to personnel at the discretion of the project superintendent or site safety officer.

7.2 Emergency Telephone Numbers

General Emergencies	911
New York City Police	911
Health Professionals NYC	1-718-218-7352
NYSDEC Spills Division	1-800-457-7362
NYSDEC Hazardous Waste Division	1-718-482-4994
NYCDEP	1-718-699-9811
NYC Department of Health	1-212-788-4711
NYC Fire Department	911
National Response Center	1-800-424-8802
Poison Control	1-212-340-4494
Site Safety Officer	1-631-504-6000
Alternate Site Safety Officer	1-631-504-6000

7.3 Personnel Responsibilities During an Emergency

The project manager is primarily responsible for responding to and correcting any emergency situations. However, in the absence of the project manager, the site safety officer shall act as the project manager's on-site designee and perform the following tasks:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, evacuate and secure the site, or upgrade/downgrade the level of protective clothing and respiratory protection;
- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department

should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;

- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;
- Determine the cause of incidents and make recommendations to prevent recurrence; and,
- Ensure that all required reports have been prepared.

The following key personnel are planned for this project:

- Project Manager Kimberly Somers (631) 504-6000
- Construction Superintendent To be added
- Site Safety Officer Kevin Waters (631) 504-6000

7.4 Medical Emergencies

A person who becomes ill or injured in the exclusion zone will be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. First aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

A person transporting an injured/exposed person to a clinic or hospital for treatment will take the directions to the hospital (**Appendix D**), and information on the chemical(s) to which they may have been exposed (**Appendix C**).

7.5 Fire or Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. The site safety officer or his designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site. If it is safe to do so, site personnel may:

- use fire fighting equipment available on site; or,
- remove or isolate flammable or other hazardous materials that may contribute to the fire.

7.6 Evacuation Routes

Evacuation routes established by work area locations for each site will be reviewed prior to commencing site operations. As the work areas change, the evacuation routes will be altered accordingly, and the new route will be reviewed.

Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.
- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

7.7 Spill Control Procedures

Spills associated with site activities may be attributed to project equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material. Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

7.8 Vapor Release Plan

If work zone organic vapor (excluding methane) exceeds 5 ppm, then a downwind reading will be made either 200 feet from the work zone or at the property line, whichever is closer. If readings at this location exceed 5 ppm over background, the work will be stopped.

If 5 ppm of VOCs are recorded over background on a PID at the property line, then an off-site reading will be taken within 20 feet of the nearest residential or commercial property, whichever is closer. If efforts to mitigate the emission source are unsuccessful for 30 minutes, then the designated site safety officer will:

- contact the local police;
- continue to monitor air every 30 minutes, 20 feet from the closest off-site property. If two successive readings are below 5 ppm (non-methane), off-site air monitoring will be halted.
- All property line and off site air monitoring locations and results associated with vapor releases will be recorded in the site safety log book.

APPENDIX A
SITE SAFETY ACKNOWLEDGEMENT FORM

DAILY BRIEFING SIGN-IN SHEET

Date: _____ Person Conducting Briefing: _____

Project Name and Location: _____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc...):

2. OTHER ISSUES (HASP changes, attendee comments, etc...):

3. ATTENDEES (Print Name):

1.	11.
2.	12.
3.	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

APPENDIX B
SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT FORM

Site Safety Plan Amendment #: _____

Site Name: _____

Reason for Amendment: _____

Alternative Procedures: _____

Required Changes in PPE: _____

Project Superintendent (signature)

Date

Health and Safety Consultant (signature)

Date

Site Safety Officer (signature)

Date

APPENDIX C
CHEMICAL HAZARDS

CHEMICAL HAZARDS

The attached International Chemical Safety Cards are provided for contaminants of concern that have been identified in soils and/or groundwater at the site.

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385



1,2-Benzoanthracene
Benzo(a)anthracene
2,3-Benzphenanthrene
Naphthanthracene
 $C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 0385
CAS # 56-55-3
RTECS # [CV9275000](#)
EC # 601-033-00-9
October 23, 1995 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0385

BENZ(a)ANTHRACENE

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p> <p>CHEMICAL DANGERS:</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2 (as pyrolysis product of organic materials) (DFG 2005).</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is probably carcinogenic to humans.</p>
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PHYSICAL PROPERTIES	<p>Sublimation point: 435°C Melting point: 162°C Relative density (water = 1): 1.274 Solubility in water: none</p>	<p>Vapour pressure, Pa at 20°C: 292 Octanol/water partition coefficient as log Pow: 5.61</p>
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ENVIRONMENTAL DATA	<p>Bioaccumulation of this chemical may occur in seafood.</p>	
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NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name. Card has been partly updated in October 2005 and August 2006: see sections Occupational Exposure Limits, EU classification.

ADDITIONAL INFORMATION

ICSC: 0385

BENZ(a)ANTHRACENE

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104



Benz(a)pyrene
3,4-Benzopyrene
Benzo(d,e,f)chrysene
 $C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0104
CAS # 50-32-8
RTECS # [DJ3675000](#)
EC # 601-032-00-3
October 17, 2005 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

I M P O R T A N T A D V I S I O N	<p>PHYSICAL STATE; APPEARANCE: PALE-YELLOW CRYSTALS</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Reacts with strong oxidants causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005). MAK: Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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PHYSICAL PROPERTIES	Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm ³	Solubility in water: none (<0.1 g/100 ml) Vapour pressure : negligible Octanol/water partition coefficient as log Pow: 6.04
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ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.	
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NOTES

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

ADDITIONAL INFORMATION

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ICSC: 0104

BENZO(a)PYRENE

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
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International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720



Benz(e)acephenanthrylene
2,3-Benzofluoranthene
Benzo(e)fluoranthene
3,4-Benzofluoranthene
 $C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0720
CAS # 205-99-2
RTECS # [CU1400000](#)
EC # 601-034-00-4
March 25, 1999 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

I	PHYSICAL STATE; APPEARANCE: COLOURLESS CRYSTALS	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation
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PHYSICAL DANGERS:

CHEMICAL DANGERS:

Upon heating, toxic fumes are formed.

OCCUPATIONAL EXPOSURE LIMITS:

TLV: A2 (suspected human carcinogen); (ACGIH 2004).

MAK:

Carcinogen category: 2;
(DFG 2004).

of its aerosol and through the skin.

INHALATION RISK:

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

This substance is possibly carcinogenic to humans. May cause genetic damage in humans.

PHYSICAL PROPERTIES

Boiling point: 481°C
Melting point: 168°C
Solubility in water:
none

Octanol/water partition coefficient as log Pow: 6.12

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to air quality and water quality.



NOTES

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0720

BENZO(b)FLUORANTHENE

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:

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International Chemical Safety Cards

CHRYSENE

ICSC: 1672



Benzoaphenanthrene
1,2-Benzophenanthrene
1,2,5,6-Dibenzonaphthalene
 $C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 1672
CAS # 218-01-9
RTECS # [GC0700000](#)
UN # 3077
EC # 601-048-00-0
October 12, 2006 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III Signal: Warning Aqua-Cancer Suspected of causing cancer Very toxic to aquatic life with long lasting effects Very toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

I M P O R T A N T D A T A	<p>PHYSICAL STATE; APPEARANCE: COLOURLESS TO BEIGE CRYSTALS OR POWDER</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p> <p>CHEMICAL DANGERS: The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK not established.</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.</p> <p>INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: This substance is possibly carcinogenic to humans.</p>
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PHYSICAL PROPERTIES	Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm ³	Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9
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ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.	
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NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. This substance does not usually occur as a pure substance but as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases.

Transport Emergency Card: TEC (R)-90GM7-III

ADDITIONAL INFORMATION

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ICSC: 1672

CHRYSENE

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.
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CHEMICAL DANGERS:
Upon heating, toxic fumes are formed.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK:
Carcinogen category: 2;
(DFG 2004).

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 536°C
Melting point: 164°C
Solubility in water:
none

Octanol/water partition coefficient as log Pow: 6.58

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish.



NOTES

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0730

INDENO(1,2,3-cd)PYRENE

(C) IPCS, CEC, 1994

IMPORTANT LEGAL NOTICE:

Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730



o-Phenylene pyrene
2,3-Phenylene pyrene
 $C_{22}H_{12}$
Molecular mass: 276.3

ICSC # 0730
CAS # 193-39-5
RTECS # [NK9300000](#)
March 25, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0730

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

I	PHYSICAL STATE; APPEARANCE: YELLOW CRYSTALS	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
M	PHYSICAL DANGERS:	INHALATION RISK:
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CHEMICAL DANGERS:
Upon heating, toxic fumes are formed.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK:
Carcinogen category: 2;
(DFG 2004).

Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

Boiling point: 536°C
Melting point: 164°C
Solubility in water:
none

Octanol/water partition coefficient as log Pow: 6.58

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to air quality and water quality. Bioaccumulation of this chemical may occur in fish.



NOTES

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0730

INDENO(1,2,3-cd)PYRENE

(C) IPCS, CEC, 1994

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International Chemical Safety Cards

CADMIUM

ICSC: 0020



Cd
Atomic mass: 112.4

ICSC # 0020
CAS # 7440-43-9
RTECS # [EU980000](#)
UN # 2570
EC # 048-002-00-0
April 22, 2005 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.	Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants acids, food and feedstuffs	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T+ symbol N symbol R: 45-26-48/23/25-62-63-68-50/53 S: 53-45-60-61 UN Hazard Class: 6.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0020

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CADMIUM

ICSC: 0020

<p>I M P O R T A N T A D V I S I O N</p>	<p>PHYSICAL STATE; APPEARANCE: SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR.</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p> <p>CHEMICAL DANGERS: Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001.) Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium, causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: (Total dust) 0.01 mg/m³ (Respirable fraction) 0.002 mg/m³ as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL*: 1910.1027 TWA 0.005 mg/m³ *Note: The PEL applies to all Cadmium compounds (as Cd). NIOSH REL*: Ca See Appendix A *Note: The REL applies to all Cadmium compounds (as Cd). NIOSH IDLH: Ca 9 mg/m³ (as Cd) See: IDLH INDEX</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.</p> <p>INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The fume is irritating to the respiratory tract Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys, resulting in kidney impairment This substance is carcinogenic to humans.</p>
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<p>PHYSICAL PROPERTIES</p>	<p>Boiling point: 765°C Melting point: 321°C Density: 8.6 g/cm³</p>	<p>Solubility in water: none Auto-ignition temperature: (cadmium metal dust) 250°C</p>
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<p>ENVIRONMENTAL DATA</p>	
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NOTES

Reacts violently with fire extinguishing agents such as water, foam, carbon dioxide and halons. Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Do NOT take working clothes home. Cadmium also exists in a pyrophoric form (EC No. 048-011-00-X), which bears the additional EU labelling symbol F, R phrase 17, and S phrases 7/8 and 43. UN numbers and packing group will vary according to the physical form of the substance.

ADDITIONAL INFORMATION

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<p>ICSC: 0020</p>	<p>CADMIUM</p>
<p>(C) IPCS, CEC, 1994</p>	

<p>IMPORTANT LEGAL NOTICE:</p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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International Chemical Safety Cards

COPPER

ICSC: 0240



Cu
(powder)

ICSC # 0240
CAS # 7440-50-8
RTECS # [GL5325000](#)
September 24, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
• INHALATION	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from - See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0240

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

COPPER

ICSC: 0240

<p>I</p> <p>M</p> <p>P</p>	<p>PHYSICAL STATE; APPEARANCE: RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS:</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p>
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Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.

EFFECTS OF SHORT-TERM EXPOSURE:
Inhalation of fumes may cause metal fume fever. See Notes.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.2 mg/m³ fume (ACGIH 1992-1993).
TLV (as Cu, dusts & mists): 1 mg/m³ (ACGIH 1992-1993).
Intended change 0.1 mg/m³
Inhal.,
A4 (not classifiable as a human carcinogen);
MAK: 0.1 mg/m³ (Inhalable fraction)
Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005).
OSHA PEL*: TWA 1 mg/m³ *Note: The PEL also applies to other copper compounds (as Cu) except copper fume.
NIOSH REL*: TWA 1 mg/m³ *Note: The REL also applies to other copper compounds (as Cu) except Copper fume.
NIOSH IDLH: 100 mg/m³ (as Cu) See: [7440508](#)

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES

Boiling point: 2595°C
Melting point: 1083°C
Relative density (water = 1): 8.9

Solubility in water:
none

ENVIRONMENTAL DATA

NOTES

The symptoms of metal fume fever do not become manifest until several hours.

ADDITIONAL INFORMATION

ICSC: 0240

COPPER

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International Chemical Safety Cards

LEAD

ICSC: 0052



Lead metal
Plumbum
Pb
Atomic mass: 207.2
(powder)

ICSC # 0052
CAS # 7439-92-1
RTECS # [OF7525000](#)
October 08, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
• SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air.</p> <p>CHEMICAL DANGERS: On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.05 mg/m³ A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004). MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004). EU OEL: as TWA 0.15 mg/m³ (EU 2002). OSHA PEL*: 1910.1025 TWA 0.050 mg/m³ See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C. NIOSH REL*: TWA 0.050 mg/m³ See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C. NIOSH IDLH: 100 mg/m³ (as Pb) See: 7439921</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.</p> <p>INHALATION RISK: A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE:</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.</p>
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PHYSICAL PROPERTIES	Boiling point: 1740°C Melting point: 327.5°C	Density: 11.34 g/cm ³ Solubility in water: none
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ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.	
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NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home.
 Transport Emergency Card: TEC (R)-51S1872

ADDITIONAL INFORMATION

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ICSC: 0052	LEAD
(C) IPCS, CEC, 1994	

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International Chemical Safety Cards

MERCURY

ICSC: 0056



Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

ICSC # 0056
CAS # 7439-97-6
RTECS # [OV4550000](#)
UN # 2809
EC # 080-001-00-0
April 22, 2004 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0056

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.</p> <p>PHYSICAL DANGERS:</p> <p>CHEMICAL DANGERS: Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 0.1 mg/m³ Sh Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003). OSHA PEL[†]: C 0.1 mg/m³ NIOSH REL: Hg Vapor: TWA 0.05 mg/m³ skin Other: C 0.1 mg/m³ skin NIOSH IDLH: 10 mg/m³ (as Hg) See: 7439976</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!</p> <p>INHALATION RISK: A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: The substance may have effects on the central nervous system kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.</p>
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<p>PHYSICAL PROPERTIES</p>	<p>Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none</p>	<p>Vapour pressure, Pa at 20°C: 0.26 Relative vapour density (air = 1): 6.93 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009</p>
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<p>ENVIRONMENTAL DATA</p>	<p>The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.</p>	
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NOTES

Depending on the degree of exposure, periodic medical examination is indicated. No odour warning if toxic concentrations are present. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-80GC9-II+III

ADDITIONAL INFORMATION

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ICSC: 0056 **MERCURY**

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International Chemical Safety Cards

ZINC POWDER

ICSC: 1205



Blue powder
Merrillite
Zn
Atomic mass: 65.4
(powder)

ICSC # 1205
CAS # 7440-66-6
RTECS # [ZG8600000](#)
UN # 1436 (zinc powder or dust)
EC # 030-001-00-1
October 24, 1994 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base (s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
• INHALATION	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
• SKIN	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
• EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Extinguish or remove all ignition sources. Do NOT wash away into sewer. Sweep spilled substance into containers. then remove to safe place. Personal protection: self-contained breathing apparatus.	Fireproof. Separated from acids, bases oxidants Dry.	Airtight. F symbol N symbol R: 15-17-50/53 S: 2-7/8-43-46-60-61 UN Hazard Class: 4.3 UN Subsidiary Risks: 4.2

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1205

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ZINC POWDER

ICSC: 1205

<p>I M P O R T A N T D A T A</p>	<p>PHYSICAL STATE; APPEARANCE: ODOURLESS GREY TO BLUE POWDER.</p> <p>PHYSICAL DANGERS: Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.</p> <p>CHEMICAL DANGERS: Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001) Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.</p> <p>OCCUPATIONAL EXPOSURE LIMITS: TLV not established.</p>	<p>ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation and by ingestion.</p> <p>INHALATION RISK: Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.</p> <p>EFFECTS OF SHORT-TERM EXPOSURE: Inhalation of fumes may cause metal fume fever. The effects may be delayed.</p> <p>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis.</p>
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<p>PHYSICAL PROPERTIES</p>	<p>Boiling point: 907°C Melting point: 419°C Relative density (water = 1): 7.14</p>	<p>Solubility in water: reaction Vapour pressure, kPa at 487°C: 0.1 Auto-ignition temperature: 460°C</p>
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<p>ENVIRONMENTAL DATA</p>	
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NOTES

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC 0001 and ICSC 0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43GWS-II+III
NFPA Code: H0; F1; R1;

ADDITIONAL INFORMATION

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ICSC: 1205

ZINC POWDER

(C) IPCS, CEC, 1994

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 4,4'-DDD PESTANAL,250 MG (2,2-BIS(4-CHL&

Product Number : 35486
Brand : Fluka

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052
Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards

Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H351 Suspected of causing cancer.
H400 Very toxic to aquatic life.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

HMIS Classification

Health hazard: 2
Chronic Health Hazard: *
Flammability: 0
Physical hazards: 0

NFPA Rating

Health hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.
Skin Harmful if absorbed through skin. May cause skin irritation.
Eyes May cause eye irritation.
Ingestion Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
4,4'-DDD
TDE

Formula : C₁₄H₁₀Cl₄
Molecular Weight : 320.04 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane			
72-54-8	200-783-0	-	-

4. FIRST AID MEASURES

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection

Handle with gloves.

Eye protection

Face shield and safety glasses

Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form solid

Safety data

pH	no data available
Melting point	94.0 - 96.0 °C (201.2 - 204.8 °F)
Boiling point	193.0 °C (379.4 °F) at 1.3 hPa (1.0 mmHg)
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	< 0.00001 hPa (< 0.00001 mmHg) at 25.0 °C (77.0 °F)
Density	1.38 g/cm ³
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.02

10. STABILITY AND REACTIVITY

Chemical stability

Stable under recommended storage conditions.

Conditions to avoid

no data available

Materials to avoid

Strong oxidizing agents

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

LD50 Oral - Hamster - > 5,000 mg/kg

TDLo Oral - Human - 428.5 mg/kg

Remarks: Endocrine:Adrenal cortex hypoplasia.

TDLo Oral - rat - 6,000 mg/kg

Remarks: Cardiac:Other changes. Gastrointestinal:Other changes. Kidney, Ureter, Bladder:Changes in both tubules and glomeruli.

TDLo Oral - rat - 14 mg/kg

Remarks: Liver:Changes in liver weight. Endocrine:Estrogenic. Musculoskeletal:Other changes.

TDLo Oral - rat - 2,100 mg/kg

Remarks: Behavioral:Altered sleep time (including change in righting reflex).

LD50 Dermal - rabbit - 1,200 mg/kg

Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Skin irritation

Skin corrosion/irritation

no data available

Serious eye damage/eye irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Specific target organ toxicity - single exposure (GHS)

no data available

Specific target organ toxicity - repeated exposure (GHS)

no data available

Aspiration hazard

no data available

Potential health effects**Inhalation**

May be harmful if inhaled. May cause respiratory tract irritation.

Ingestion

Toxic if swallowed.

Skin

Harmful if absorbed through skin. May cause skin irritation.

Eyes May cause eye irritation.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information

RTECS: KI0700000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish LC50 - other fish - 1.18 - 9 mg/l - 96.0 h
LC50 - Lepomis macrochirus (Bluegill) - 0.04 - 0.05 mg/l - 96.0 h
LC50 - Oncorhynchus mykiss (rainbow trout) - 0.06 - 0.09 mg/l - 96.0 h
LC50 - Pimephales promelas (fathead minnow) - 3.47 - 5.58 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates. EC50 - Daphnia pulex (Water flea) - 0.01 mg/l - 48 h

Persistence and degradability

no data available

Bioaccumulative potential

Indication of bioaccumulation.

Mobility in soil

no data available

PBT and vPvB assessment

no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

13. DISPOSAL CONSIDERATIONS

Product

Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG

UN-Number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)
Marine pollutant: No

IATA

UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane)

15. REGULATORY INFORMATION

OSHA Hazards

Toxic by ingestion, Harmful by skin absorption., Possible carcinogen.

DSL Status

This product contains the following components that are not on the Canadian DSL nor NDSL lists.

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8
---	--------------------

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard

Massachusetts Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

Pennsylvania Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

New Jersey Right To Know Components

2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
---	--------------------	---------------

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. 2,2-bis(4-Chlorophenyl)-1,1-dichloro-ethane	CAS-No. 72-54-8	Revision Date
--	--------------------	---------------

16. OTHER INFORMATION

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

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Search

72-55-9 msds



MSDS 250,000+

MSDS : 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%
 CAS : 72-55-9
 SYNONYMS : p,p'-DDE ; ethylene,1,1-dichloro-2,2-bis-(p-chlorophenyl)- ; DDT dehydrochloride ; DDE; 1-1'-(Dichloroethenylidene)bis(4-chlorobenzene)

[MSDS Safety Sheet](#)

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AdChoices ▶

Catalog of Chemical Suppliers, Buyers, Custom Synthesis Companies And Equipment Manufacturers
 [2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% 72-55-9]

Suppliers:

Not Available

Buyers:

Not Available

[Sprayon® LU711 Lubricant](#) Because your environment demands a TRUE Industrial Lubricant Sprayon.com

[MSDS Safety Sheet](#) We Get Companys In Compliance & Keep Them There! Custom Catalogs www.MSDSCatalogService.com

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AdChoices ▶

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

```

+-----+-----+-----+-----+
| CAS# | Chemical Name | % | EINECS# |
|-----|-----|-----|-----|
| 72-55-9 | 2,2-Bis-(4-chlorophenyl)-1,1-dichloro | 99 | 200-784-6 |
| | ethylene | | |
+-----+-----+-----+-----+

```

Hazard Symbols: XN

Risk Phrases: 22 33

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Harmful if swallowed. Danger of cumulative effects. Cancer suspect agent. Possible risks of irreversible effects.

Potential Health Effects

Eye:
 May cause eye irritation.

Skin:
 May cause skin irritation.

Ingestion:
 May cause irritation of the digestive tract. May be harmful if swallowed. Ingestion of large amounts may cause liver and/or kidney damage.

Inhalation:
 May cause respiratory tract irritation.
 Chronic:
 May cause cancer according to animal studies. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin:
 Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion:
 If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:
 Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:
 Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.

Extinguishing Media:

For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Do not ingest or inhale. Use with adequate ventilation.

Storage:

Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

CAS# 72-55-9:

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Crystals

Color: white

Odor: None reported.

pH: Not available.

Vapor Pressure: 6.5106 mm Hg @ 20 C

Viscosity: Not available.

Boiling Point: 336 deg C

Freezing/Melting Point: 88.00 - 90.00 deg C

Autoignition Temperature: Not available.

Flash Point: Not available.

Explosion Limits, lower: Not available.

Explosion Limits, upper: Not available.

Decomposition Temperature:

Solubility in water: 0.010 ppm

Specific Gravity/Density:

Molecular Formula: C14H8Cl4

Molecular Weight: 318.02

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:

Stable under normal temperatures and pressures.

Conditions to Avoid:

Incompatible materials, dust generation, strong oxidants.

Incompatibilities with Other Materials:

Strong oxidizing agents - strong bases.

Hazardous Decomposition Products:

Hydrogen chloride, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:

CAS# 72-55-9: KV9450000

LD50/LC50:

CAS# 72-55-9: Oral, mouse: LD50 = 700 mg/kg; Oral, rat: LD50 = 880 mg/kg.

Carcinogenicity:

2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene -

California: carcinogen, initial date 1/1/89

Other:

See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:

Estimated BCF value = 8,300 based on water solubility. Estimated Koc value = 8,300. There was no movement of DDE reported in soil column mobility experiments.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

IATA

Not regulated as a hazardous material.

IMO

Not regulated as a hazardous material.

RID/ADR

Not regulated as a hazardous material.

USA RQ: CAS# 72-55-9: 1 lb final RQ; 0.454 kg final RQ

**** SECTION 15 - REGULATORY INFORMATION ****

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN

Risk Phrases:

R 22 Harmful if swallowed.

R 33 Danger of cumulative effects.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 72-55-9: 3

Canada

None of the chemicals in this product are listed on the DSL/NDSL list.

CAS# 72-55-9 is listed on Canada's Ingredient Disclosure List.

US FEDERAL

TSCA

CAS# 72-55-9 is not listed on the TSCA inventory.

It is for research and development use only.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/28/1998 Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

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ALL MSDS PAGES IN THIS GROUP

NAME	CAS
M-Benzyloxybenzyl Alcohol , 97%	1700-30-7
Octaphenylcyclotetrasiloxane, 98%	546-56-5
Cetylpyridinium chloride	123-03-5
3,4-Difluorophenol, 99%	2713-33-9
1-Benzyl-4-Hydroxypiperidine, 97%	4727-72-4
4-tert-Butylbenzoyl chloride	1710-98-1
Borane-morpholine complex, 97%	4856-95-5
Benzyl Ether, 99%	103-50-4
5-Amino-1-Naphthol (Pract)	83-55-6
Pyridinium-P-Toluenesulfonate 98%	24057-28-1
Pyrogallol Red, 98% (Titr.)	32638-88-3
Amberlite ira 416	9002-26-0
3-Methoxybenzotrile, 98%	1527-89-5
1-Adamantanemethanol, 99%	770-71-8
Inosine, 99%	58-63-9
Pentafluoropropionic Acid	422-64-0
Pyruvic Acid	127-17-3
Potassium hydrogen fluoride, 99+%	7789-29-9
Aluminum Nitride, 98% Particle Size <10 Micron	24304-00-5
Nickel(II) hydroxide, c.p., 60-61% Ni	12054-48-7
1-Adamantanamine sulfate, 99%	31377-23-8
S-(Thiobenzoyl)-Thioglycolic Acid, 97%	942-91-6
N,N-Dimethyl-P-Nitroaniline	100-23-2
Benzofuroxan	480-96-6
cis-2-Aminomethyl-1-cyclohexanol hydrochloride, 99%	24947-68-0
Silver Phosphate, 98% (Titr.)	7784-09-0

4-Cyano-4-Phenylpiperidine Hydrochloride, 99% (TLC)	51304-58-6
Methanesulfonamide	3144-09-0
gamma-Octanoic lactone, 98%	104-50-7
Cis,cis,cis-1,2,3,4-cyclopentane- tetracarboxylic dianhydride,	4802-47-5
Tetrachloroethylene Carbonate, 98+%	22432-68-4
Oxamic Acid, 98%	471-47-6
1O,11-Dihydro-5H-Dibenzo(A,D)-Cycloheptene, 98%	833-48-7
Thallium (I) Sulfate, 99.9+%	7446-18-6
N-(2,6-Dimethylphenylcarbamoyl-Methyl)-Iminodiacetic Acid, 99%	59160-29-1
P-(Dimethylamino)cinnamic Acid, 99%	1552-96-1
Biebrich Scarlet, 99% (UV-VIS)	4196-99-0
4-Chlorobenzenediazonium hexafluoro- phosphate	1582-27-0
Ammonium hexachloroiridate(IV), 99.99%	16940-92-4
Methylamine-d2 deuteriochloride, 98+ atom % D	593-51-1
2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%	72-55-9
Nitro red	56431-61-9
Methyl 2,3-dichlorobenzoate, 98+%	2905-54-6
Isopropyl Bromoacetate, 98% (GC)	29921-57-1
1-Iodo-4-Nitrobenzene, 99%	636-98-6
4-Ethylcyclohexanol, 99% cis/trans mixture	4534-74-1
Fluorescamine	38183-12-9
Tris(2,2,6,6-Tetramethyl-3,5-Heptanedionato)Dysprosium(III), 99+%	15522-69-7
3-Amino-2,2,5,5-Tetramethyl-1-Pyrrolidinylxy, 99% (Titr.)	34272-83-8
3,4-Dihydroxyphenylacetic Acid,98%	102-32-9

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APPENDIX D
HOSPITAL INFORMATION AND MAP
FIELD ACCIDENT REPORT

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME _____ PROJECT. NO. _____

Date of Accident _____ Time _____ Report By _____

Type of Accident (Check One):

Vehicular Personal Property

Name of Injured _____ DOB or Age _____

How Long Employed _____

Names of Witnesses _____

Description of Accident _____

Action Taken _____

Did the Injured Lose Any Time? _____ How Much (Days/Hrs.)? _____

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? _____

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claim through his/her Health and Welfare Fund.)

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

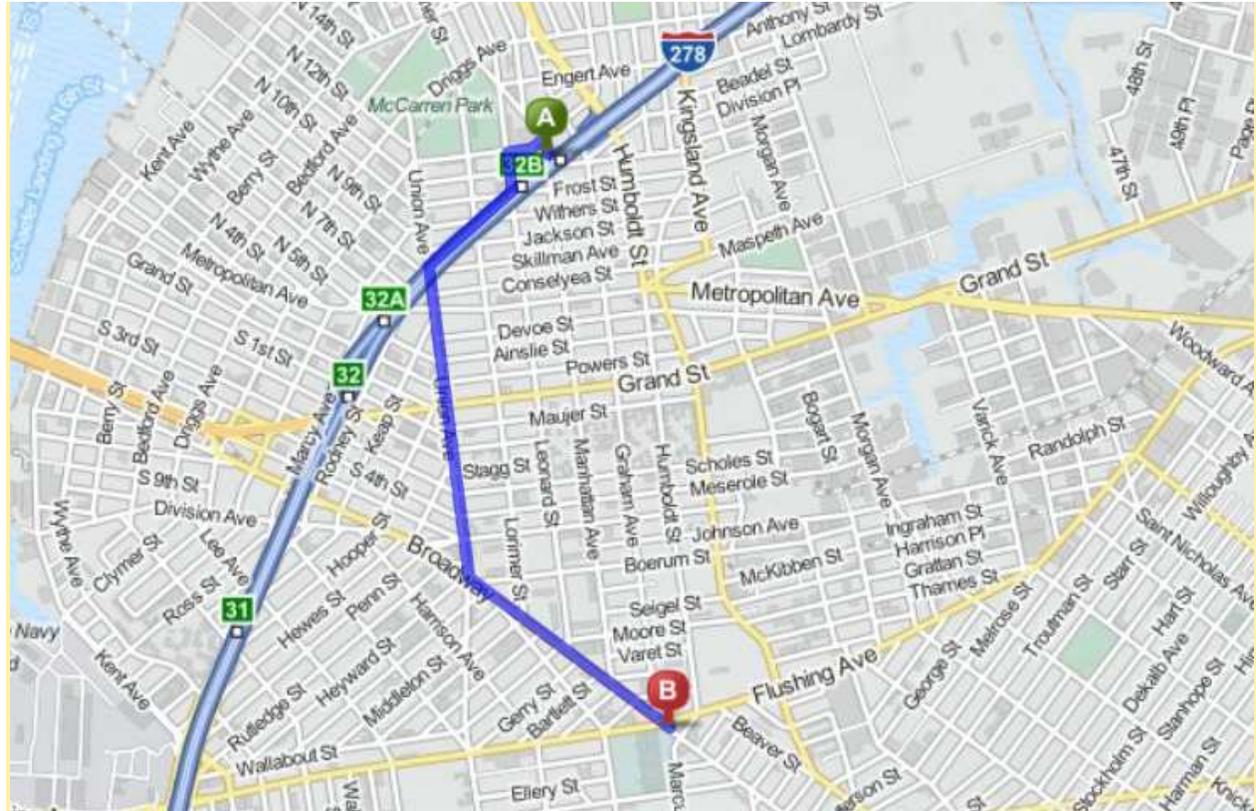
The BROOKLYN HOSPITAL CENTER

WOODHULL MEDICAL CENTER

760 Broadway Brooklyn, New York 11206

718-963-8000

1.7 Miles – About 6 Minutes



START: 417 Manhattan Avenue, Brooklyn, NY 11221

1. Head north on Manhattan Avenue on Bayard Street
2. Turn first left onto Bayard Street
3. Turn left onto Leonard Street
4. Turn right onto Meeker Avenue
5. Turn slight left onto Union Avenue
6. Turn slight left onto Broadway
7. Your destination on Broadway is on the right (*if you reach Marcus Garvey Blvd you've gone too far*)

HOSPITAL: 760 Broadway, Brooklyn, NY 11206

ATTACHMENT F
***Waterproofing Membrane/
Vapor Barrier Specifications***

PREPRUFE® 300R & 160R

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

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:

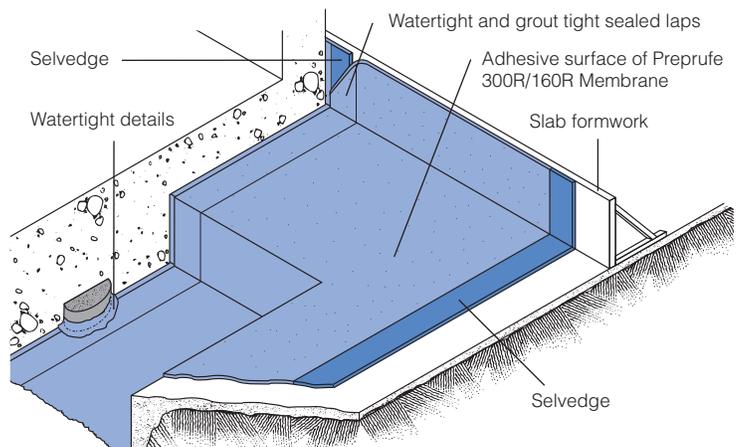
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe 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 selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

All surfaces—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 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 selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

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 selvedge 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 selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe 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

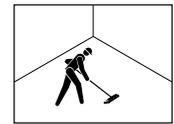


Figure 2

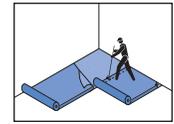
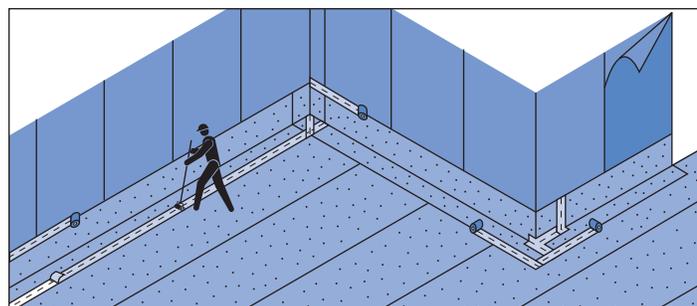
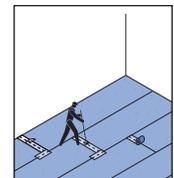


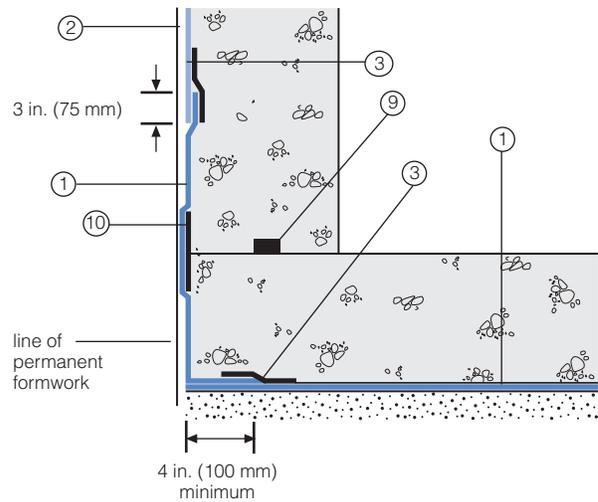
Figure 3



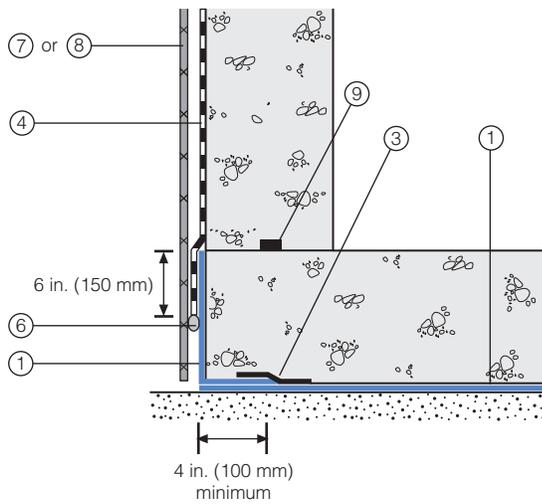
Detail Drawings

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).

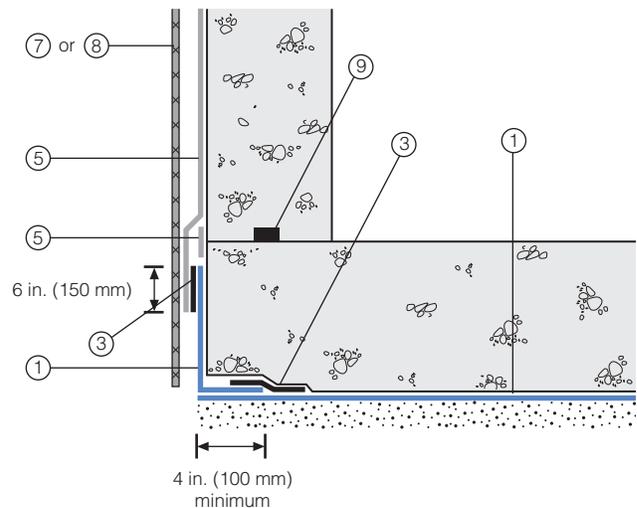
Wall base detail against permanent shutter



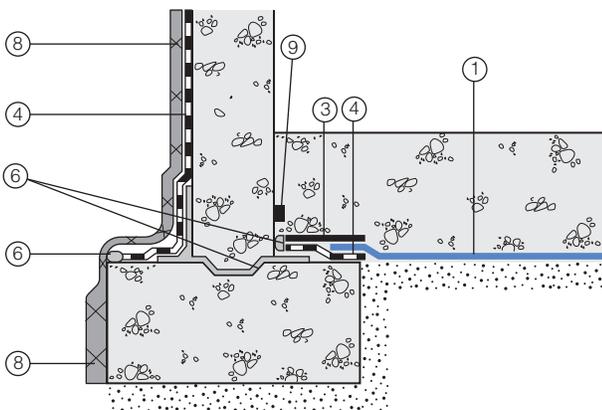
Bituthene wall base detail (Option 1)



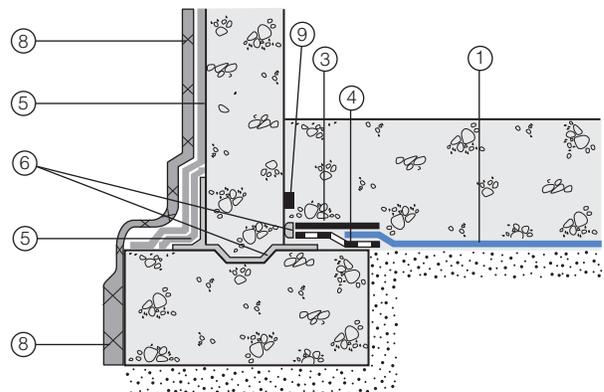
Procor wall base detail (Option 1)



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)

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