4202 18TH AVENUE

BROOKLYN, NEW YORK

Remedial Action Work Plan

NYC VCP Number: 15CVCP108K
E-Designation Site Number: 14EHAZ319K

Prepared for:
AIG Builders
1422 58 Street
Brooklyn NY 11219

Prepared by:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS

1808 Middle Country Road
Ridge, NY 11961

MARCH 2015

REMEDIAL ACTION WORK PLAN
TABLE OF CONTENTS

LIST OF ACRONYMS

CERTIFICATION

EXECUTIVE SUMMARY i

COMMUNITY PROTECTION STATEMENT ..... A

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 7

3.0 REMEDIAL ALTERNATIVES ANALYSIS 8

3.1 Threshold Criteria 10

3.2. Balancing Criteria 11

4.0 REMEDIAL ACTION 18

4.1 Summary of Preferred Remedial Action 18

4.2 Soil Cleanup Objectives and Soil/Fill Management 20

4.3 Engineering Controls 24

4.4 Institutional Controls 25

4.5 Site Management Plan 26

4.6 Qualitative Human Health Exposure Assessment 27

5.0 REMEDIAL ACTION MANAGEMENT 32

5.1 Project Organization and Oversight 32

5.2 Site Security 32

5.3 Work Hours 32

5.4 Construction Health and Safety Plan 32

5.5 Community Air Monitoring Plan 33

5.6 Agency Approvals 35
5.7 Site Preparation 35
5.8 Traffic Control 39
5.9 Demobilization 40
5.10 Reporting and Record Keeping 40
5.11 Complaint Management 41
5.12 Deviations from the Remedial Action Work Plan 41
6.0 REMEDIAL ACTION REPORT 42
7.0 SCHEDULE 44

TABLES

Table 1 Imported Backfill and Clean Soil Limits

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 Vapor Barrier Plan
Figure 8 Truck Route Map

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 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 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, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the Redevelopment Site located at 4202 18th Avenue, Brooklyn, NY, Site number 14HAZ319K and NYC VCP number 15CVCP108K.

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

_____

Name

_____

NYS PE License Number

_____

Signature

_____

Date

PE Stamp

EXECUTIVE SUMMARY

AIG Builders has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 4,240 -ft^2 Site located at 4202 18th Avenue in the Mapleton 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 4202 18th Avenue in the Mapleton section of Brooklyn, New York, and is currently identified as Block 5409, Lot 30 on the New York City Tax Map. Figure 1 shows the Site location. Lot 30 is a rectangular shaped lot consisting of 43.67 feet of street frontage on 18th Avenue and 97.02 feet of street frontage on East 3rd Street for a total of approximately 4,240 ft^2. The Site is located on the west side of 18th Avenue and the north side of East 3rd Street and is bordered by a 1 & 2 family residential building to the north (814 East 3rd Street), 18th Avenue followed by several 1 & 2 family residential buildings to the south (4131-4205 18th Avenue), a 2-story office building to the west (4208 18th Avenue), and East 3rd Street followed by a grocery store to the east (4102 18th Avenue). A map of the site boundary is shown on Figure 2.

The Site currently is developed with an auto sale and repair shop which occupies the northwest corner of the Site. The remainder of the Site is a paved parking area.

Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of developing the lot with a new 4-story apartment building with a full cellar level. The cellar will contain tenant storage spaces, two laundry rooms, mechanical rooms, stairwells, and two bathrooms. The first floor will consist of two apartments, and a residential vestibule and staircases. The second, third and fourth floors will consist of apartments.

The building and cellar footprint will encompass 3,367 sf of the site and require the excavation to a depth of approximately 7 feet below grade. An estimated 873 cubic yards (1,309 tons) of soil will require excavation for the new building's cellar. The remaining 873 sf of the Site (the first 5 ft fronting East 3rd Street) will not require excavation and will feature concrete porches, stairs and landscaped areas.

Layout of the redevelopment plans for the cellar and first floors are presented in Figure 3. The current zoning designation is 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.

Summary of Environmental Findings

1. The elevation of the Site is approximately 47 feet.
2. Depth to groundwater is estimated to be approximately 42 feet below sidewalk grade.
3. Groundwater flow is generally southwest.
4. Depth to bedrock is at the Site is greater than 100 feet.
5. The stratigraphy of the Site consists of historic fill material to depths as great as 3 feet, underlain by native brown sand.
6. Soil/fill samples results were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (Track 1) and Restricted Residential Use Soil Cleanup Objectives (Track 2) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill results showed no PCBs and trace concentrations of several VOCs, but none above Unrestricted Use SOCs. One VOC, methylene chloride was detected above Unrestricted Use SCOs in trip blank. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benz(a)anthracene (max. of 3,200 µg/kg), benzo(a)pyrene (max. of 2,700 µg/kg), benzo(b)fluoranthene (max. of 3,300 µg/kg) and dibenz(a,h)anthracene (max. of 360 µg/kg), exceeding Restricted Residential Use SCOs within one of the three shallow soil samples. Several metals including chromium (max of 41.4 mg/kg) in one of nine samples,

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

lead (max. of 114 mg/kg) in one of nine samples, and nickel (max. of 75.2 mg/kg) in four of nine samples exceeded Unrestricted Use SCOs. No metals exceeded Restricted Residential use SCOs. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.

7. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater results showed no PCBs or pesticides in any sample. Several VOCs exceeded their GQSs in first round of groundwater sampling. During groundwater re-sampling, trace concentrations of several VOCs were detected, but none exceeded their GQS. Several metals were identified in groundwater, but only iron (max. of 0.88 mg/L), manganese (1.5 mg/L), and sodium (max. of 68.9 mg/L) exceeded their respective GQS.

8. Soil vapor results collected during the RI were compared to the compounds listed in Vapor Intrusion Matrices in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006. Soil vapor samples collected during the RI showed moderate levels of petroleum-related VOCs and low levels of chlorinated VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from 49.5 $\mu g/m^3$ to 88.72 $\mu g/m^3$. Highest concentrations were detected for acetone (max. of 337 $\mu g/m^3$). The chlorinated VOCs, trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA) were detected in two of the four soil gas samples at a maximum concentration of 0 1.25 $\mu g/m^3$ and 9.87 $\mu g/m^3$, respectively. Tetrachloroethylene (PCE) was detected in all four soil gas samples with a maximum concentration of 6.35 $\mu g/m^3$ and carbon tetrachloride was detected in all samples with a maximum concentration of 0.69 $\mu g/m^3$. Concentrations of the chlorinated VOCs were below the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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, 3,367 sf of the Site will require excavation to a depth of approximately 7 feet below grade for the building cellar level. Approximately 1,309 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. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
15. Placement of demarcation layer in the unexcavated/landscaped areas.
16. Installation of a 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 the VaporBlock 20 Plus system as manufactured by Ravens Industries or equivalent system.
17. Construction and maintenance of an engineered composite cover consisting of the 4 inch thick concrete cellar slab beneath the building and a 2 ft clean soil cover in exposed areas along East 3rd Street to prevent human exposure to residual soil/fill remaining under the Site.
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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

Construction 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 CHASP. 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, Sarah Pong (212) 442-8342.

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, Mr. Kimberly Somers (EBC) at (631) 504-6000, the NYC Office of Environmental Remediation Project Manager, Sarah Pong at (212) 442-8342, 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 OER's website.

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

AIG Builders has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 4202 18th Avenue in the Mapleton 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 4202 18th Avenue in the Mapleton section of Brooklyn, New York, and is currently identified as Block 5409, Lot 30 on the New York City Tax Map. Figure 1 shows the Site location. Lot 30 is a rectangular shaped lot consisting of 43.67 feet of street frontage on 18th Avenue and 97.02 feet of street frontage on East 3rd Street for a total of approximately 4,240 ft^2. The Site is located on the west side of 18th Avenue and the north side of East 3rd Street and is bordered by a 1 & 2 family residential building to the north (814 East 3rd Street), 18th Avenue followed by several 1 & 2 family residential buildings to the south (4131-4205 18th Avenue), a 2-story office building to the west (4208 18th Avenue), and East 3rd Street followed by a grocery store to the east (4102 18th Avenue). A map of the site boundary is shown on Figure 2.

The Site currently is developed with an auto sale and repair shop which occupies the northwest corner of the Site. The remainder of the Site is a paved parking area.

1.2 Proposed Redevelopment Plan

The proposed future use of the Site will consist of developing the lot with a new 4-story apartment building with a full cellar level.

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PH: 631.504.6000
FAX: 631.928.2780

The cellar will contain 10 individual storage spaces for the apartments above, as well as two accessory cellars to the apartments above on the 1st floor, two laundry rooms, mechanical rooms, stairwells, and two bathrooms. The first floor will be approximately 4 feet above sidewalk grade and will consist of two apartments, and the residential vestibule and staircases. The second, third and fourth floors will consist of apartments.

The cellar will require excavation of 69% of the lot to a depth of approximately 7 feet below grade. An estimated 873 cubic yards (1,309 tons) of soil will require excavation for the new building's cellar. The remaining 873 sf of the Site (the first 5 ft fronting East 3rd Street) will not be excavated and will feature concrete porches, stairs and landscaped areas.

Layout of the redevelopment plans for the cellar and first floor are presented in Figure 3. The current zoning designation is 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 immediately surrounding Site consists of multi-family walk-ups to the south and north, an office building and restaurant to the west, and a grocery store to the east. 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. P.S. K134 is located approximately 500 feet northeast of the Site. No other schools, hospitals or daycare facilities are located within a 500 ft radius of the Site.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

Surrounding Property Usage

Direction	Property Description
North – *Adjacent Property*	Block 5409, Lot 27- 814 East 3rd Street A 5,200 ft^2 lot developed with a residential 1 & 2 family building.
South – *Across 18th Avenue*	Block 5416, Lots 18, 20 and 21 - 4133-4205 18th Avenue A 3,656 ft^2 lot with a mixed use residential and commercial building (4205 18th Avenue), and two 2,531 ft^2 lots, each with a residential 1 & 2 family building (4203 and 4133 18th Avenue).
East – *Across East 3rd Street*	Block 5410, Lot 1 - 4102 18th Avenue A 25,800 ft^2 commercial lot currently occupied by a grocery store.
West – *Adjacent property*	Block 5409, Lot 25 - 4208 18th Avenue A 2,370 ft^2 lot developed with a two-story office building.

1.4 Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called "*Remedial Investigation Report, 4202 18th Avenue, Brooklyn, NY*", dated March 2015 (RIR).

Summary of Past Uses of Site and Areas of Concern

A Phase I Screening was completed by EBC in 2015. The following Site history was established based on historic Sanborn maps: The Site was developed in 1929 with a 1-story building occupied by a filling station with three gasoline storage tanks located in the south end of the lot. From 1950 to 1993, the Site contained three USTs and the 1-story building had expanded towards the northern side of the Site. The building was occupied by an office, auto repair garage, a greasing garage, and an auto laundry garage. In 1994, the USTs were no longer shown on the maps and the building was listed as an auto repair shop. The site remained in this configuration until at least 2007.

The property was assigned an E-designation (E-44) for Hazmat during the Ocean Parkway District Rezoning completed by the City in August 1993 (CEQR 93DCP013K).

A Geophysical Report was completed by GeoSeek LLC (Pine Beach, NJ) in November 2012. The investigation concluded that there were at least 8 underground storage tanks present on Site, as well as a possible oil water separator in the existing building. A former pump island, two vent

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

pipes, and two fill ports were also noted on Site. A Phase II Subsurface Investigation Report was completed by Peak Environmental, Inc. (Woodbridge, NJ) in January 2013. Results of the Phase II Investigation showed elevated concentrations of BTEX VOCs in soils near the former gasoline pump island, indicative of gasoline contamination, resulting in NYS DEC Spill Case No. 1215784 being assigned for the Site. In August 2014, an Underground Storage Tank Closure Report was prepared for the Site by Peak Environmental, Inc. (Woodbridge, NJ). The report documents the removal of eight previously closed in-place USTs ranging from 275 gallons to 2,000 gallons in capacity as well as the remote fill piping located beneath the sidewalk. Petroleum impact soils were removed and excavated areas backfilled to grade with clean fill. The report concluded that a No Further Action be proposed relating to the Spill Case associated with this Site. A Spill Closure letter was issued by NYSDEC for Spill No. 1215784 on August 22, 2014.

Areas of Concern (AOCs) identified for the Site include:

1. The presence of historic fill material to depths as great as 3 feet.
2. The historic usage of the Site is an auto repair shop, greasing garage, auto laundry garage and filling station.
3. The Site is identified as being assigned an E-designation (E-44) for Hazmat as part of the Ocean Parkway District Rezoning completed by the City in August 1993 (CEQR 93DCP013K).

Summary of the Work Performed under the Remedial Investigation

EBC performed the following scope of work at the Site in December of 2014, and January and February of 2015:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed 4 soil borings across the Site, and collected 9 soil for chemical analysis from the soil borings to evaluate soil quality;

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

3. Installed 3 groundwater monitoring wells throughout the Site and collected 3 groundwater samples and one duplicate groundwater sample for chemical analysis to evaluate groundwater quality; and
4. Installed 2 sub-slab soil gas implants and 2 soil vapor probes across the Site and collected 4 samples for chemical analysis.

Summary of Environmental Findings

1. The elevation of the Site is approximately 47 feet.
2. Depth to groundwater is estimated to be approximately 42 feet below sidewalk grade.
3. Regional groundwater flow is generally southwest.
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 historic fill material to depths as great as 4 feet, underlain by native brown sand.
6. Soil/fill samples results were compared to NYSDEC Unrestricted Use Soil Cleanup Objectives (Track 1) and Restricted Residential Use Soil Cleanup Objectives (Track 2) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill results showed no PCBs and trace concentrations of several VOCs, but none above Unrestricted Use SOCs. One VOC, methylene chloride was detected above Unrestricted Use SCOs in trip blank. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benz(a)anthracene (max. of 3,200 µg/kg), benzo(a)pyrene (max. of 2,700 µg/kg), benzo(b)fluoranthene (max. of 3,300 µg/kg) and dibenz(a,h)anthracene (max. of 360 µg/kg), exceeding Restricted Residential Use SCOs within one of the three shallow soil samples. Several metals including chromium (max of 41.4 mg/kg) in one of nine samples, lead (max. of 114 mg/kg) in one of nine samples, and nickel (max. of 75.2 mg/kg) in four of nine samples exceeded Unrestricted Use SCOs. No metals exceeded Restricted Residential use SCOs. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.
7. Groundwater samples results were compared to the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (GQS) for Class GA (drinking water). Groundwater results showed no PCBs or pesticides in any sample.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

Several VOCs exceeded their GQSs in first round of groundwater sampling. During groundwater resampling, trace concentrations of several VOCs were detected, but none exceeded their GQS. Several metals were identified in groundwater, but only iron (max. of 0.88 mg/L), manganese (1.5 mg/L), and sodium (max. of 68.9 mg/L) exceeded their respective GQS.

8. Soil vapor samples collected during the 2014 EBC RI were compared to the New York State Department of Health (NYSDOH) Final Guidance on Soil Vapor Intrusion (October 2006) Matrix 1 and Matrix 2 values. Soil vapor samples collected during the RI showed moderate levels of petroleum-related VOCs and low levels of chlorinated VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from 49.5 µg/m3 to 88.72 µg/m3. Highest concentrations were detected for acetone (max. of 337 µg/m3). The chlorinated VOCs, trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA) were detected in two of the four soil gas samples at a maximum concentration of 0 1.25 µg/m3 and 9.87 µg/m3 respectively. Tetrachloroethylene (PCE) was detected in all four soil gas samples with a maximum concentration of 6.35 µg/m3 and carbon tetrachloride was detected in all samples with a maximum concentration of 0.69 µg/m3. Concentrations of the chlorinated VOCs were below the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

2.0 REMEDIAL ACTION OBJECTIVES

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

Groundwater

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

Soil

- Prevent direct contact with contaminated soil.
- Prevent migration of contaminants that would result in groundwater contamination.

Soil Vapor

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process under is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). 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 alternative analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 Unrestricted Use 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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, but installation of a vapor barrier 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 Site-Specific (Track 4) 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 7 feet below grade across 69% 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

- 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 cellar 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 alternative to achieve applicable standards, criteria and guidance.

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Groundwater Protection Standards. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system below the new building's cellar 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 to meet Track 4 Site-Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system below the new building's cellar slab and continuing the vapor barrier around foundation walls, as well as a final engineered composite cover over the entire Site. 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. All potential sources for groundwater contamination would be removed as part of the remedial action via soil excavation and removal of any buried tanks, etc. identified as part of the development project. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 would potentially be higher for Alternative 1 due to excavation of greater amounts of historical fill material in the landscaped area along East 3rd Street. 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 53, 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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. Removal of on-Site contaminant sources would prevent potential for future groundwater contamination. Installation of a vapor barrier below the new building's basement slab and up along foundation walls, as part of construction, would prevent potential future migration of soil vapors into the new building

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 thus permanently eliminating the toxicity, mobility, and volume of contaminants, and any remaining on-Site soil beneath the new building and the 5 ft setback along East 3rd Street will meet Track 4 - Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on-Site.

The removal of soil across 69% of the Site to approximately 7 feet for the new development in both scenarios would probably result in relatively minor differences between these two alternatives. All potential sources for groundwater contamination would be removed as part of the remedial action via soil excavation and removal of any tanks, etc. identified as part of the development project.

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

Since historic fill at the Site was only found during the RI to extend to a depth of up to 4 feet below grade, and the new building requires excavation of 69% of the Site to a depth of approximately 7 feet, the costs associated with both Alternative 1 would be significantly higher because of additional excavations required in the 5ft setback along East 3rd Street to achieve Track 1 Unrestricted Use SCOs. Additional long-term costs would be required for Alternative 2 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 import 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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, 69% of the Site will require excavation to a depth of approximately 7 feet below grade for the building cellar level. Approximately 1,309 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 four 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. Installation of a 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 Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins.
14. Construction and maintenance of an engineered composite cover consisting of the 4 inch thick concrete cellar slab, and the addition of two feet of clean soil cover in the unexcavated and uncapped portions along East 3rd Street to prevent human exposure to residual soil/fill remaining under the Site.
15. Placement of demarcation layer in the unexcavated/side landscaped areas.
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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 SCOs for this Site are listed in the 6NYCRR Part 375, Table 6.8(b) Restricted Residential Use SCOs as amended by the following Site-Specific SCOs:

Contaminant	Track 4 SCOs
SVOCs	250 ppm

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

No over-excavation beyond the development cut is anticipated. If any hot-spot areas are identified during development and remediation at the Site, they 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated and disposed off-Site is 1309 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 are identified) 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 $4^{o}C$.

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 with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Prepare field blanks by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. 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 0tons. The estimated quantity of

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

on-Site soil/fill expected to be reused/relocated on Site is 50 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 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 4 inch thick concrete cellar slab and 2 feet of clean soil cover in exposed areas along the set back fronting East 3rd Street.

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.

Vapor Barrier

Migration of potential soil vapor from on-Site or off-Site in the future will be mitigated with a vapor barrier. The vapor barrier will consist of Raven Industries' VaporBlock 20 Plus, which is a seven layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins. The vapor barrier will be installed prior to pouring the building's concrete slab. The vapor barrier will extend throughout the area occupied by the footprint of the new buildings 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 vapor barrier seam, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 vapor barrier. The extent of the proposed 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 manufacturers 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 at 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted annually and will comply with RCNY §43-1407(l)(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; and
- 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) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) 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 30 of the year following the reporting period.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 chromium, lead and nickel exceeding Unrestricted Use SCOs; and
- SVOCs (PAH compounds) including benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeding Restricted Residential SCOs.

<u>Groundwater</u>

- VOCs, including 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 2-isopropyltoluene,

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

acetone, carbon disulfide, chloroform, chloromethane, ethylbenzene, isopropylbenzene, m&p-xylenes, methyl ethyl ketone, naphthalene, n-butylbenzene, n-propylbenzene, o-xylene, p-isopropyltoluene, sec-butylbenzene, tetrachloroethene, toluene, and trichloroethene exceeding their respective Groundwater Quality Standards. These compounds were not detected in resampled groundwater;

- SVOCs including polycyclic aromatic hydrocarbons (PAHs) benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, and indeno(1,2,3-cd)pyrene exceeding GQS; and
- Metals, including iron, manganese, and sodium (dissolved) exceeding their respective GQS.

Soil Vapor

- Petroleum-related VOCs including BTEX were detected at low concentrations; and
- Chlorinated VOCs, including carbon tetrachloride, trichloroethene (TCE), and tetrachloroethene (PCE) were all at concentrations well below NYSDOH monitoring thresholds.

Nature, Extent, Fate and Transport of Contaminants

SVOCs and metals are present in the historic fill materials to depths of 2-3 feet below grade. None of the SVOCs detected in soil were detected above GQS in groundwater. No chlorinated VOCs were detected in on-Site soil above Unrestricted Use SCOs, and no chlorinated VOCs were detected above GQS in groundwater.

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 pathway 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

Existence of Human Health Exposure

Current Conditions: A potential for exposure to surficial historic fill exists under current conditions but is limited due to 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 and there is no potential for exposure. 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

Receptor Populations

On-Site Receptors - The Site is currently developed with a 1-story commercial auto repair shop. The property is vacant, and the remainder of the site covered in asphalt. Current receptor populations are trespassers and site representatives. 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 potential complete exposure pathways (i.e., source, route to exposure, receptor population) for the current Site condition. There is a potential complete, exposure pathway that requires mitigation during implementation of the remedy. Under current conditions, on-Site exposure pathways exist for Site personnel and trespassers. 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. There is no complete exposure pathway under future conditions after the Site is developed. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill, as all soil above Track 4 Site Specific SCOs will have been removed and a vapor barrier system will have been installed as part of development. The vapor barrier system will prevent potential vapor intrusion. The composite cover system and use restrictions will prevent contact with residual soil or groundwater and continued protection after the remedial action will be achieved

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

by the implementation of site management including periodic inspection and certification of the performance of remedial controls. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened. This assessment takes into consideration the reasonably anticipated use of the Site, which includes a residential structure, site-wide impervious surface cover cap, and a vapor barrier for the building.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 E. 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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. Exceedances 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 mcg/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 mcg/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 mcg/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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 incompliance 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 42 feet below grade and excavation to a depth of approximately 7 feet is anticipated; therefore, dewatering of groundwater during construction will not be necessary.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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; lose materials will be secured

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 by 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 is shown on Figure 8.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 project at 4202 18th Avenue, Brooklyn, NY, NYC VCP Site number TBD.

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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	6
Demobilization	8	1
Submit Remedial Action Report	15	-

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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
Acenapthylene	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[f]
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.

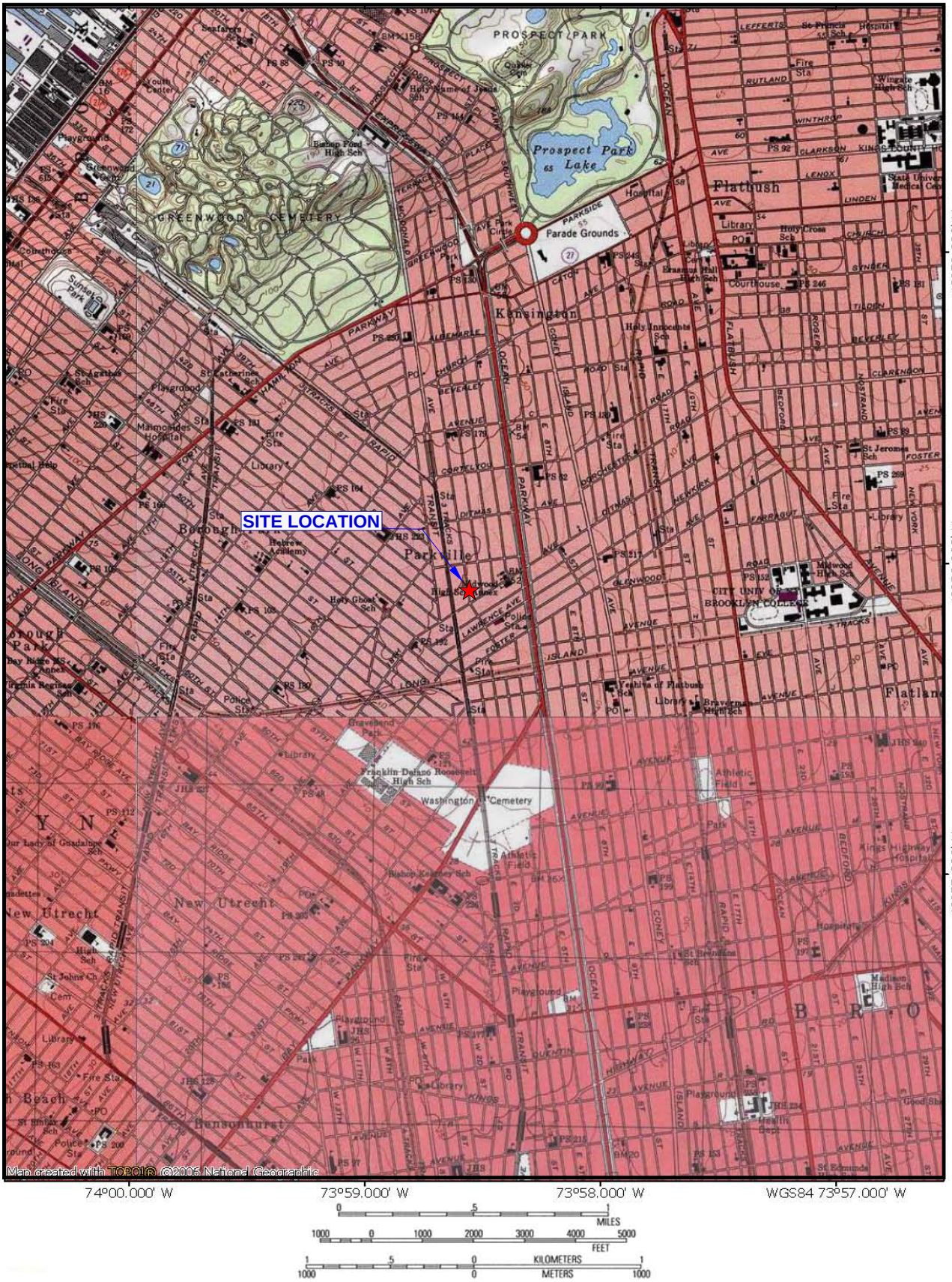
b The SCOs for commercial use were capped at a maximum value of 500 ppm. See TSD section 9.3.

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

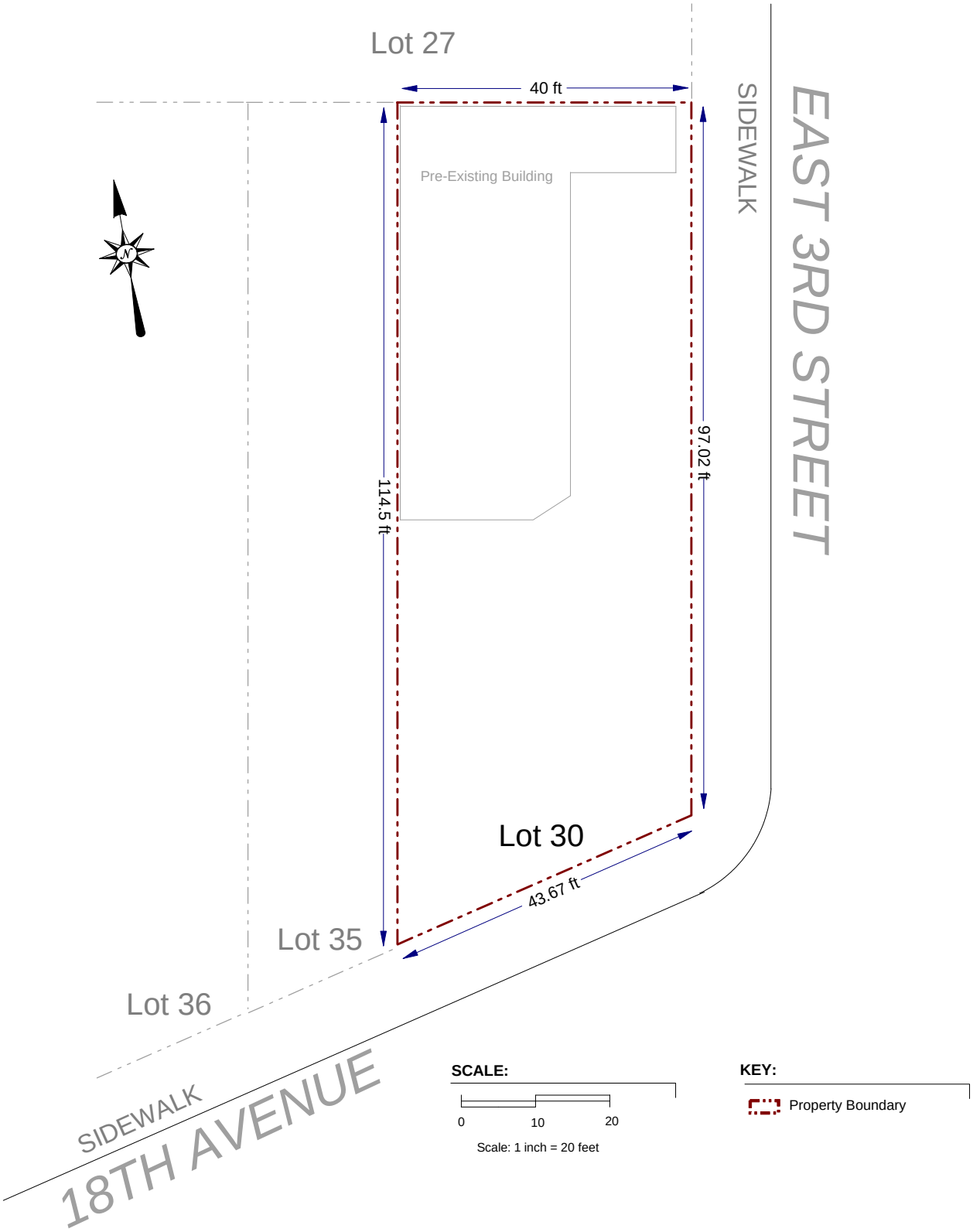


USGS Central Park, NY Quadrangle 1995, Contour Interval = 10 feet

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

4202 18TH AVENUE, BROOKLYN, NY

FIGURE 1 SITE LOCATION MAP

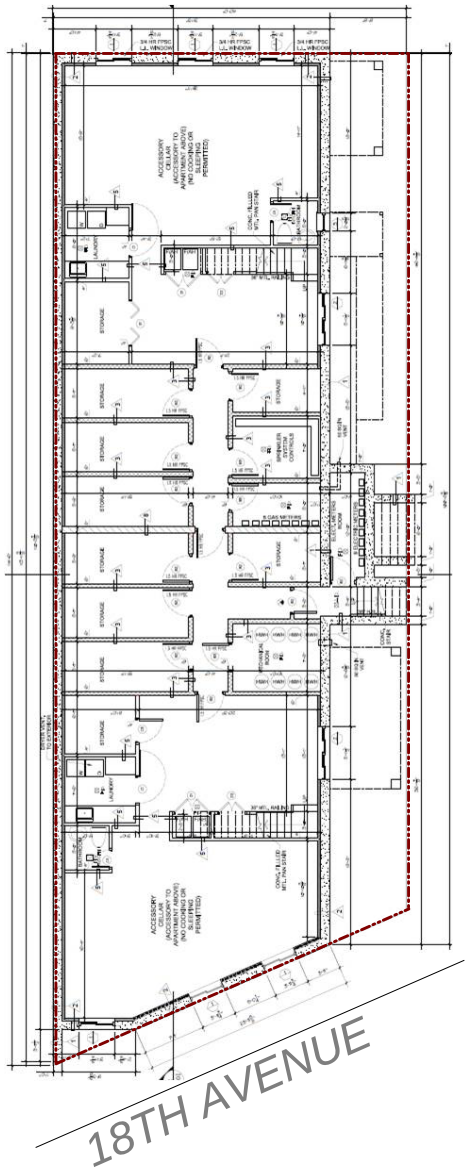


EBC
Environmental Business Consultants
Phone 631.504.6000
Fax 631. 924 .2870

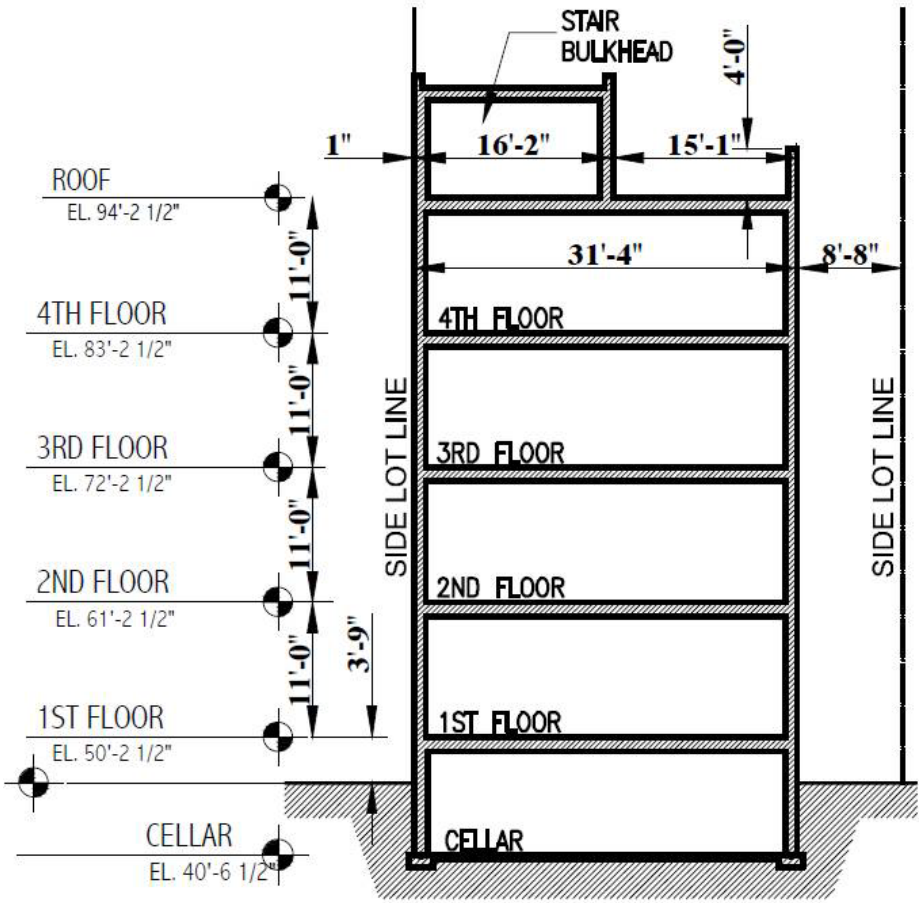
Figure No. 2

Site Name: Redevelopment Project
Site Address: 4202 18th Avenue, Brooklyn, NY
Drawing Title: Site Boundary Map

CELLAR PLANS



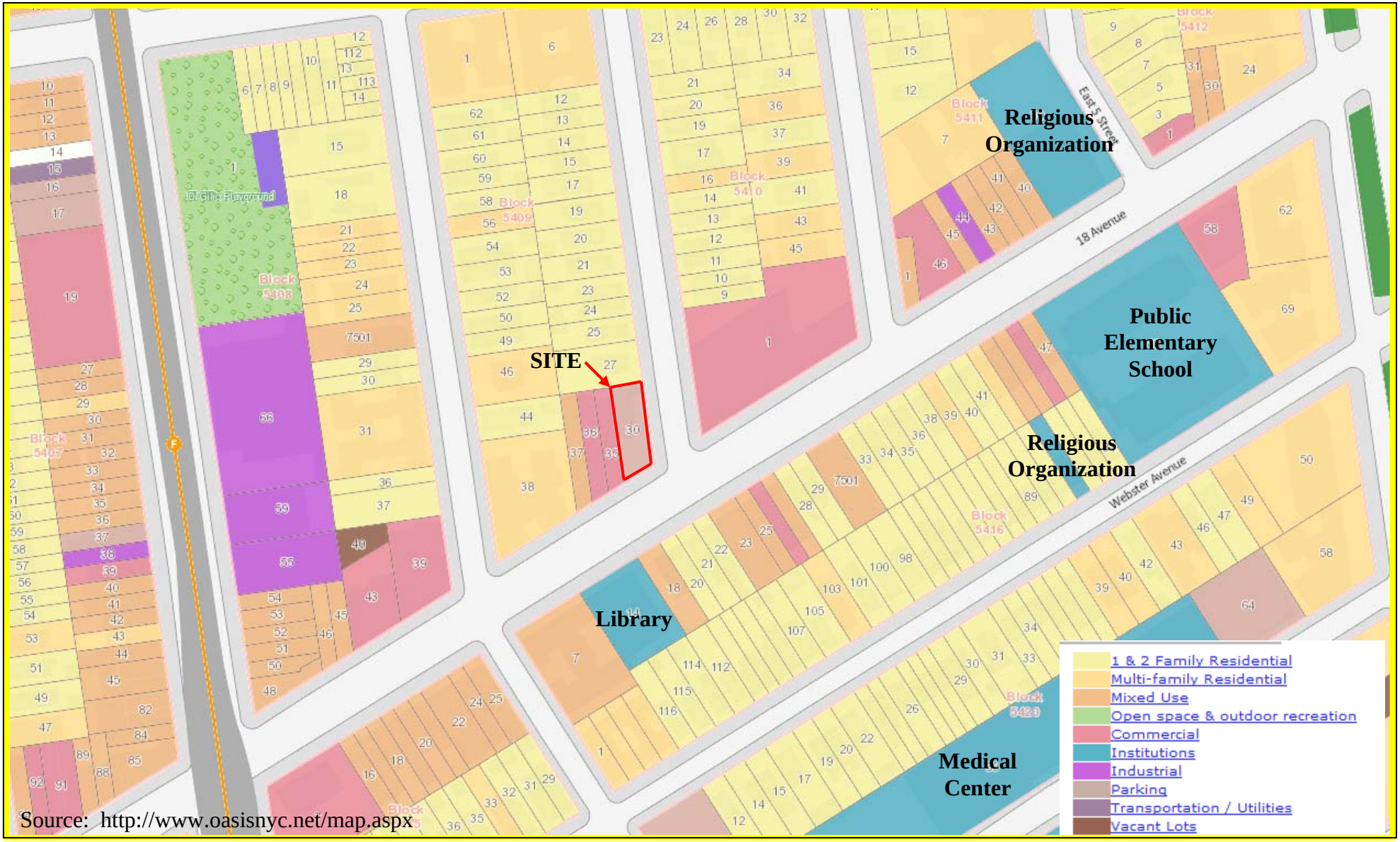
FRONT ELEVATION



EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631. 924 .2870

4202 18TH AVENUE
BROOKLYN, NY 11218

FIGURE 3 REDEVELOPMENT PLANS



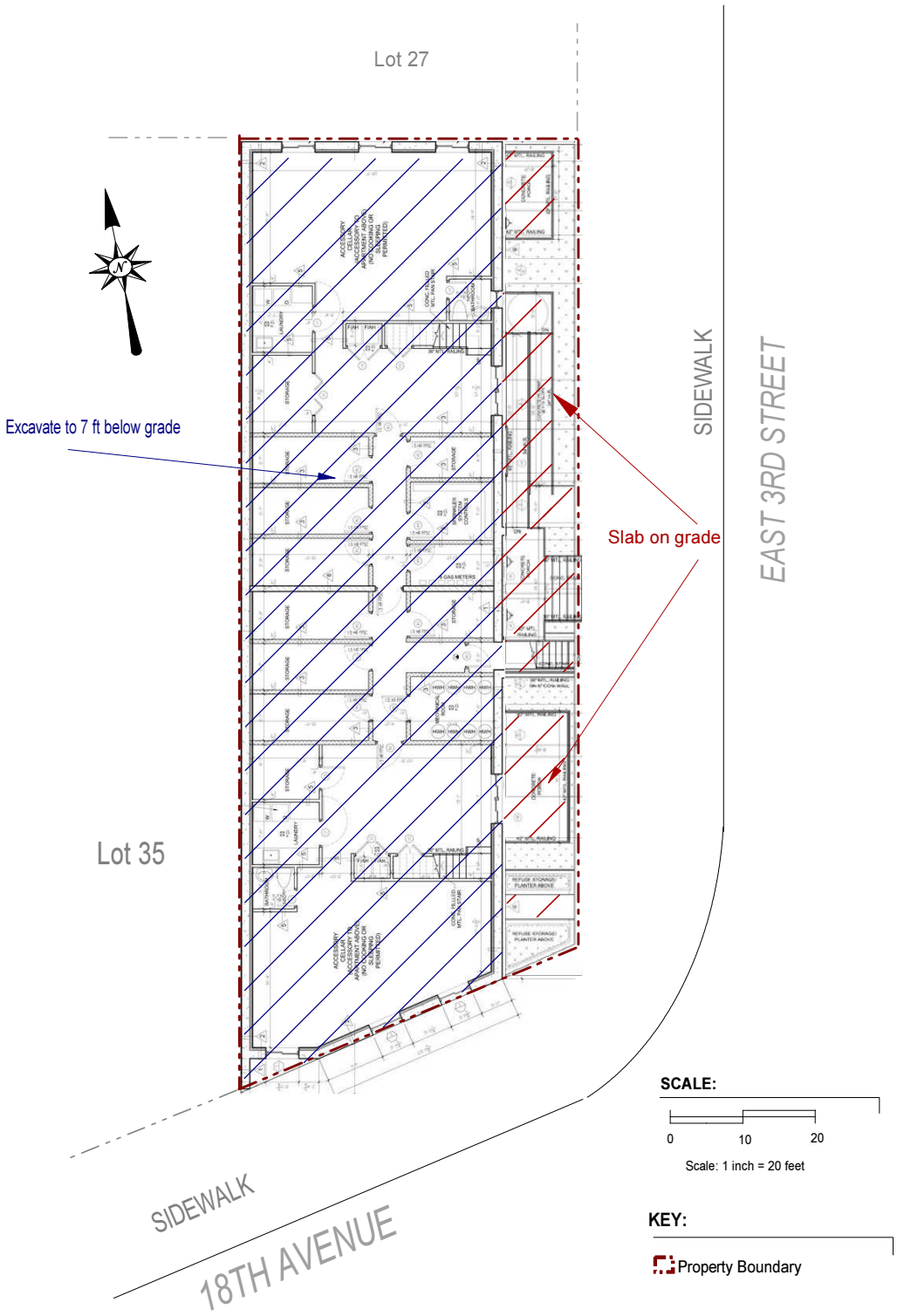
Source: http://www.oasisnyc.net/map.aspx

FIGURE 4
SURROUNDING LAND USE MAP

4202 18th AVENUE, BROOKLYN NY 11218

HAZARDOUS MATERIALS REMEDIAL INVESTIGATION REPORT

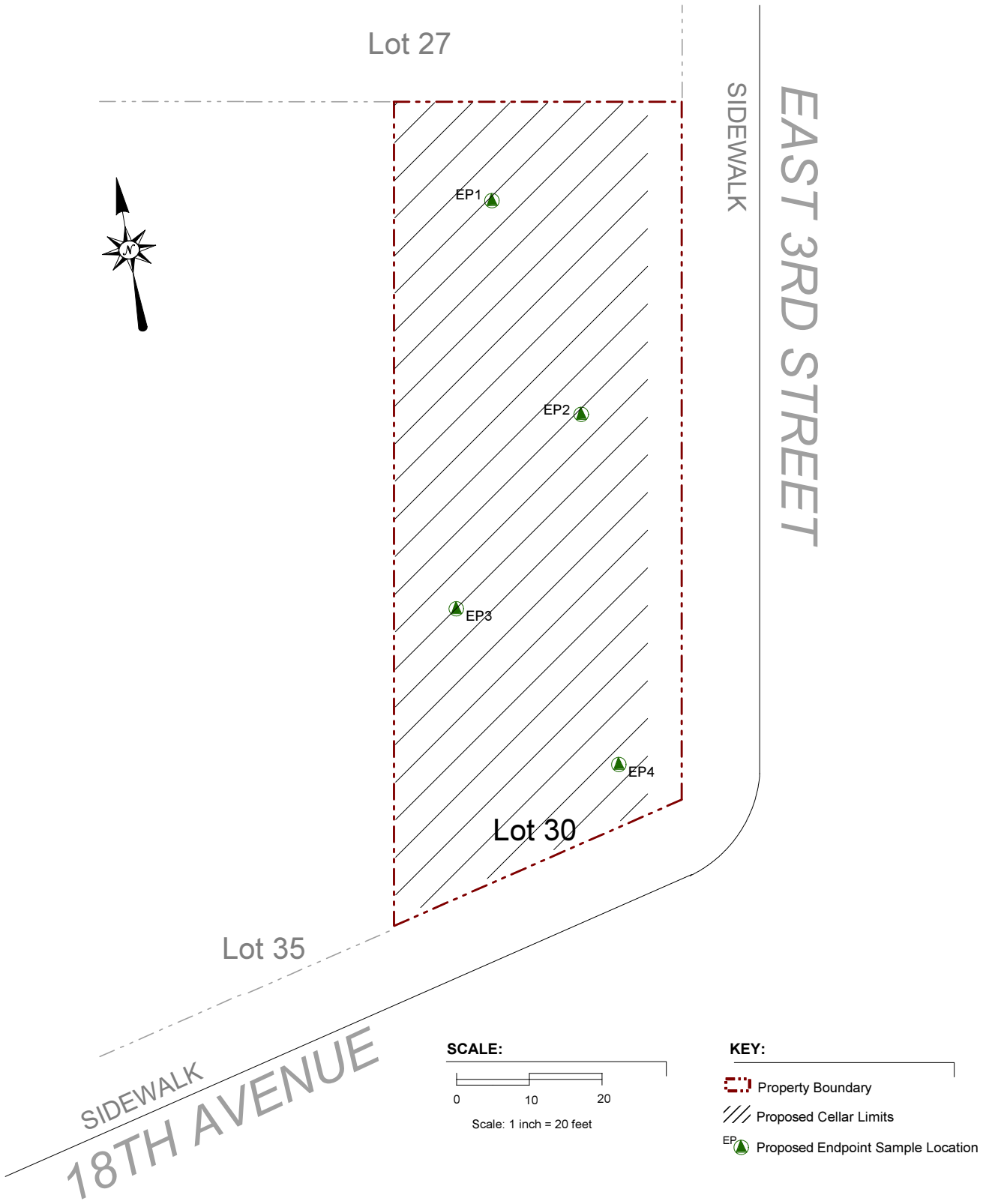
EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD, RIDGE, NEW YORK 11961
PHONE: (631) 504-6000 FAX: (631) 924-2870



EBC
Environmental Business Consultants
Phone 631.504.6000
Fax 631. 924.2870

Figure No. 5

Site Name: Redevelopment Project
Site Address: 4202 18th Avenue, Brooklyn, NY
Drawing Title: Excavation and Capping Plan

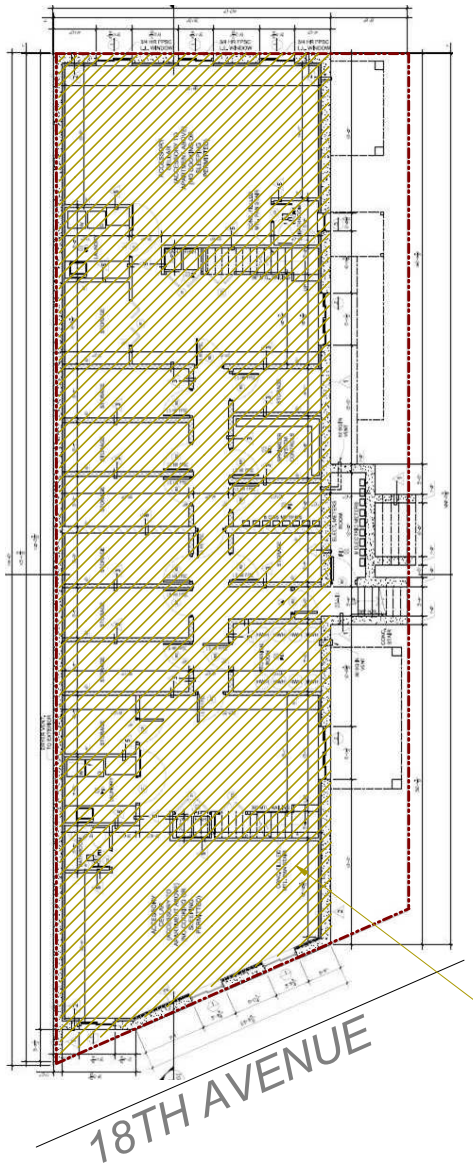


EBC
Environmental Business Consultants
Phone 631.504.6000
Fax 631. 924.2870

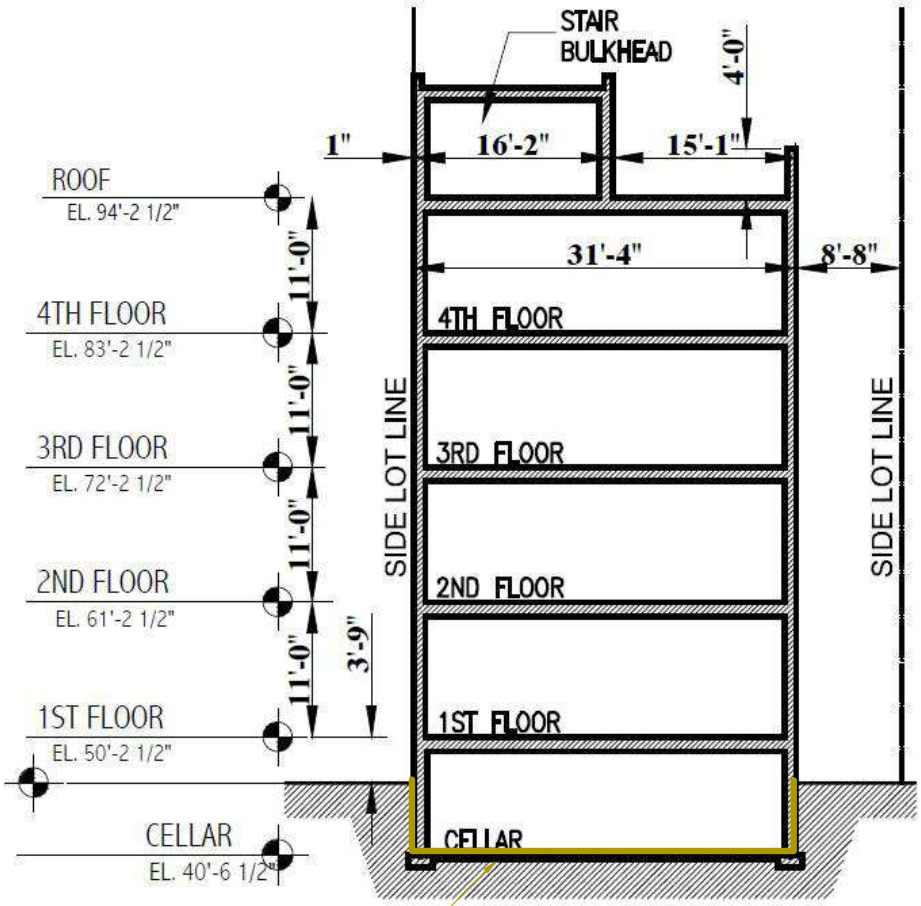
Figure No. 6

Site Name: Redevelopment Project
Site Address: 4202 18th Avenue, Brooklyn, NY
Drawing Title: Endpoint Sampling Plan

CELLAR PLANS



FRONT ELEVATION

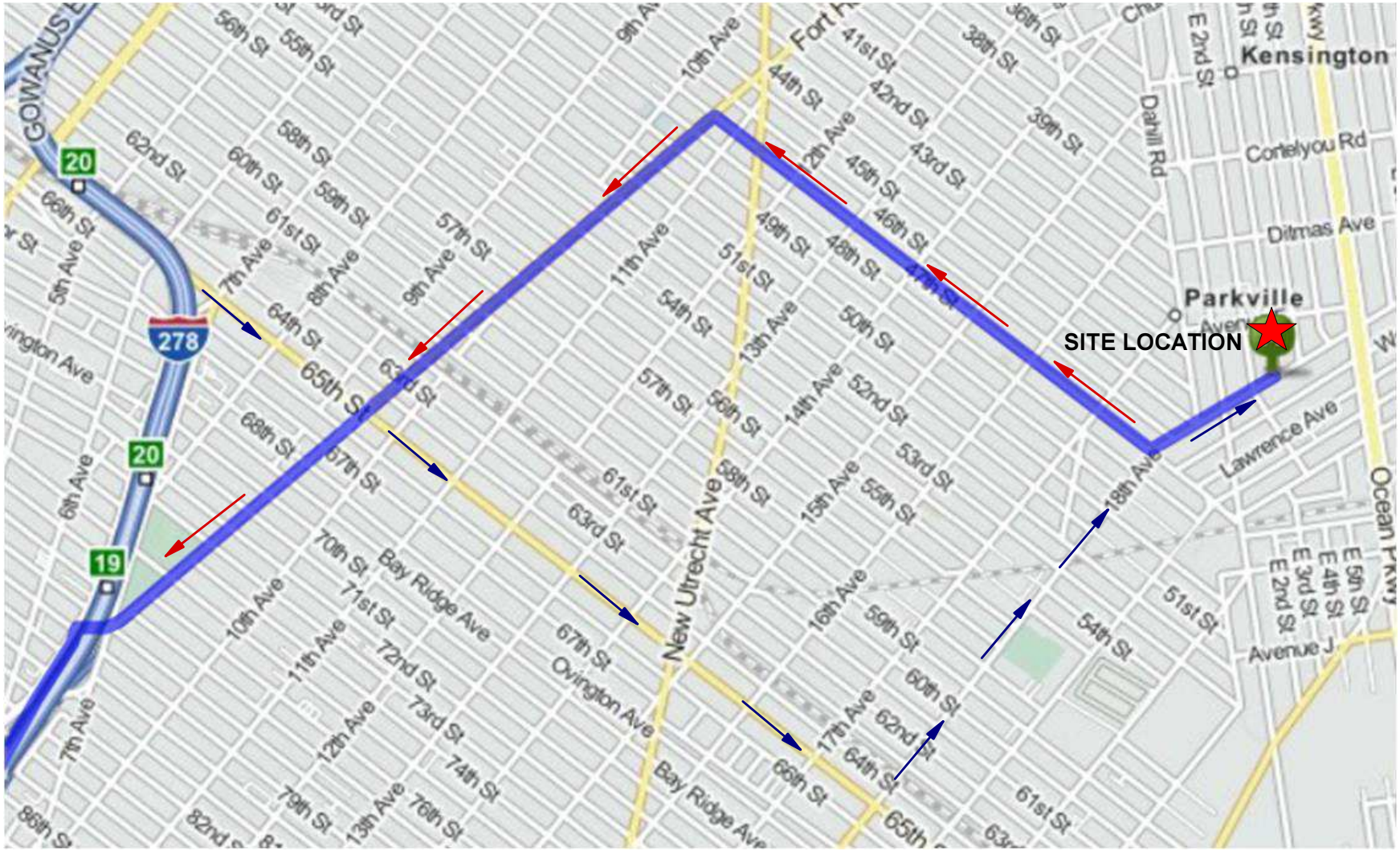


Raven Industries VaporBlock 20 Plus
Vapor Barrier

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
Phone 631.504.6000
Fax 631.924.2870

4202 18TH AVENUE
BROOKLYN, NY 11218

FIGURE 7 VAPOR BARRIER PLAN



Key

Truck Route to the Site

Truck Route from the Site

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS

Phone 631.504.6000
Fax 631.924.2870

Figure No. 8

Site Name: REDEVELOPMENT PROJECT

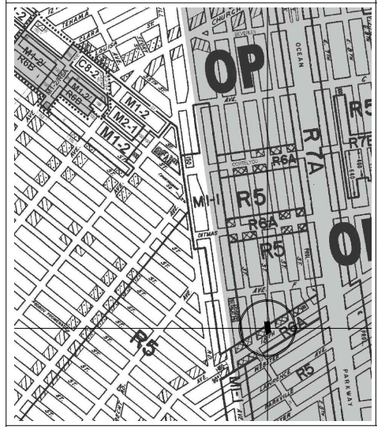
Site Address: 4202 18TH AVENUE, BROOKLYN, NY

Drawing Title: TRUCK ROUTE MAP

ATTACHMENT A
Redevelopment Plans

ZONING MAP (22-D)

SCALE: NTS



DRAWINGS LIST

Z-001.00 PLOT PLAN, ZONING ANALYSIS
Z-002.00 FLOOR AREA DIAGRAM, NOTES
A-100.00 CELLAR FLOOR PLAN
A-101.00 1ST FLOOR PLAN
A-102.00 2ND FLOOR PLAN
A-103.00 3RD FLOOR PLAN
A-104.00 PENTHOUSE FLOOR PLAN
A-105.00 PENTHOUSE ROOF PLAN
A-200.00 SIDE AND FRONT ELEVATIONS (AVE M)
A-201.00 FRONT ELEVATION(EAST 4TH ST)
A-202.00 SIDE ELEVATION
A-300.00 SECTION 1-1
A-301.00 SECTION 2-2
A-302.00 SECTION 3-3/WALL SECTION
A-400.00 WALL DETAILS
A-401.00 STAIR DETAILS
A-402.00 ACCESSIBILITY DETAILS
A-403.00 ACCESSIBILITY DETAILS
A-500.00 PLUMBING RISER DIAGRAM
S-100.00 FOUNDATION & 1ST FLOOR FRAMING PLAN
S-101.00 2ND FLOOR FRAMING PLAN
S-102.00 3RD FLOOR FRAMING PLAN
S-103.00 ROOF FRAMING PLAN
S-104.00 PENTHOUSE FRAMING PLAN
EN-001.00 ENERGY ANALYSIS
EN-002.00 ENERGY PROGRESS INSPECTIONS
EN-003.00 ENERGY NOTES
RCP-001.00 CELLAR & 1ST FLOOR REFLECTED CEILING PLANS.
RCP-002.00 2ND & 3RD FLOOR REFLECTED CEILING PLANS.
RCP-003.00 PENTHOUSE REFLECTED CEILING PLAN.

Table 601
Fire-Resistance Rating Requirements for Building Element (hours)

Building Element	Type I A	Type I B	Type II A[d]	Type II B	Type III A[d]	Type III B	Type IV HT	Type V[f] A[d]	Type V[f] B
Structural frame[a] Including columns, girders, trusses	3[b]	2[b]	1	0	1	0	HT	1	0
Bearing walls Exterior[e,g]	3	2	1	0	2	2	2	1	0
Interior	3[b]	2[b]	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions Exterior	See Table 602								
Nonbearing walls and partitions Interior[e]	0	0	0	0	0	0	See Section 602.4.6	0	0
Floor construction[h] Including supporting beams and joists	2	2	1	0	1	0	HT	1	0
Roof construction Including supporting beams and joists	1 1/2[c]	1[c]	1[c]	0	1[c]	0	HT	1[c]	0

For SI: 1 foot = 304.8 mm.
a. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns and bracing members designed to carry gravity loads. The members of floor or roof panels which have no connection to the columns shall be considered secondary members and not a part of the structural frame.
b. Roof supports: Fire-resistance ratings of structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
c. 1. Except in Factory-Industrial (F-1), Hazardous (H), Mercantile (M) and Moderate-Hazard Storage (S-1) occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
2. Except in Factory-Industrial (F) occupancies subject to regulation under Sections 264(1) and 264(2) of the New York State Labor Law, and in Group I-1, R-1, and Group R-2 occupancies, in all occupancies heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.

Table 503 (Continued)

Group	Hgt (feet) Hgt(s)	Type I A	Type I B	Type II A	Type II B	Type III A	Type III B	Type IV HT	Type V A	Type V B
		Type of Construction								
R-1	S	UL	UL	6	NP	6	NP	6	NP	NP
	A	UL	UL	UL	NP	24,000	NP	20,500	NP	NP
R-2	S	UL	UL	6	NP	6	3	6	NP	NP
	A	UL	UL	UL	NP	24,000	5,600	20,500	NP	NP
R-3	S	UL	UL	6	3	6	3	6	3	3
	A	UL	UL	17,500	10,500	14,700	5,600	30,000	8,400	5,500
S-1	S	UL	6	5	3	4	3	4	3	2
	A	UL	48,000	12,000	7,500	7,500	7,500	7,500	5,000	1,000
S-2[h,e]	S	UL	UL	6	3	6	4	6	3	2
	A	UL	UL	15,000	10,000	10,000	8,500	10,000	8,400	5,500
U[c]	S	UL	5	4	2	3	2	4	2	1
	A	UL	35,000	19,000	8,500	14,000	8,500	18,000	9,000	5,500

a. See the following sections for general exceptions to Table 503:
1. Section 504.2, Allowable height increase due to automatic sprinkler system installation.
2. Section 506.2, Allowable area increase due to frontage.
3. Section 506.3, Allowable area increase due to automatic sprinkler system installation.
4. Section 507, Unlimited area building.
b. For open parking structures, see Section 406.3.
c. For private garages, see Section 406.1.
d. See Section 415.5 for limitations.
e. Except for occupancy groups F-1, H-1 through H-5, I-2, I-3, S-1 and U, buildings equipped throughout with an approved automatic sprinkler system in accordance with section 903.3.1.1 shall be unlimited in height.
For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².
UL = Unlimited, NP = Not permitted.

Not permitted in Fire District

Not permitted in Fire District without sprinklers

Table 704.8
Maximum Area of Exterior Wall Openings[a,l]

Classification of Opening	0 to 3[e,h]	Greater than 3 and not more than 5[h]	Greater than 5 and not more than 10[d,f]	Greater than 10 and not more than 15[d,f]	Greater than 15 and not more than 20[d,f]	Greater than 20 and not more than 25[d,f]	Greater than 25 and not more than 30[d,f]	Greater than 30
	Fire Separation Distance (feet)							
Unprotected	Not Permitted[j]	Not Permitted[j,k]	10%	15%	25%	45%	70%	No Limit
Protected	Not Permitted[j,i]	15%[k]	25%[k]	45%[k]	75%[k]	No Limit[k]	No Limit[k]	No Limit

For SI: 1 foot = 304.8 mm.
a. Values given are percentage of the area of the exterior wall.
b. For occupancies in Group R-3, the maximum percentage of unprotected and protected exterior wall openings shall be 25 percent.
c. The area of openings in an open parking structure with a fire separation distance of greater than 10 feet shall not be limited.
d. For occupancies in Group H-2 or H-3, unprotected openings shall not be permitted for openings with a fire separation distance of 15 feet or less.
e. For requirements for fire walls for buildings with differing roof heights, see Section 705.6.1.
f. The area of unprotected and protected openings is not limited for occupancies in Group R-3, with a fire separation distance greater than 5 feet.
g. Buildings whose exterior bearing wall, exterior nonbearing wall and exterior structural frame are not required to be fire-resistance rated shall be permitted to have unlimited unprotected openings.
h. Includes accessory buildings to Group R-3.
i. Protected openings through a wall or walls between buildings shall comply with Section 705.8.
j. Protected openings within a fire separation distance of 3 feet or less are permitted for Occupancy Groups R-2 and R-3 provided such openings do not exceed 10% of the area of the facade of the story in which they are located. These openings shall not be credited towards meeting any mandatory natural light or ventilation requirements.
k. In Groups R-2 and R-3 occupancies with an exterior separation distance greater than 3 feet, openings shall be in accordance with percentages indicated as "Protected" Classification of Opening in Table 704.8. However, such openings shall not be required to be protected.
l. Upon special application, the commissioner may permit exterior wall openings to be constructed in excess of the permitted area established by Table 704.8 if such openings at the time of their construction are located at least sixty feet in a direct line from any neighboring building, unless otherwise permitted by Section 704.3 for buildings on the same lot. If any neighboring building is later altered or constructed to come within the above distance limitation, the affected exterior openings shall immediately be closed with construction meeting the fire-resistance rating requirements for exterior wall construction of the building in which they are located. Such additional openings shall not be credited toward meeting any of the mandatory natural light or ventilation requirements unless they also comply with applicable provisions of Chapter 12 and the zoning resolution.

COPYRIGHT 1983-2002 © BRICOLAGE DESIGNS, ALL RIGHTS RESERVED

ZONING ANALYSIS

#4202 18TH AVENUE, BROOKLYN, NY
BLOCK: 5409 LOT: 30
ZONE: R-5 ; R6-A MAP 22-C
LOT AREA : 4,230.4 SF (AS PER SURVEY), CORNER LOT. FLOOD ZONE: NO

SCOPE OF WORK:
NEW 4 STORY AND CELLAR, 8-FAMILY RESIDENTIAL BUILDING
CONSTRUCTION CLASS: II-A. OCCUPANCY CLASS: R-2
USE GROUP: 2 RESIDENTIAL
BUILDINGS DEVELOPED PURSUANT TO THE QUALITY HOUSING PROGRAM

1ST FLOOR: UG 2 (RESIDENTIAL), OCCUPANCY R-2 (APARTMENTS)
2ND FLOOR: UG 2 (RESIDENTIAL), OCCUPANCY R-2 (APARTMENTS)
3RD FLOOR: UG 2 (RESIDENTIAL), OCCUPANCY R-2 (APARTMENTS)
4TH FLOOR: UG 2 (RESIDENTIAL), OCCUPANCY R-2 (APARTMENTS)

ZR 35-22 / ZR 23-145. FAR = 3.0 LC = 80% (4,230.4 X 80% = 3,384.32 SF)
MAX PERMITTED RESIDENTIAL FLOOR AREA = 4,230.4 X 3 = 12,691.2 SF
PROPOSED "FLOOR AREA"
1ST FLOOR "FA" : 3,088.37 SF
2 FLOOR "FA"= 3,322.82 SF
3 FLOOR "FA"= 3,322.82 SF
4 FLOOR "FA" = 2,509.87 SF
TOTAL RESIDENTIAL "FA"= 12,243.88 SF, LESS THAN 12,691.2 SF. PROPOSED FAR: 0.96
ZR 35-40 DENSITY
MAX # OF DWELLING UNITS: (11,027.49 - 3,166.65) /680 =11. PROPOSED: 5 DWELLING UNITS

ZR 23-32 MIN LOT AREA AND LOT WIDTH
MIN LOT AREA: 1,700 SF. MIN LOT WIDTH: 18'
EXISTING LOT AREA: 3,675.83 SF, EXISTING LOT WIDTH: 40'-0"

ZR 35-52 SIDE YARDS. REQUIRED: 0' OR 8' MIN, PROPOSED: 0' AND 17'-7"

ZR 35-24 HEIGHT AND SETBACK
B) STREET WALL LOCATION
REQUIRED: AT LEAST 70 PERCENT OF THE #AGGREGATE WIDTH OF STREET WALLS# SHALL BE LOCATED WITHIN EIGHT FEET OF THE #STREET LINE# AND SHALL EXTEND TO AT LEAST THE MINIMUM BASE HEIGHT SPECIFIED IN TABLE A OF THIS SECTION FOR #BUILDINGS# IN CONTEXTUAL DISTRICTS, OR TABLE B FOR #BUILDINGS# IN NON-CONTEXTUAL DISTRICTS, OR THE HEIGHT OF THE #BUILDING#, WHICHEVER IS LESS. THE REMAINING 30 PERCENT OF THE #AGGREGATE WIDTH OF STREET WALLS# MAY BE LOCATED BEYOND EIGHT FEET OF THE #STREET LINE#.FOR #ZONING LOTS# BOUNDED BY MORE THAN ONE #STREET LINE#, THESE #STREET WALL# LOCATION PROVISIONS SHALL BE MANDATORY ALONG ONLY ONE #STREET LINE#, 70% OF PROPOSED STREET (28') WALL LOCATED WITHIN 8' OF STREET LINE

E) ADDITIONAL REGULATIONS
THE MINIMUM BASE HEIGHT PROVISIONS OF PARAGRAPH (B) SHALL NOT APPLY TO #BUILDINGS DEVELOPED# OR #ENLARGED# AFTER FEBRUARY 2, 2011, THAT DO NOT EXCEED SUCH MINIMUM BASE HEIGHTS, EXCEPT WHERE SUCH #BUILDINGS# ARE LOCATED ON #ZONING LOTS# WITH MULTIPLE #BUILDINGS#, ONE OR MORE OF WHICH IS #DEVELOPED#, #ENLARGED# OR ALTERED AFTER FEBRUARY 2, 2011, TO A HEIGHT EXCEEDING SUCH MINIMUM BASE HEIGHTS.
PROPOSED: ENTIRE BUILDING HEIGHT: 39'-10 1/2", LESS THAN 40'

SETBACK REQUIRED: 10' ON WIDE STREET, 15' ON NARROW STREET
(NOT APPLICABLE, ENTIRE BUILDING LESS THAN MIN BASE HEIGHT)
MAX BASE HEIGHT: 60'
MAX PERMITTED BUILDING HEIGHT: 70', PROPOSED BUILDING HEIGHT: 39'-10 1/2"
REAR YARD: NOT APPLICABLE (CORNER LOT)

ZR 36-341 PARKING
REQ'D = LOT AREA 10,000 SF OR LESS: 50% OF D.U.=5 X 50% = 3 SPACES
PROPOSED = 0, WAIVED AS PER ZR 36-361 (NOT MORE THAN 5 SPACES)
ZR 36-711 BICYCLE PARKING
REQ'D: 1 SPACES PER 2 D.U.=5/2=2.5=3, WAIVED (NOT MORE THAN 10 D.UNITS)
RECREATION AREA = N/A (LESS THAN 9 UNITS)
AREA BETWEEN FRONT LOT LINE AND BUILDING WALL IS PLANTED (QH): N/A
(NO FRONT YARD PROPOSED)

COMMERCIAL PORTION
ZR 33-121 MAX PERMITTED COMMERCIAL FAR: 2.0
MAX PERMITTED COMMERCIAL FLOOR AREA: 3,675.83 X 2 = 7,351.66 SF
PROPOSED COMMERCIAL "FA": 3,166.65 SF, LESS THAN 7,351.66 SF
PROPOSED COMMERCIAL FAR: 0.861
SIDE YARDS REQUIRED: 0' OR 8' MIN, SIDE YARDS PROPOSED: 0'
1-STORY (NOT MORE THAN 23' HIGH) IS PERMITTED OBSTRUCTION AS PER ZR 33-23

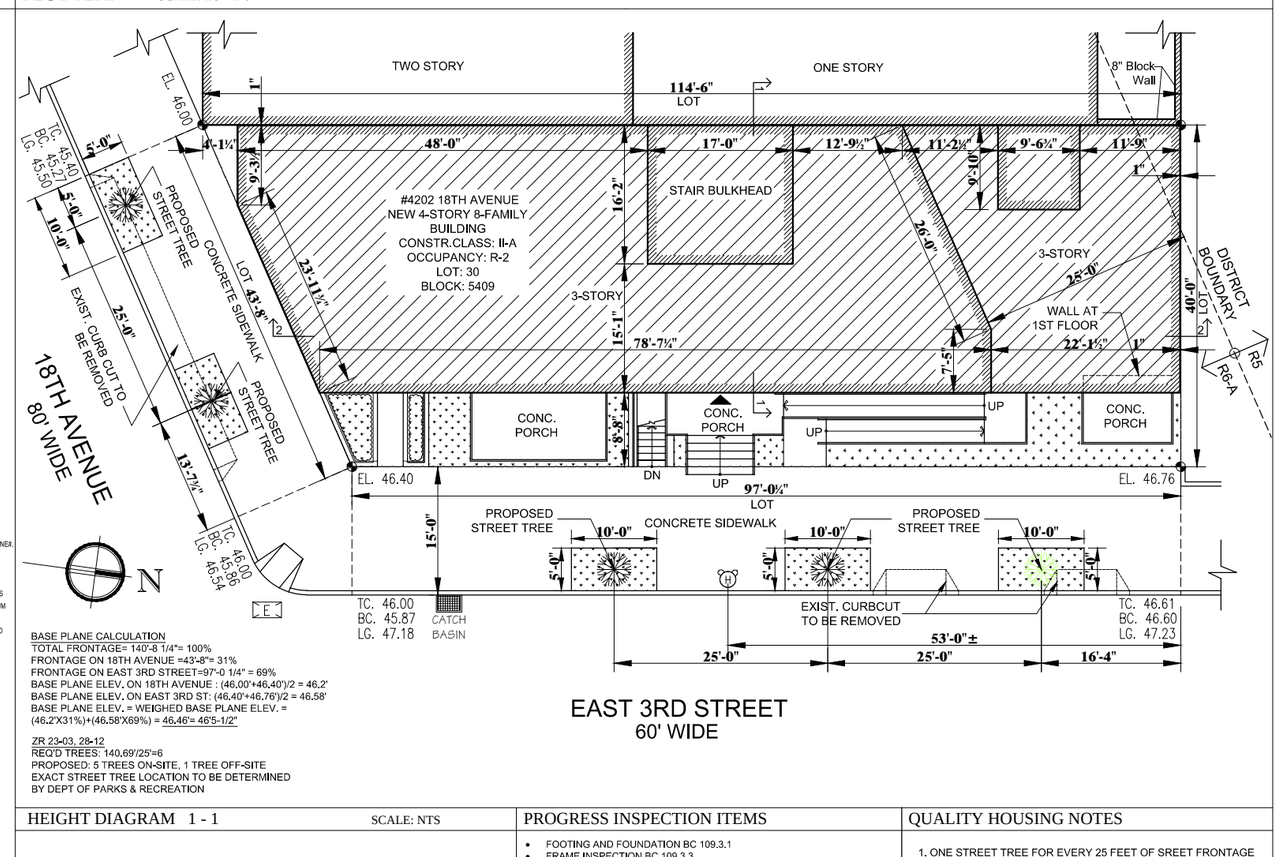
ZR 36-21 COMMERCIAL PARKING
REQUIRED: 1 PER 1,000 SF OF #FLOOR AREA#: 3,166.65/1,000 = 3 SPACES
PROPOSED: 0 (WAIVED AS PER ZR 26-232 A) LESS THAN 40 SPACES)

ZR 35-011 THE ENTIRE #BUILDING# COMPLIES WITH THE #BULK# REGULATIONS FOR #QUALITY HOUSING BUILDINGS# IN ARTICLE III, CHAPTER 5. MAX COMBINED FAR: 3.0
MAX PERMITTED COMBINED "FLOOR AREA": 11,027.49 SF
PROPOSED COMBINED "FLOOR AREA": 6,308.13 + 3,166.65 = 9,474.78 SF,
LESS THAN 11,027.49 SF, PROPOSED COMBINED FAR: 2.577

ZR 28-23 REFUSE STORAGE AND DISPOSAL.
REQUIRED: 2.9 CU. FT. PER D.U.=2.9 X5 = 14.5 CU. FT.
PROPOSED: 74.83 SF X 10'-0"=748.3 CU. FT.

PLOT PLAN

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

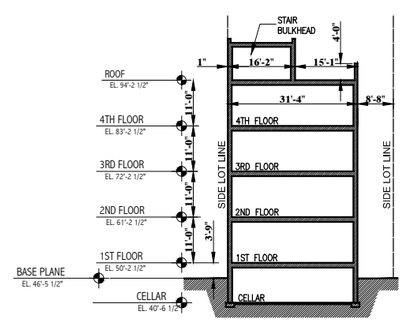


BASE PLANE CALCULATION
TOTAL FRONTAGE= 140'-8 1/4"= 100%
FRONTAGE ON 18TH AVENUE =43'-8"= 31%
FRONTAGE ON EAST 3RD STREET=97'-0 1/4" = 69%
BASE PLANE ELEV. ON 18TH AVENUE : (46.00'+46.40')/2 = 46.2'
BASE PLANE ELEV. ON EAST 3RD ST: (46.40'+46.76')/2 = 46.58'
BASE PLANE ELEV. = WEIGHED BASE PLANE ELEV. =
(46.2'X31%)+(46.58'X69%) = 46.46'= 46'5-1/2"

ZR 23-03, 28-12
REQ'D TREES: 140.69'/25'=6
PROPOSED: 5 TREES ON-SITE, 1 TREE OFF-SITE
EXACT STREET TREE LOCATION TO BE DETERMINED
BY DEPT OF PARKS & RECREATION

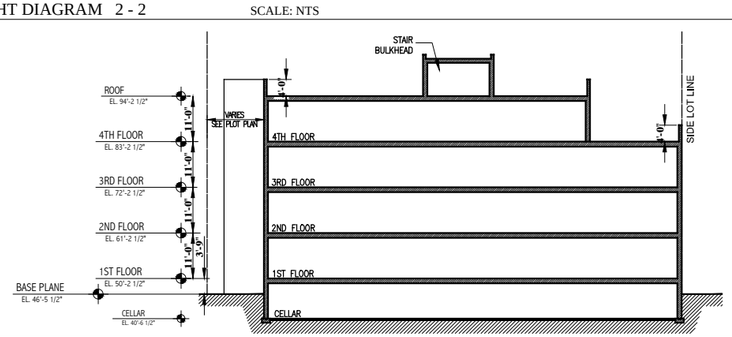
HEIGHT DIAGRAM 1 - 1

SCALE: NTS



HEIGHT DIAGRAM 2 - 2

SCALE: NTS



PROGRESS INSPECTION ITEMS

- FOOTING AND FOUNDATION BC 109.3.1
- FRAME INSPECTION BC 109.3.3
- ENERGY CODE COMPLIANCE INSPECTIONS BC 109.3.5
- FIRE-RESISTANCE RATED CONSTRUCTION BC 109.3.4

ENERGY CODE PROGRESS INSPECTION ITEMS

- PROTECTION OF FOUNDATION INSULATION (IIA-1)
- INSULATION PLACEMENT AND R VALUES (IIA-2)
- FENESTRATION THERMAL VALUES AND RATINGS (IIA-3)
- FENESTRATION AREAS (IIA-5)
- AIR SEALING AND INSULATION - VISUAL (IIA-6)
- HVAC AND SERVICE WATER HEATING EQUIPMENT (IIB-3)
- HVAC AND SERVICE WATER HEATING CONTROLS (IIB-4)
- DUCT PLENUM AND PIPING INSULATIONAND SEALING (IIB-5)
- ELECTRICAL METERING (IIC-1)
- LIGHTING IN DWELLING UNITS (IIC-2)
- INTERIOR LIGHTING POWER (IIC3)
- EXTERIOR LIGHTING POWER (IIC4)
- LIGHTING CONTROLS (IIC5)
- TANDEM WIRING (IIC7)
- ELECTRICAL MOTORS (IIC8)
- MAINTENANCE INFORMATION (IID1)

LIGHTING WITHIN DWELLING UNITS SHALL HAVE A MINIMUM OF 50 PERCENT OF THE PERMANENTLY INSTALLED INTERIOR LIGHT FIXTURES FITTED WITH HIGH-EFFICACY LAMPS

QUALITY HOUSING NOTES

1. ONE STREET TREE FOR EVERY 25 FEET OF SREET FRONTAGE OF THE ZONING LOT. (ZR:28-12)
2. ALL DWELLING UNITS (D.U.) SHALL HAVE AN AREA OF AT LEAST 400.0 S.F. OF FLOOR AREA (ZR: 28-21)
3. ALL WINDOWS TO BE DOUBLE GLAZED (ZR: 28-22)
4. DEVELOPMENTS WITH NINE OR MORE D.U. PER VERTICAL CIRCULATION CORE SHALL HAVE A REFUSE ROOM WITH 2.9 CUBIC FT. PER D.U. BUT NOT LESS THAN 12 S.F. WITH NO DIMENSION LESS THAN 3'-0". MAX. OF 12 S.F SHALL BE EXCLUDED FROM FLOOR AREA (ZR: 28-23)
5. LAUNDRY FACILITIES WITH A MIN. OF 1 WASHING MACHINE PER 20 D.U. AND 1 DRYER PER 40 D.U. (ZR: 28-24)
6. DEVELOPMENS WITH NINE OR MORE D.U. PER VERTICAL CIRCULATION CORE SHALL PROVIDE AT LEAST THE MIN. AMOUNT OF RECREATION SPACE AS FOLLOWS: (ZR: 28-31)3.3% (R6 & R7) OF TOTAL RESIDENTIAL FLOOR AREA
7. PLANTING AREA BETWEEN THE STREET LINE AND THE THE STREET WALL SHALL BE PLANTED EXCEPT AT THE ENTRANCES TO AND EXITS FROM THE BUILDING.

SPECIAL INSPECTION ITEMS

- 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
- CONCRETE TEST CYLINDERS* ▌TR2 BC 1905.6
- CONCRETE DESIGN MIX* ▌TR3 BC 1905.3
- SOILS - INVESTIGATIONS (BORINGS/TEST PITS) ▌TR4 BC 1704.7.4
- EXCAVATION - SHEETING, SHORING, AND BRACING BC 1704.19, BC 3304.4.1
- MECHANICAL SYSTEMS BC 1704.15
- SITE STORM DRAINAGE DISPOSAL AND DETENTION SYSTEM INSTALLATION
- SPRINKLER SYSTEMS BC 1704.21
- FIRESTOP, DRAFTSTOP, AND FIREBLOCK SYSTEMS BC 1704.25

WORK TYPES TO BE FILED UNDER SEPARATE APPLICATION

WORK TYPES TO BE FILED UNDER SUBSEQUENT APPLICATION

- SHORING
- UNDERPINNING
- SPRINKLERS

STRUCTURAL DESIGN, DETAILS AND NOTES INCLUDED HEREIN
ARE IN COMPLIANCE WITH CHAPTER 16 STRUCTURAL DESIGN OF NYC BUILDING CODE

ENERGY CODE COMPLIANCE STATEMENT

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK CITY (2011 EDITION, CLIMATE ZONE 4) CHAPTER 5

ARCHITECTS
PLANNERS
CONSULTANTS
6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111
BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, DEVIATIONS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

Zoning Analysis - Plot Plan
NEW 4-STORY 8-FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK
Client: Marvel Comics

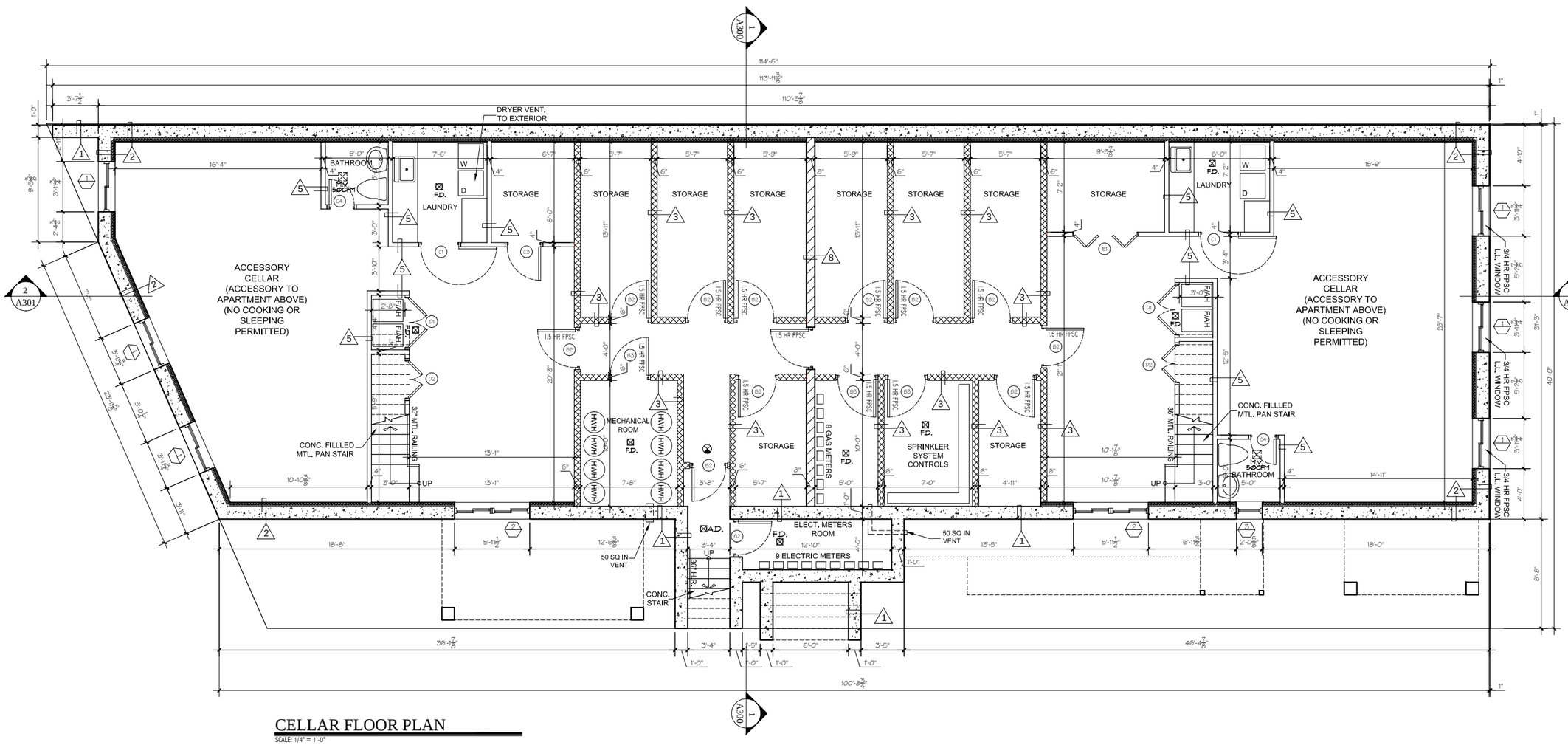
ISSUE:

DRAWN BY:	R.G
PROJECT No.:	14-139
DATE:	09-12-2014

DRAWING No.:

Z-001.00

x OF x



CELLAR FLOOR PLAN

SCALE: 1/4" = 1'-0"

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THE FOREGOING TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

Cellar Floor Plan

NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

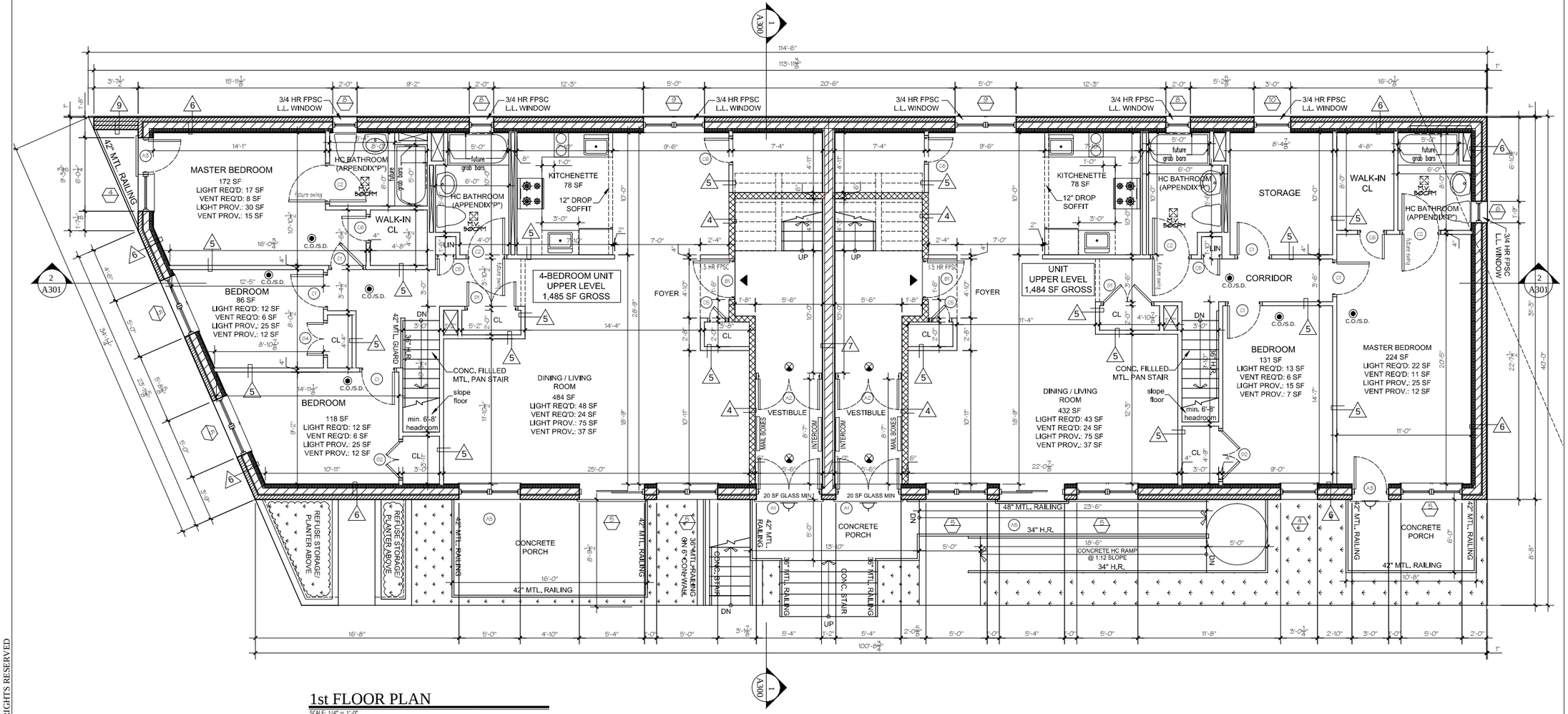
REVISIONS:

DRAWN BY:	R.G
PROJECT No.:	14-139
DATE:	09-12-2014

DRAWING No.:

A-100.00

X OF X



1st FLOOR PLAN

SCALE: 1/4" = 1'-0"

EL EXTERIOR LIGHT INCANDESCENT, 60W

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR FOR THE ACTS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THE FOREGOING TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

First Floor Plan

NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

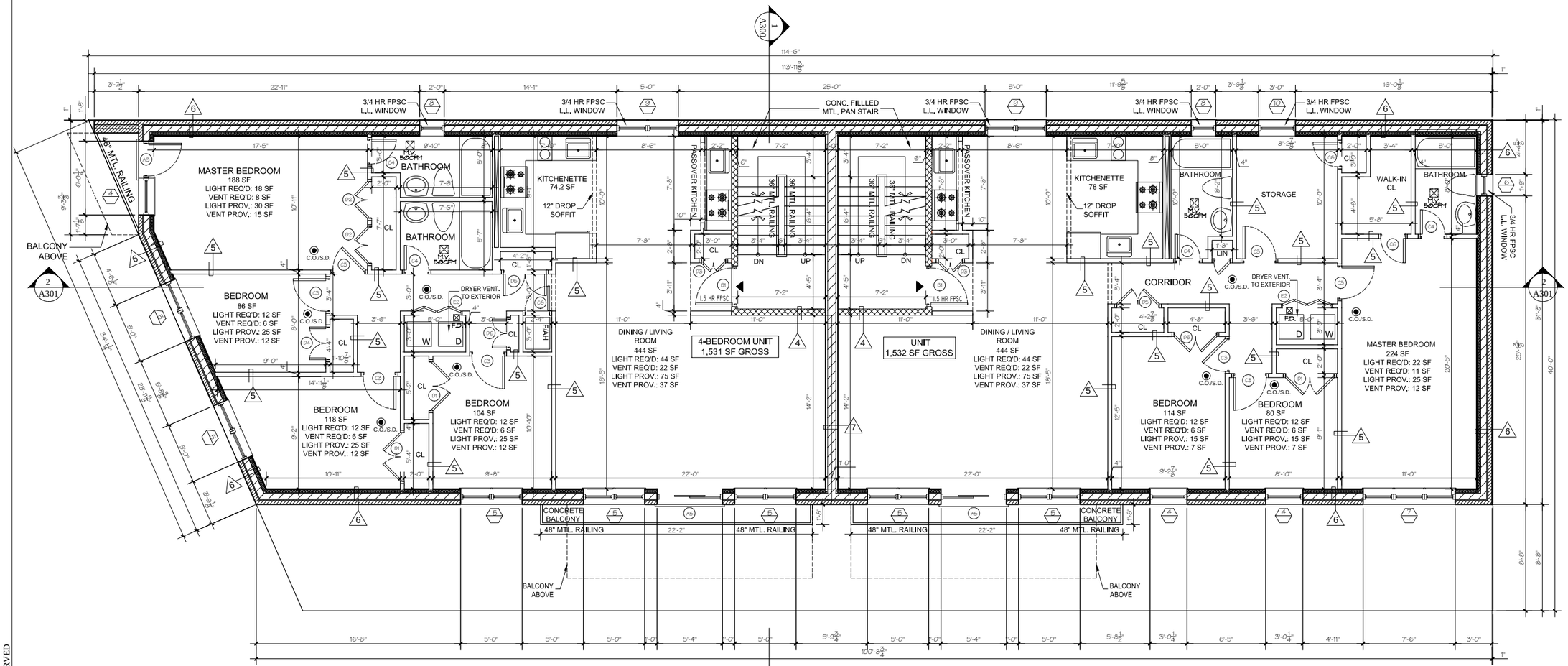
REVISIONS:

DRAWN BY:	R.G
PROJECT No.:	14-139
DATE:	09-12-2014

DRAWING No.:

A-101.00

x OF x



2nd FLOOR PLAN

SCALE: 1/4" = 1'-0"

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR FOR THE ACTS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE NOT FURNISHING OF THE WORK BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

Second Floor Plan

NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

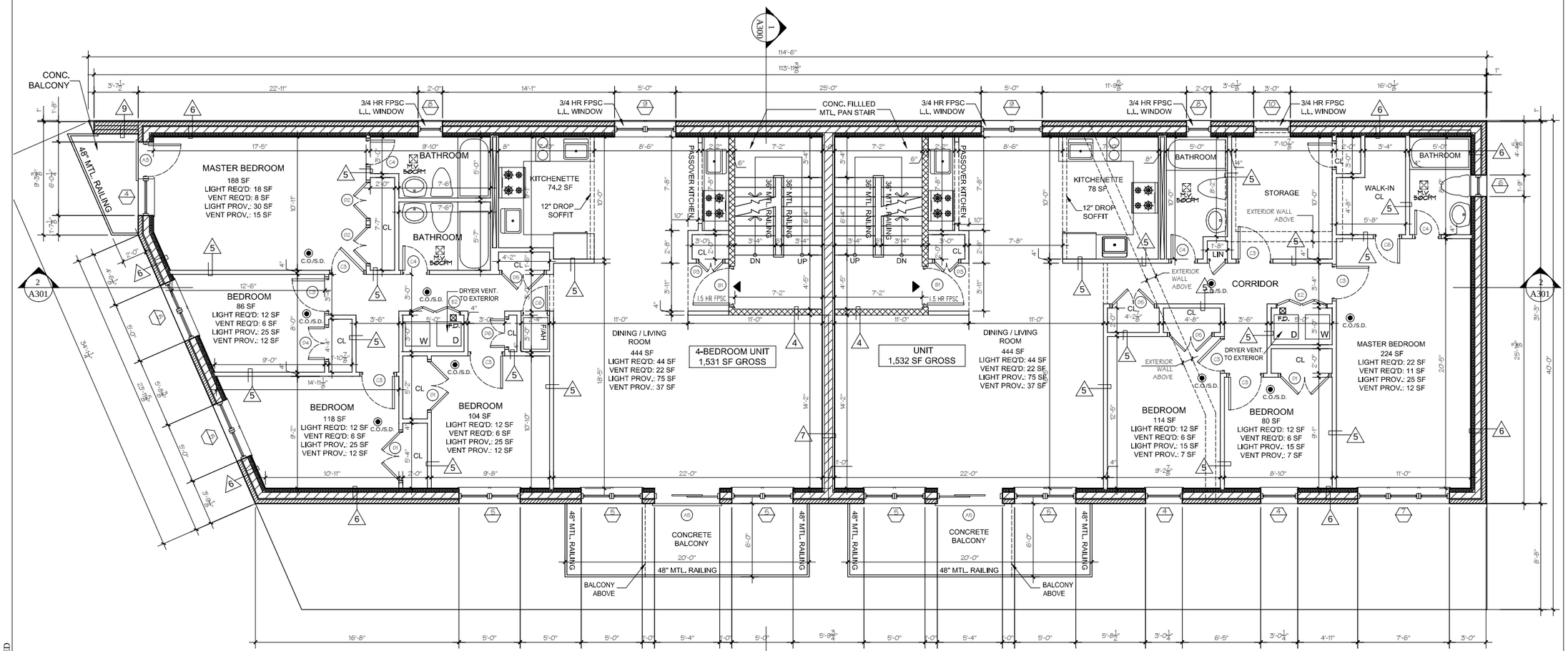
REVISIONS:

DRAWN BY:	R.G
PROJECT No.:	14-139
DATE:	09-12-2014

DRAWING No.:

A-102.00

x OF x



3rd FLOOR PLAN

SCALE: 1/4" = 1'-0"

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE ERRORS AND OMISSIONS IN THE WORK NOT PERFORMED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

Third Floor Plan

NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

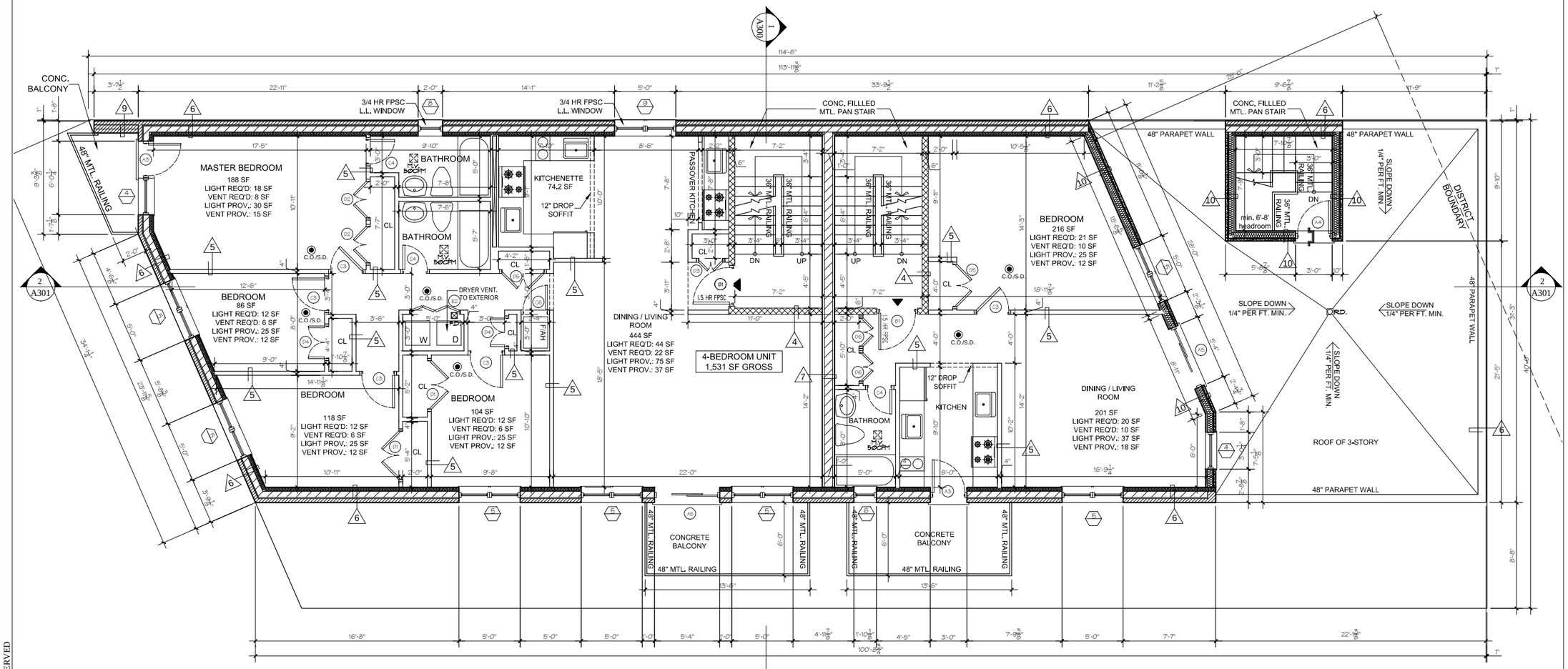
REVISIONS:

DRAWN BY:	R.G
PROJECT No.:	14-139
DATE:	09-12-2014

DRAWING No.:

A-103.00

x OF x



4th FLOOR PLAN

SCALE: 1/4" = 1'-0"

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR FOR THE ACTS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE WRITTEN DIMENSIONS WHICH WERE NOT DRAWN IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. ALWAYS USE DIMENSIONS AS SHOWN DRAWINGS ARE NOT TO BE SCALED

Fourht Floor Plan

NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

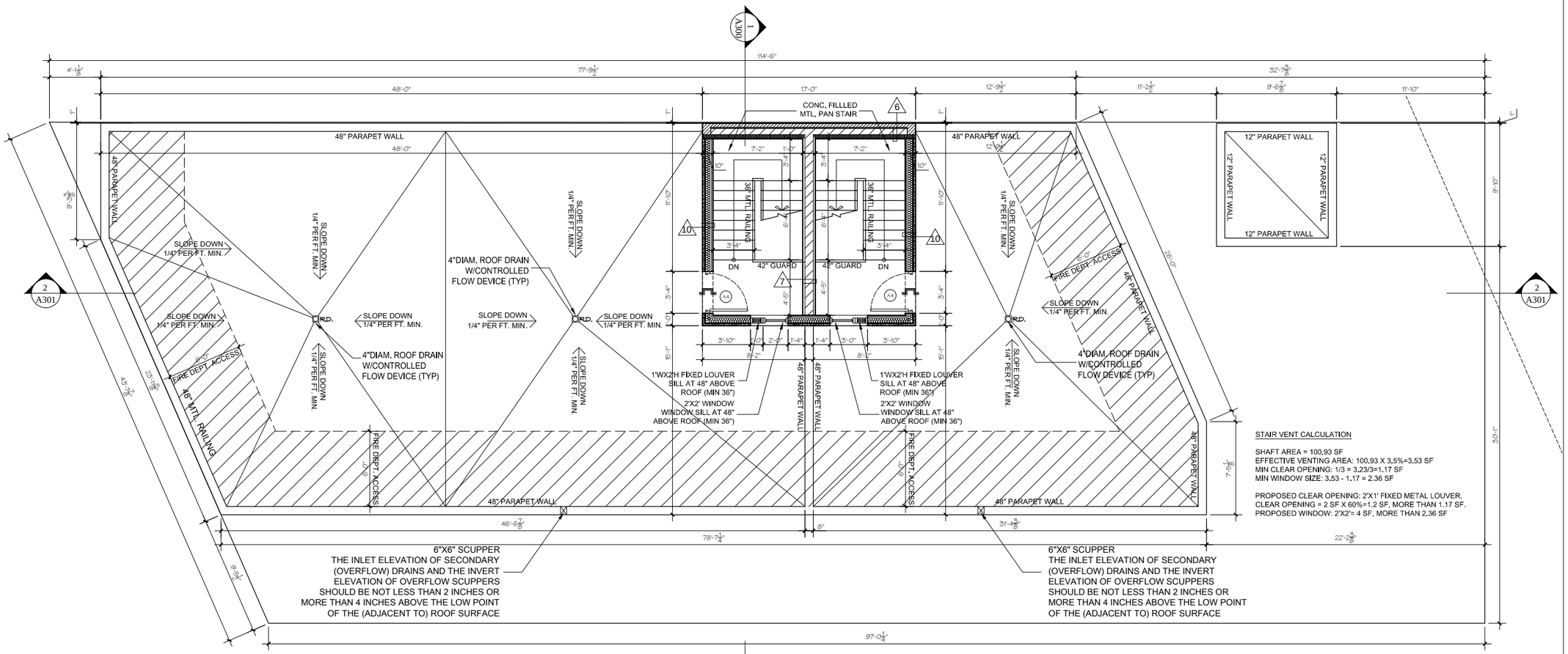
REVISIONS:

DRAWN BY:	R.G
PROJECT No.:	14-139
DATE:	09-12-2014

DRAWING No.:

A-104.00

x OF x



STAIR VENT CALCULATION

SHAFT AREA = 100,93 SF
EFFECTIVE VENTING AREA: 100,93 X 3,5%=3,53 SF
MIN CLEAR OPENING: 1/3 = 3,23/3=1,17 SF
MIN WINDOW SIZE: 3,53 - 1,17 = 2,36 SF

PROPOSED CLEAR OPENING: 2'X1' FIXED METAL LOUVER,
CLEAR OPENING = 2 SF X 60%=1,2 SF, MORE THAN 1,17 SF.
PROPOSED WINDOW: 2'X2'= 4 SF, MORE THAN 2,36 SF

ROOF PLAN

SCALE: 1/4" = 1'-0"

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR SHALL THE ARCHITECT BE RESPONSIBLE FOR PERSONS PERFORMING ANY OF THE WORK, OR FOR THE ACCURACY OR COMPLETENESS OF THE CONTRACTOR'S WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

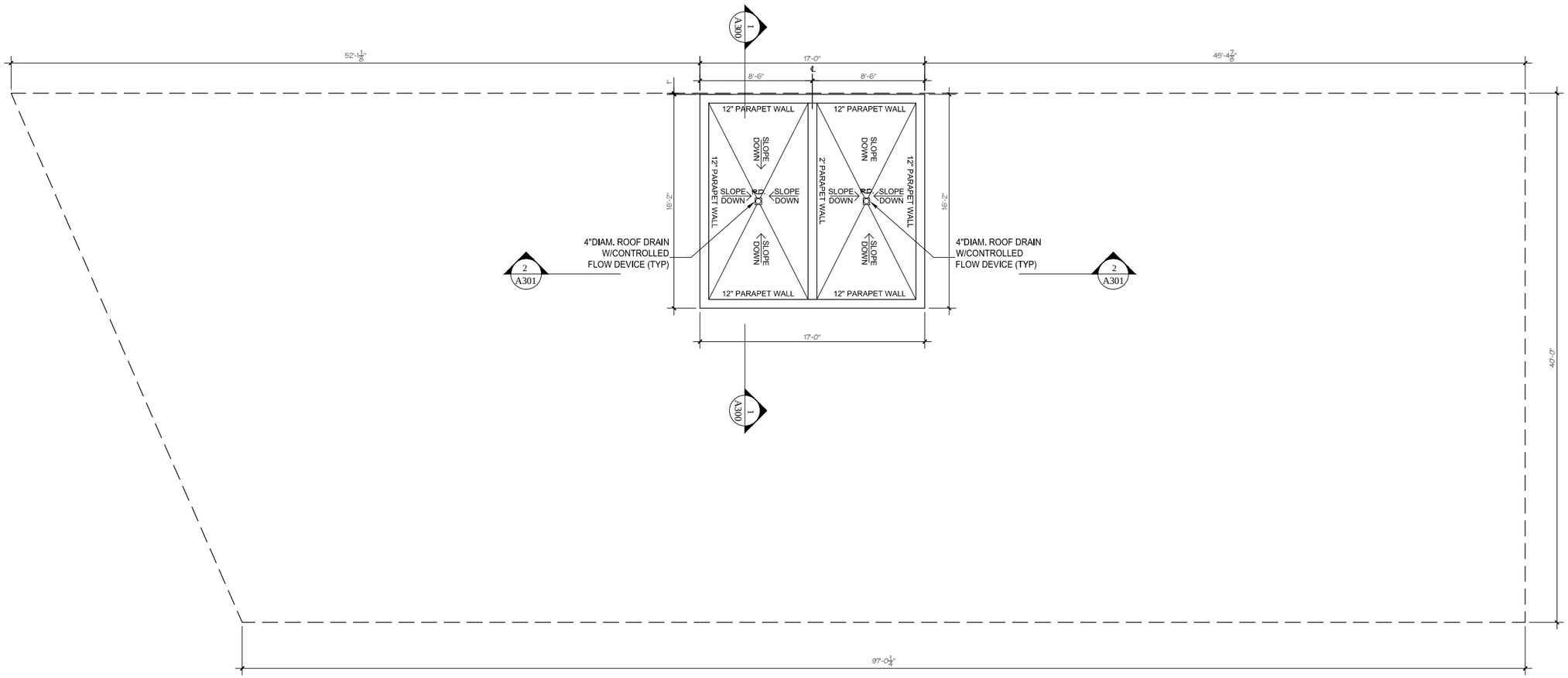
Roof Plan

NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

REVISIONS:

DRAWN BY: R.G
PROJECT No.: 14-139
DATE: 09-12-2014
DRAWING No.:
A-105.00
x OF x



STAIR BULKHEAD ROOF PLAN

SCALE: 1/4" = 1'-0"

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

Bulkhead Roof Plan

NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

REVISIONS:

DRAWN BY:	R.G
PROJECT No.:	14-139
DATE:	09-12-2014

DRAWING No.:

A-106.00

x OF x

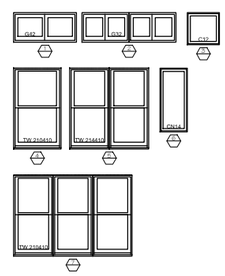
DOOR SCHEDULE

DOOR NUMBER	DOORS SIZE W X H	THICK.	MAT.	FINISH	UNDERCUT	FRAME MATERIAL	FIRE RATING / HR	SADDLE MATERIAL	HARDWARE LOCK	LATCH	CLOSER	REMARKS ALL HARDWARE TO BE ADA COMPLIANT
A1	5'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	AL	X	X	—	EXTERIOR ENTRANCE DOUBLE SWING DR. U–FACTOR 0.30
A2	5'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	AL	—	X	—	INTERIOR ENTRANCE SINGLE SWING DR.
A3	3'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	AL	X	X	—	EXTERIOR ENTRANCE SINGLE SWING DR.
A4	3'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	AL	X	X	—	EXTERIOR SINGLE SWING DOOR (STAIR BULKHEAD)
A5	5'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	AL	X	X	—	SLIDING DOOR
B1	2'–8" X 7'–0"	1 3/4"	HM	PTD	—	HM	1 1/2	AL	X	X	X	INTERIOR SINGLE SWING APART ENTRANCE DOOR W/PEEPHOLE
B2	3'–0" X 7'–0"	1 3/4"	HM	PTD	—	HM	1 1/2	—	X	X	X	INTERIOR SINGLE SWING DOOR FPSC
B3	3'–0" X 7'–0"	1 3/4"	HM	PTD	—	HM	1 1/2	—	—	X	X	INTERIOR SINGLE SWING DOOR FPSC
C1	3'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR SINGLE SWING DOOR (BEDROOM)
C2	3'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	MB	—	X	—	INTERIOR SINGLE SWING DOOR (BATHROOM)
C3	2'–8" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR SINGLE SWING DOOR (BEDROOM)
C4	2'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	MB	—	X	—	INTERIOR SINGLE SWING DOOR (BATHROOM)
C5	1'–6" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR SINGLE SWING DOOR (CLOSET)
C6	2'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR SINGLE SWING DOOR (CLOSET)
D1	4'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE SWING DOOR (CLOSET)
D2	3'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE SWING DOOR (CLOSET)
D3	2'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE SWING DOOR (CLOSET)
D4	2'–8" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE SWING DOOR (CLOSET)
D5	3'–6" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE SWING DOOR (CLOSET)
D6	2'–4" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE SWING DOOR (CLOSET)
E1	5'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE BI–FOLD DOOR (LAUNDRY)
E2	4'–0" X 7'–0"	1 3/4"	WD	PTD	—	WD	—	—	—	X	—	INTERIOR DOUBLE BI–FOLD DOOR (LAUNDRY)

GL- GLASS
HM- HOLLOW METAL
WP- WEATHER PROOF MARBLE
LS- LOCK SET
PS- PASSAGE SET
SW- SOLID WOOD
GWB- GYPSUM WALL BOARD
M-
CER- CERAMIC TILE
AL- ALUMINUM

WINDOW SCHEDULE

TAG	MODEL / ROUGH OPENING WIDTH / HEIGHT	OPERATION TYPE	AFF	FIRE RATING	MANUFACTURER	U FACTOR HP LOW-E4TM GLASS	SHGC HP LOW-E4TM GLASS	STC
G42	G42 R.O. 3'- 11 3/4" X 1'- 10 3/4"	GLIDER	80"	NR	ANDERSEN WINDOWS	0.30	0.29	26
G32	G32 X2 R.O. 5'-11 1/4" X 1'- 10 3/4"	GLIDER	80"	NR	—//—	0.30	0.29	26
C12	C12 R.O. 2'-0 5/8" X 2'- 0 5/8"	CASEMENT	79"	NR	—//—	0.28	0.32	26
TW 210410	TW 210410 R.O. 3'-0 1/8" X 5'- 0 7/8"	DOUBLE HUNG	32"	NR	—//—	0.29	0.31	26
TW 24410	TW 24410 x2 R.O. 4'-11 7/8" X 5'- 0 7/8"	DOUBLE HUNG	32"	NR	—//—	0.29	0.31	26
CN14	CN14 R.O. 1'- 9" X 4'- 0 1/2"	CASEMENT	42"	NR	—//—	0.28	0.32	26
TW 210410 X3	TW 210410 X3 R.O. 7'-5 5/8" X 5'- 0 7/8"	DOUBLE HUNG	32"	NR	—//—	0.29	0.31	26
CN24	R.O. 2'-0" X 4'- 0"	CASEMENT	42"	3/4 HR	OPTIMUM WINDOWS	0.28	0.32	26
TW 310410	R.O. 5'-0" X 5'- 0"	DOUBLE HUNG	32"	3/4 HR	—//—	0.29	0.31	26
TW 310417	R.O. 3'-0" X 5'- 0"	DOUBLE HUNG	32"	3/4 HR	—//—	0.29	0.31	26



WALL LEGEND

TAG	SYMBOL	FIRE RATING	DESCRIPTION
1		4 HR	DENOTES CONCRETE FOUNDATION WALL (THICKNESS AS PER PLAN)
2		4 HR	DENOTES INSULATED CONCRETE FOUNDATION WALL (THICKNESS AS PER PLAN)
3		2 HR	DENOTES TWO HR RATED INTERIOR PARTITION CONSTRUCTED OF 22 GA. (20 GA. JAMBS @ ALL OPENINGS) 3-5/8" MTL. STUDS @ 16" O.C. WITH TWO LAYERS 5/8" G.W.B TYPE 'x' EACH SIDE. IN WET AREAS USE M.R. G.W.B (GA FILE No. WP 1522) B.S.A. No. 301-60SM
4		2 HR	DENOTES TWO HR RATED INTERIOR PARTITION CONSTRUCTED OF 25 GAUGE GALVANIZED METAL STUDS 16" O.C. SLAB TO FINISHED CEILING, HEAD AND SILL TRACK FASTENED BY SELF-TAPPING SM. SCREWS. TWO (2) LAYERS OF ⅝" GYPSUM WALL BOARD EACH SIDE SLAB TO FINISHED CEILING. 3½" R-13 FIBERGLASS ALUMINUM FACED BATTS. 3 COATS VINYL SPACKLING COMPOUND AT TAPE JOINTS, SANDED SMOOTH TO 4" ABOVE FINISHED CEILING, NO HORIZONTAL JOINTS PERMITTED BELOW CEILING LINE, PROVIDE TAPING J BEAD AT HEAD BOTH SIDES.
5		1 HR	DENOTES ONE HOUR RATED INTERIOR PARTITION CONSTRUCTED OF 25 GAUGE GALVANIZED METAL STUDS 16" O.C. SLAB TO UNDERSIDE DECK, HEAD AND SILL TRACK FASTENED BY SELF-TAPPING SM. SCREWS TO MAIN CEILING ONE LAYER OF ⅝" TYPE 'X' GYPSUM WALL BOARD EACH SIDE SLAB TO UNDERSIDE OF DECK (SCRIBE FIT PENETRATIONS) 3 COATS VINYL SPACKLING COMPOUND AT TAPE JOINTS, SANDED SMOOTH TO 4" ABOVE FINISHED CEILING (NO HORIZONTAL JOINTS PERMITTED BELOW CEILING LINE
6		3 HR	DENOTES THREE HR RATED EXTERIOR WALL CONSTRUCTED OF 75% SOLID C.M.U. COMPLYING WITH ASTMC 140 LAID PATTERN. R-13 FIBERGLASS ALUMINUM FACED BATTS. 3⅝" 25 GAUGE GALVANIZED METAL STUDS 16" O.C. SLAB TO FINISHED CEILING, HEAD AND SILL TRACK FASTENED BY SELF TAPPING SM. SCREWS. 3 COATS VINYL SPACKLING COMPOUND AT TAPE JOINTS, SANDED SMOOTH TO 4" ABOVE FINISHED CEILING, NO HORIZONTAL JOINTS PERMITTED BELOW CEILING LINE, PROVIDE TAPING J BEAD AT HEAD BOTH SIDES.
7		3 HR	DENOTES THREE HR RATED 75% SOLID C.M.U. COMPLYING WITH ASTMC 140 LAID PATTERN, ⅝" GYPSUM WALL BOARD TO FULL EXPOSED HEIGHT (4" ABOVE FINISHED CEILING, OR TO UNDERSIDE OF DECK AS INDICATED IN FINISH SCHEDULE). ⅞" 25 GAUGE FURRING CHANNEL FULL HEIGHT, 16" O.C.
8		3 HR	DENOTES THREE HR RATED 75% SOLID C.M.U. COMPLYING WITH ASTMC 140 LAID PATTERN.
9		3 HR	DENOTES TWO HR RATED EXTERIOR BRICK WALL
10		2 HR	DENOTES 2HR RATED INSULATED EXTERIOR BEARING CONSTRUCTED 3/4" MIN.STUCCO (PORTLAND CEMENT TYPE OR APPROVED EQUAL). THICK.3 ½" SOUND ATTENUATION BLANKET FULL HEIGHT, FULL WIDTH. 3 ½" R-13 FIBERGLASS ALUMINUM FACED BATTS). 2" x 6" WOOD STUDS 16" O.C. SUB-FLOOR TO UNDERSIDE OF FLOOR JOIST.

COPYRIGHT 1983-2009 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS
6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111
BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
ALWAYS USE DIMENSIONS AS SHOWN. DRAWINGS ARE NOT TO BE SCALED

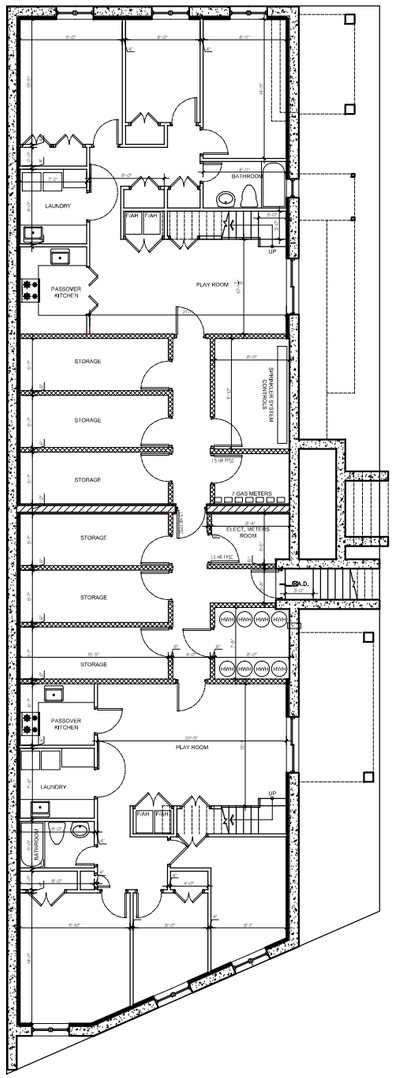
Schedules - Wall Legend

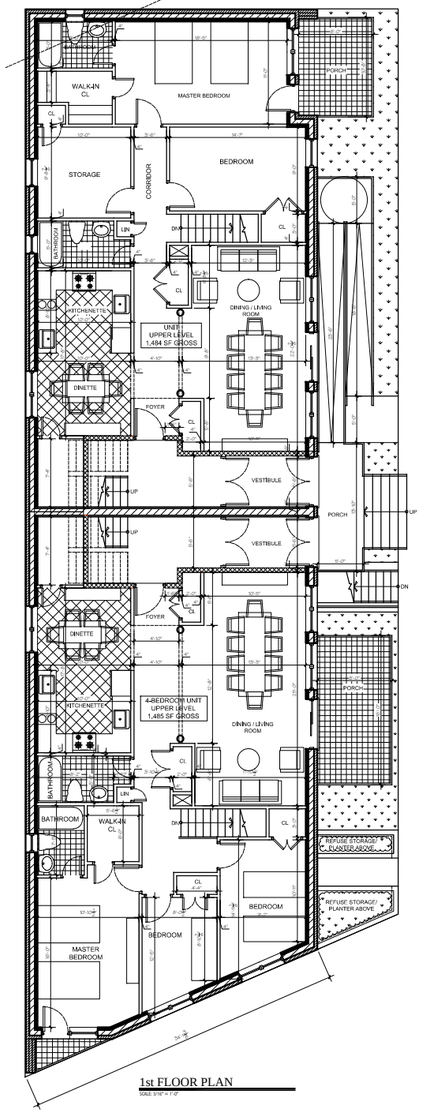
NEW 4-STORY & CELLAR
8- FAMILY BUILDING
LOCATED @ 4202 18TH AVENUE,
BROOKLYN, NEW YORK

Client: Marvel Comics

REVISIONS:

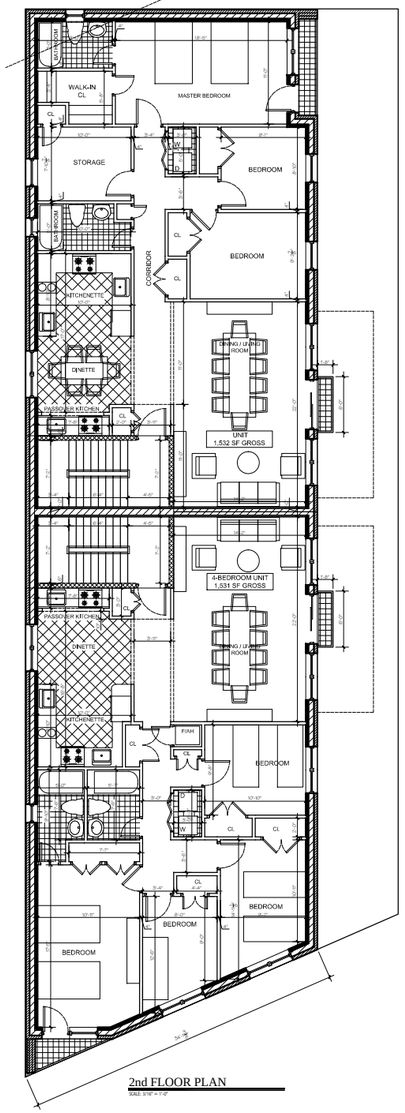
DRAWN BY: R.G
PROJECT No.: 14-139
DATE: 09-12-2014
DRAWING No.:
A-107.00
x OF x





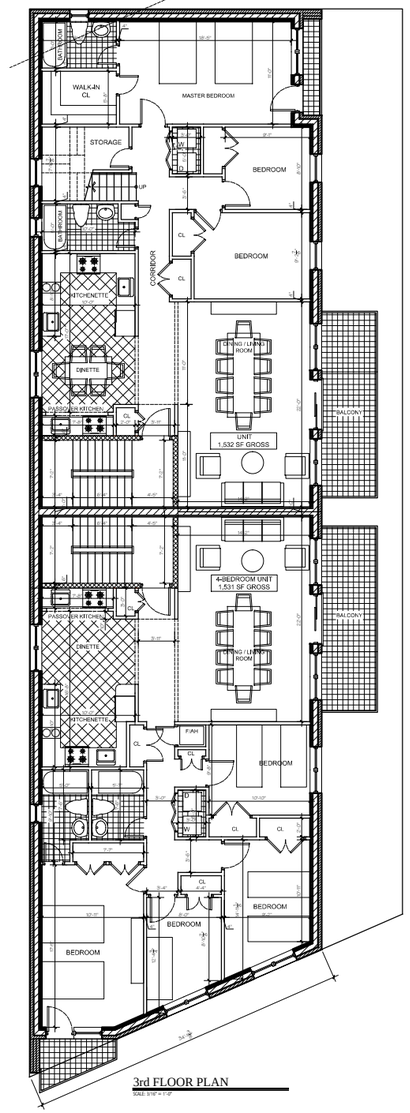
1st FLOOR PLAN

SCALE: 3/16" = 1'-0"



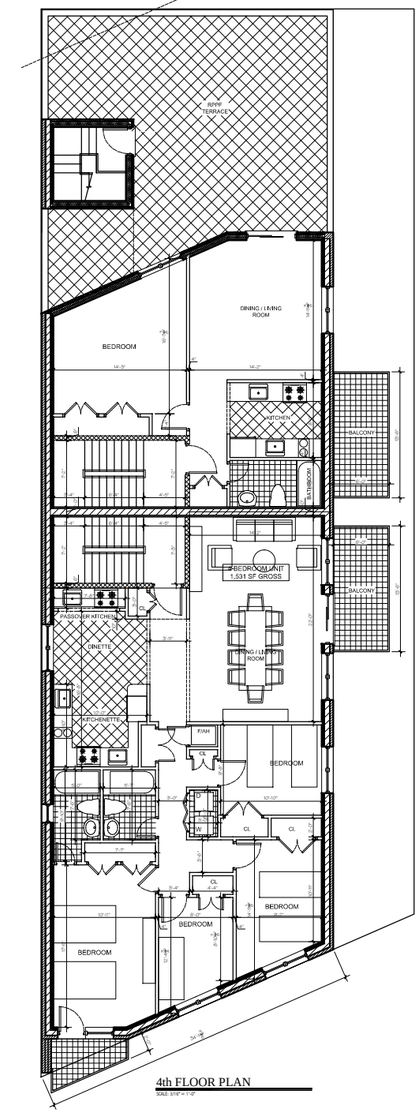
2nd FLOOR PLAN

SCALE: 3/16" = 1'-0"



3rd FLOOR PLAN

SCALE: 3/16" = 1'-0"



4th FLOOR PLAN

SCALE: 3/16" = 1'-0"

COPYRIGHT 1983-2006 © BRICOLAGE DESIGNS. ALL RIGHTS RESERVED

ARCHITECTS
PLANNERS
CONSULTANTS

6321 New Utrecht Avenue
Brooklyn, N.Y. 11219
Tel. 718.259.1100
Fax. 718.259.0111

BRICOLAGE
d·e·s·i·g·n·s

THE ARCHITECT SHALL NOT HAVE CONTROL OR CHARGE OF AND SHALL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, DEVIATIONS, TECHNIQUES, SEQUENCES, OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THE FOREGOING TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
ALWAYS USE DIMENSIONS AS SHOWN, DRAWINGS ARE NOT TO BE SCALED

PRELIMINARY FLOOR PLANS

NEW 4-STORY & CELLAR
7-FAMILY RESIDENTIAL BUILDING
LOCATED @ 4202 18 AVENUE,
BROOKLYN 11218 , NEW YORK

Client:

REVISIONS:

DRAWN BY:	RG
PROJECT No.:	13-166
DATE:	04-11-2014

DRAWING No.:

SK-001.00

X OF X

ATTACHMENT B
CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and AIG Builders 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, AIG Builders 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, Eric Ilijevich, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 442-8342.

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.

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS
1808 MIDDLE COUNTRY ROAD
RIDGE, NY 11961
PH: 631.504.6000
FAX: 631.928.2780

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

The library nearest the Site is:

Brooklyn Public Library - Mapleton Branch
1702 60th Street, Brooklyn, NY
Telephone Number: 718-256-2117
Hours of Operation:

Mon	closed
Tue	10:00AM - 6:00PM
Wed	10:00AM - 6:00PM
Thu	1:00PM - 8:00PM
Fri	10:00AM - 6:00PM
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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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 AIG Builders, reviewed and approved by OER prior to distribution and mailed by AIG Builders. 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:

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

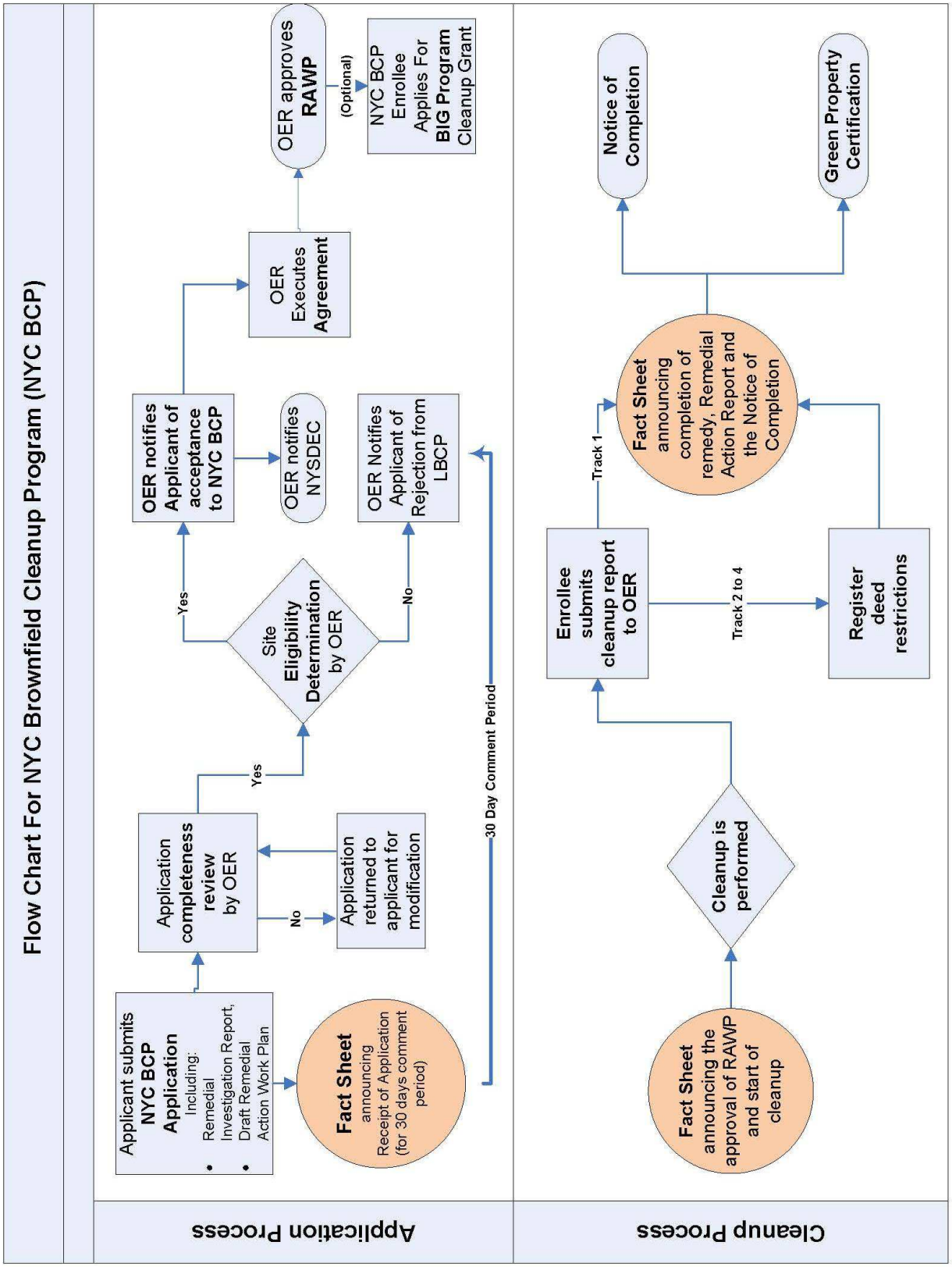
- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

  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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780



EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

be reported.

Paperless Voluntary Cleanup Program. AIG Builders 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. AIG Builders 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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. The outbound truck transport route is shown on Figure 8.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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

1.6 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in 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).

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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:

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

- 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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

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

1.11 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

ATTACHMENT E
HEALTH AND SAFETY PLAN

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Ph: 631.504.6000
Fax: 631.928.2780

4202 18th AVENUE
BROOKLYN, NEW YORK
Block 5409, Lot 30

CONSTRUCTION
HEALTH AND SAFETY PLAN

MARCH 2015

Prepared By:

EBC
ENVIRONMENTAL BUSINESS CONSULTANTS

1808 Middle Country Road
Ridge, NY 11961

TABLE OF CONTENTS
CONSTRUCTION HEALTH AND SAFETY PLAN
4202 18th Avenue, BROOKLYN, NY

STATEMENT OF COMMITMENT SC-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, February 2015)* 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

EBC
Environmental Business Consultants
Phone 631.504.6000 | Phone 631.504.6000
Fax: 631.924.2870 | Fax: 631.924.2870

CONSTRUCTION HEALTH AND SAFETY PLAN
4202 18th 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 4202 18th 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 4202 18th Avenue, Brooklyn, 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.
-

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

2.0 SITE BACKGROUND AND SCOPE OF WORK

The Site is located at 4202 18th Avenue in the Mapleton section of Brooklyn, New York, and is currently identified as Block 5409, Lot 30 on the New York City Tax Map. Lot 30 is a rectangular shaped lot consisting of 43.67 feet of street frontage on 18th Avenue and 97.02 feet of street frontage on East 3rd Street for a total of approximately 4,240 ft2. The Site is located on the west side of 18th Avenue and the north side of East 3rd Street and is bordered by a 1 & 2 family residential building to the north (814 East 3rd Street), 18th Avenue followed by several 1 & 2 family residential buildings to the south (4131-4205 18th Avenue), a 2-story office building to the west (4208 18th Avenue), and East 3rd Street followed by a grocery store to the east (4102 18th Avenue). The Site currently is developed with an auto sale and repair shop which occupies the northwest corner of the Site. The remainder of the Site is a paved parking area.

The development project consists of redeveloping the lot with a 4 story residential apartment building with a full cellar level accessory space for residential tenants. The cellar will contain tenant storage spaces, two laundry rooms, mechanical rooms, stairwells, and two bathrooms. The first floor will consist of two apartments, and a residential vestibule and staircases. The second, third and fourth floors will consist of apartments. Floors 1 through 4 will consist of residential apartments.

The building and cellar footprint will encompass 3,367 sf of the site and require the excavation to a depth of approximately 7 feet below grade. An estimated 873 cubic yards (1,309 tons) of soil will require excavation for the new building's cellar. The remaining 873 sf of the Site (the first 5 ft fronting East 3rd Street) will not require excavation and will feature concrete porches, stairs and landscaped areas.

The water table is expected at approximately 42 feet below grade surface (bgs), and will therefore not be encountered during excavation. The current zoning designation is 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 2015. The following Site history was established based on historic Sanborn maps: The Site was developed in 1929 with a 1-story building occupied by a filling station with three gasoline storage tanks located in the south end of the lot. From 1950 to 1993, the Site contained three USTs and the 1-story building had expanded towards the northern side of the Site. The building was occupied by an office, auto repair garage, a greasing garage, and an auto laundry garage. In 1994, the USTs were no longer shown on the maps and the building was listed as an auto repair shop. The site remained in this configuration until at least 2007.

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

The property is listed as a NYSDEC Spill Site with Spill No. 1215784 (closed on August 22, 2014), which was assigned as a result of a leaking on-site UST. The property was assigned E-designations (E-44) for hazmat during the Ocean Parkway District Rezoning action completed by the city in August 1993 (CEQR 93DCP013K).

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

1. Installed 4 soil borings across the Site, and collected 9 soil for chemical analysis from the soil borings to evaluate soil quality;
2. Installed 3 groundwater monitoring wells throughout the Site and collected 3 groundwater samples and one duplicate groundwater sample for chemical analysis to evaluate groundwater quality; and
3. Installed 2 sub-slab soil gas implants and 2 soil vapor probes across the Site and collected 4 samples for chemical analysis.

Summary of Environmental Findings

1. The elevation of the Site is approximately 47 feet.
1. Depth to groundwater is estimated to be approximately 42 feet below sidewalk grade.
2. Regional groundwater flow is generally southwest.
3. Depth to bedrock is at the Site is greater than 100 feet.
2. The stratigraphy of the Site from the surface down consists of historic fill material to depths as great as 4 feet, underlain by native brown sand.
3. Soil/fill samples results 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. Soil/fill results showed no PCBs and trace concentrations of several VOCs, but none above Unrestricted Use SOCs. One VOC, methylene chloride was detected above Unrestricted Use SCOs in trip blank. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benz(a)anthracene (max. of 3,200 µg/kg), benzo(a)pyrene (max. of 2,700 µg/kg), benzo(b)fluoranthene (max. of 3,300 µg/kg) and dibenz(a,h)anthracene (max. of 360 µg/kg), exceeding Restricted Residential Use SCOs within one of the three shallow soil samples. Several metals including chromium (max of 41.4 mg/kg) in one of nine samples, lead (max. of 114 mg/kg) in one of nine samples, and nickel (max. of 75.2 mg/kg) in four of nine samples exceeded Unrestricted Use SCOs. No metals exceeded Restricted Residential use SCOs. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.
4. Groundwater samples results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater results showed no PCBs or pesticides in any sample. Several VOCs exceeded their GQSs in first round of groundwater sampling. During groundwater resampling, trace concentrations of several VOCs were detected, but none exceeded their GQS. Several metals were identified in groundwater, but only iron (max. of 0.88 mg/L), manganese (1.5 mg/L), and sodium (max. of 68.9 mg/L) exceeded their respective GQS.
5. Soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guidance Values derived by the New York State Department of Health (NYSDOH) located in the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006. Soil vapor samples collected during the RI showed moderate levels of petroleum-related VOCs and low levels of chlorinated VOCs. The total concentration

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

of petroleum-related VOCs (BTEX) ranged from 49.5 µg/m3 to 88.72 µg/m3. Highest concentrations were detected for acetone (max. of 337 µg/m3). The chlorinated VOCs, trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA) were detected in two of the four soil gas samples at a maximum concentration of 0 1.25 µg/m3 and 9.87 µg/m3 respectively. Tetrachloroethylene (PCE) was detected in all four soil gas samples with a maximum concentration of 6.35 µg/m3 and carbon tetrachloride was detected in all samples with a maximum concentration of 0.69 µg/m3. Concentrations of the chlorinated VOCs were below the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

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 vapor barrier beneath the proposed building's slab and sidewalls to grade.

2.2 Redevelopment Plans

The development project consists of redeveloping the lot with a 4-story residential apartment building with cellar level accessory space for residential tenants. The cellar will contain 10 individual storage spaces for the apartments above, as well as two accessory cellars to the apartments above on the 1st floor, two laundry rooms, mechanical rooms, stairwells, and two bathrooms. The first floor will be approximately 4 feet above sidewalk grade and will consist of two apartments, and the residential vestibule and staircases. The second, third and fourth floors will consist of apartments.

The cellar will require excavation of 69% of the lot to a depth of approximately 7 feet below grade. An estimated 873 cubic yards (1,309 tons) of soil will require excavation for the new building's cellar. The remaining 873 sf of the Site (the first 5 ft fronting East 3rd Street) will not be excavated and will feature concrete porches, stairs and landscaped areas. The water table is expected at approximately 42 feet below grade surface (bgs), and will therefore not be encountered during excavation.

The current zoning designation is R6A. The proposed use is consistent with existing zoning for the property. Layout of the proposed site development is presented in Figure 3.

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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 or 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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 $\mu g/m^3$ 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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;

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

- 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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	• Continue excavating • Level D protection • Continue monitoring every 10 minutes
1-5 ppm Above Background, Sustained Reading	1-10%	• Continue excavating • Go to Level C protection or employ engineering controls • Continue monitoring every 10 minutes
5-25 ppm Above Background, Sustaineed Reading	10-20%	• 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%	• 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 then 5 ppm (see Community Air Monitoring Plan).

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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.

EBC
Environmental Business Consultants
1808 Middle Country Road
Ridge, NY 11961
Phone 631.504.6000
Fax 631.924.2870

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 BREIFING 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.

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

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

N O T E S

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.

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.

BENZO(a)PYRENE

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
PALE-YELLOW CRYSTALS

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Reacts with strong oxidants causing fire and explosion hazard.

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).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

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

EFFECTS OF SHORT-TERM EXPOSURE:

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.

PHYSICAL PROPERTIES

Boiling point: 496°C
Melting point: 178.1°C
Density: 1.4
g/cm³

Solubility in water: none (<0.1 g/100 ml)
Vapour pressure :
negligible
Octanol/water partition coefficient as log Pow: 6.04

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.

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

(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(b)FLUORANTHENE

ICSC: 0720

Benz(e)acephenanthrylene
2,3-Benzofluoroanthene
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

IMPORTANT DATA	**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.

N O T E S

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/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

(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(k)FLUORANTHENE

ICSC: 0721

Dibenzo(b,jk)fluorene
8,9-Benzofluoranthene
11,12-Benzofluoranthene
$C_{20}H_{12}$
Molecular mass: 252.3

ICSC # 0721
CAS # 207-08-9
RTECS # DF6350000
EC # 601-036-00-5
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 if powder.	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: 0721

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(k)FLUORANTHENE

ICSC: 0721

I M	**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.

P O R T A N T D A T A	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK: Carcinogen category: 2; (DFG 2004). **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.
PHYSICAL PROPERTIES	Boiling point: 480°C Melting point: 217°C Solubility in water: none Octanol/water partition coefficient as log Pow: 6.84
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 crustacea and in fish.

N O T E S

Benzo(k)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(k)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m^3. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

(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

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

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

CHRYSENE

ICSC: 1672

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO BEIGE CRYSTALS OR POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006).
MAK not established.

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed

EFFECTS OF SHORT-TERM EXPOSURE:

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

PHYSICAL PROPERTIES

Boiling point: 448°C
Melting point: 254 - 256°C
Density: 1.3 g/cm³

Solubility in water:
very poor
Octanol/water partition coefficient as log Pow: 5.9

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.

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

(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

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

1,25,6-Dibenzanthracene
$C_{22}H_{14}$
Molecular mass: 278.4

ICSC # 0431
CAS # 53-70-3
RTECS # HN2625000
EC # 601-041-00-2
October 23, 1995 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	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: P3 filter respirator for toxic particles.	Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0431

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

DIBENZO(a,h)ANTHRACENE

ICSC: 0431

I M P O

PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALLINE POWDER.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration

R T A N T D A T A	**CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the skin , resulting in photosensitization. This substance is probably carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 524°C Melting point: 267°C Relative density (water = 1): 1.28	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.5
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in seafood.	

N O T E S

This 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. DBA is a commonly used name. This substance is one of many polycyclic aromatic hydrocarbons (PAH).

ADDITIONAL INFORMATION

ICSC: 0431 **DIBENZO(a,h)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.

Material Safety Data Sheet

Version 3.1
Revision Date 03/22/2010
Print Date 12/09/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Dibenzofuran

Product Number : 236373
Brand : Aldrich

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

HMIS Classification
Health hazard: 2
Flammability: 1
Physical hazards: 0

NFPA Rating
Health hazard: 2
Fire: 1
Reactivity Hazard: 0

Potential Health Effects

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Diphenylene oxide

Formula : $C_{12}H_8O$
Molecular Weight : 168.19 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Dibenzofuran			
132-64-9	205-071-3	-	-

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.

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 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 dust mask type N95 (US) or type P1 (EN 143) 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
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	crystalline
Colour	white, beige

Safety data

pH	no data available
Melting point	80 - 82 °C (176 - 180 °F) - lit.
Boiling point	154 - 155 °C (309 - 311 °F) at 27 hPa (20 mmHg) - lit.
Flash point	130.0 °C (266.0 °F) - closed cup
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 3.77

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

11. TOXICOLOGICAL INFORMATION

Acute toxicity
no data available

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

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	May be 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: HP4430000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	NOEC - Cyprinodon variegatus (sheepshead minnow) - 1 mg/l - 96.0 h
	LC50 - Pimephales promelas (fathead minnow) - 1.05 mg/l - 96.0 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

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.

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: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Dibenzofuran)
Reportable Quantity (RQ): 100 lbs
Marine pollutant: Marine pollutant
Poison Inhalation Hazard: No

IMDG

UN-Number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Dibenzofuran)
Marine pollutant: Marine pollutant

IATA
UN-Number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenzofuran)

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion

DSL Status
All components of this product are on the Canadian DSL list.

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

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information
Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
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.

International Chemical Safety Cards

INDENO(1,2,3-cd)PYRENE

ICSC: 0730

o-Phenylenepyrene
2,3-Phenylenepyrene
$C_{22}H_{12}$
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 **M** **P**	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS **PHYSICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:**

O R T A N T D A T A	**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.	

N O T E S

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/m^3. 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

CHROMIUM

ICSC: 0029

Chrome
Cr
Atomic mass: 52.0
(powder)

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000
October 27, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	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
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		R: S:

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0029

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

CHROMIUM

ICSC: 0029

I M P

PHYSICAL STATE; APPEARANCE:
GREY POWDER

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

ROUTES OF EXPOSURE:

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed.

O R T A N T D A T A	**CHEMICAL DANGERS:** Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004). MAK not established. OSHA PEL*: TWA 1 mg/m^3 See Appendix C *Note: The PEL also applies to insoluble chromium salts. NIOSH REL: TWA 0.5 mg/m^3 See Appendix C NIOSH IDLH: 250 mg/m^3 (as Cr) See: 7440473	**EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation tothe eyesandthe respiratory tract. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm³	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

ICSC: 0029 **CHROMIUM**

(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

NICKEL

ICSC: 0062

Ni
Atomic mass: 58.7
(powder)

ICSC # 0062
CAS # 7440-02-0
RTECS # QR5950000
EC # 028-002-00-7
October 17, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
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!	
•INHALATION	Cough. Shortness of breath.	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.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place. Personal protection: P2 filter respirator for harmful particles.	Separated from strong acids.	Xn symbol R: 40-43 S: 2-22-36

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0062

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

NICKEL

ICSC: 0062

I

PHYSICAL STATE; APPEARANCE:
SILVERY METALLIC SOLID IN VARIOUS FORMS.

PHYSICAL DANGERS:

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of the dust.

M P O R T A N T D A T A	Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (Inhalable fraction) 1.5 mg/m³ as TWA A5 (not suspected as a human carcinogen); (ACGIH 2004). MAK: (Inhalable fraction) sensitization of respiratory tract and skin (Sah); Carcinogen category: 1; (DFG 2004). OSHA PEL*†: TWA 1 mg/m^3 *Note: The PEL does not apply to Nickel carbonyl. NIOSH REL*: Ca TWA 0.015 mg/m^3 See Appendix A *Note: The REL does not apply to Nickel carbonyl. NIOSH IDLH: Ca 10 mg/m^3 (as Ni) See: 7440020	**INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation. Inhalation of fumes may cause pneumonitis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 2730°C Melting point: 1455°C Density: 8.9 g/cm3	Solubility in water: none
ENVIRONMENTAL DATA		

N O T E S

At high temperatures, nickel oxide fumes will be formed. Depending on the degree of exposure, periodic medical examination is suggested. The symptoms of asthma 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. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

ADDITIONAL INFORMATION

(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.

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.)

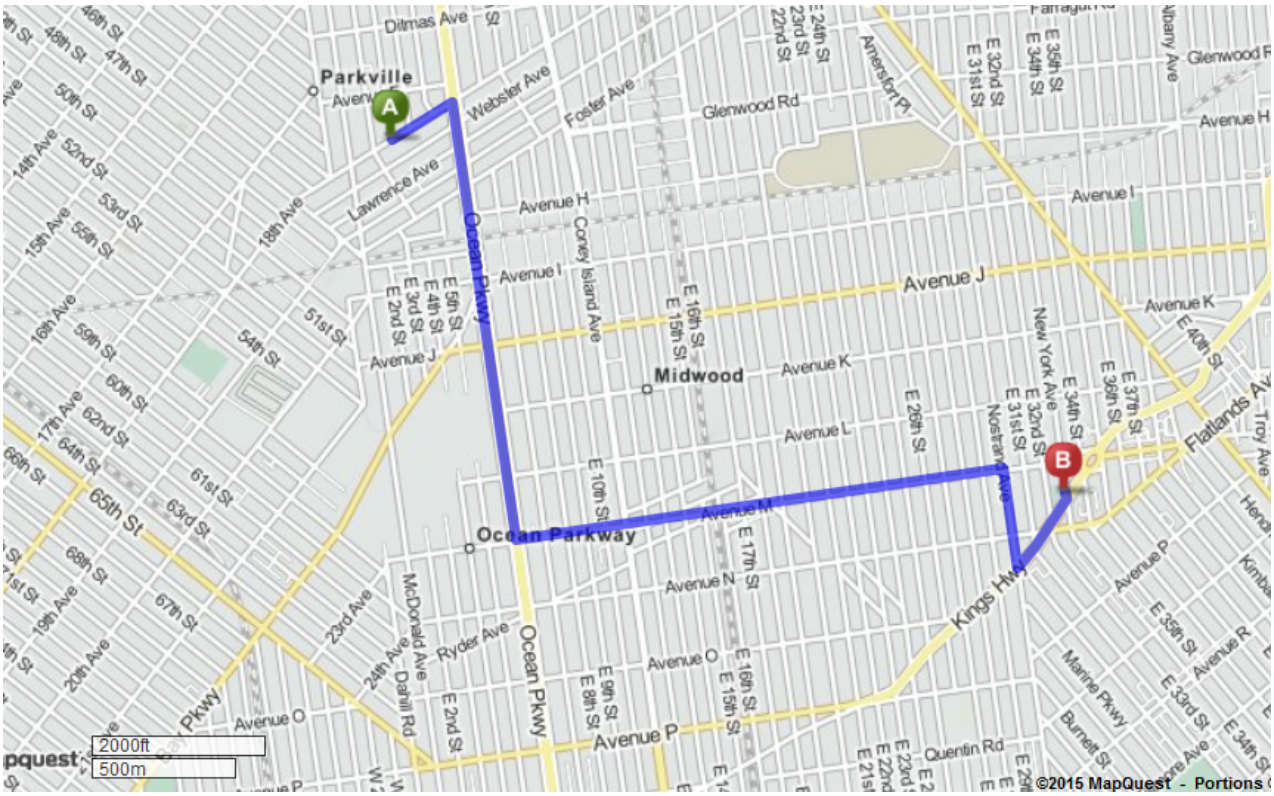
INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

HOSPITAL INFORMATION AND MAP

The hospital nearest the site is:

Mount Sinai Beth Israel

3201 Kings Highway, Brooklyn
718-252-3000
3.06 Miles – About 8 Minutes



START:
A 4202 18th Avenue, Brooklyn

Head northeast on 18th Avenue toward E 3rd Street

Turn right onto Ocean Parkway

Turn left onto Avenue M

Turn right onto Nostrand Ave

Turn left onto Kings Highway

Slight left onto New York Avenue

Turn sharp left onto Kings Highway

HOSPITAL:
B 3201 Kings Highway is on the right

ATTACHMENT F
Vapor Barrier Specifications

VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

RAVEN INDUSTRIES

Product Description

VaporBlock® Plus™ 20 is a seven-layer co-extruded barrier made from state-of-the-art polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission. VaporBlock® Plus™ 20 is a highly resilient underslab / vertical wall barrier designed to restrict naturally occurring gases such as radon and/or methane from migrating through the ground and concrete slab. VaporBlock® Plus™ 20 is more than 100 times less permeable than typical high-performance polyethylene vapor retarders against Methane, Radon and other harmful VOCs.

VaporBlock® Plus™ 20 is one of the most effective underslab gas barriers in the building industry today far exceeding ASTM E-1745 (Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs) Class A, B and C requirements. Available in a 20 (Class A) mil thicknesses designed to meet the most stringent requirements. VaporBlock® Plus™ 20 is produced within the strict guidelines of our ISO 9001:2008 Certified Management System.

Product Use

VaporBlock® Plus™ 20 resists gas and moisture migration into the building envelop when properly installed to provide protection from toxic/harmful chemicals. It can be installed as part of a passive or active control system extending across the entire building including floors, walls and crawl spaces. When installed as a passive system it is recommended to also include a ventilated system with sump(s) that could be converted to an active control system with properly designed ventilation fans.

VaporBlock® Plus™ 20 works to protect your flooring and other moisture-sensitive furnishings in the building's interior from moisture and water vapor migration, greatly reducing condensation, mold and degradation.

Size & Packaging

VaporBlock® Plus™ 20 is available in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements.

Under-Slab Vapor/Gas Retarder

Product	Part #
VaporBlock Plus 20	VBP20

APPLICATIONS

- Radon Barrier
- Methane Barrier
- VOC Barrier
- Under-Slab Vapor Retarder
- Foundation Wall Vapor Retarder

VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

PROPERTIES	TEST METHOD	VAPORBLOCK PLUS 20 IMPERIAL	VAPORBLOCK PLUS 20 METRIC
Appearance		White/Gold	
Thickness, Nominal		20 mil	0.51 mm
Weight		102 lbs/MSF	498 g/m²
Classification	ASTM E 1745	CLASS A, B & C	
Tensile Strength lbf/in (N/cm) average MD & TD (new material)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
Impact Resistance	ASTM D 1709	2600 g	
Maximum Use Temperature		180° F	82° C
Minimum Use Temperature		-70° F	-57° C
Permeance (new material)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.0098 Perms grains/(ft²·hr·in·Hg)	0.0064 Perms g/(24hr·m²·mm Hg)
(after conditioning) Perms (same measurement as above permeance)	ASTM E 154 Section 8, E96 Section 11, E96 Section 12, E96 Section 13, E96	0.0079 0.0079 0.0097 0.0113	0.0052 0.0052 0.0064 0.0074
WVTR	ASTM E 96 Procedure B	0.0040 grains/hr-ft²	0.0028 gm/hr-m²
Radon Diffusion Coeffiecient	K124/02/95	< 1.1 x 10^{-13} m²/s	
Methane Permeance	ASTM D 1434	< 1.7 x 10^{-10} m²/d• atm 0.32 GTR (Gas Transmission Rate) ml/m²•D•ATM	

VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.
Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.
ASTM E-1643 also provides general installation information for vapor retarders.

VaporBlock® Plus™ UNDERSLAB VAPOR RETARDER / GAS BARRIER

VaporBlock® Plus™ is a seven-layer co-extruded barrier made using high quality virgin-grade polyethylene and EVOH resins to provide unmatched impact strength as well as superior resistance to gas and moisture transmission.

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or