

**REDEVELOPMENT PROJECT  
390-398 WALLABOUT STREET  
BROOKLYN, NEW YORK**

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**Remedial Action Work Plan**

**NYC VCP Number: 12CVCP056K**

**Prepared for:**

The Rabsky Group, LLC  
39 Heyward Street  
Brooklyn, NY 11211

**Prepared by:**

***EBC***

***ENVIRONMENTAL BUSINESS CONSULTANTS***

1808 Middle Country Road  
Ridge, NY 11961

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**MAY 2012**



May 29, 2012

New York City Office of Environmental Remediation  
City Brownfield Cleanup Program  
c/o Shaminder Chawla  
100 Gold Street, 2<sup>nd</sup> Floor  
New York, NY 10038

**Re: 12CBCP056K**  
**390 Wallabout Street, Brooklyn, NY**  
**Remedial Action Work Plan (RAWP) Stipulation List**

Dear Mr. Chawla:

Environmental Business Consultants (EBC) hereby submits a Remedial Action Work Plan (RAWP) Stipulation List for the Site to the New York City Office of Environmental Remediation (NYCOER) on behalf of The Rabsky Group, LLC. This letter serves as an addendum to the RAWP to stipulate additional content, requirements and procedures that will be followed during the Site remediation. The contents of this list are added to the RAWP and will supersede the content in the RAWP where there is a conflict in purpose or intent. The additional requirements/procedures include the following:

#### STIPULATION LIST

1. The criterion attached in Addendum 1 will be utilized if a petroleum containing tank or vessel is identified during the remedial action or subsequent redevelopment excavation activities. All petroleum spills will be reported to the NYSDEC hotline as required by applicable laws and regulations. This contingency plan is designed for heating oil tanks and other small or moderately sized storage vessels. If larger tanks, such as gasoline storage tanks are identified, OER will be notified before this criterion is utilized.
2. The five 25 ft wide tax lots will be developed with identical residential four-story masonry buildings with full cellars. Each of the five buildings will extend approximately 65 feet, meeting both side lot lines. Therefore, the gross building square footage for each building is 8,125 ft<sup>2</sup>. There will be a rear cellar level walk-out court yard behind each building, that will be extend from the rear of the building to the rear property line. The concrete slab of the cellar will be approximately 6 feet 4 inches below sidewalk level. The street front portion of the cellar will consist of a boiler room, gas meter room, electric meter room and a large open cellar area. The remaining portions of the cellar for each building will consist of two bedrooms, two bathrooms, and a laundry/Passover kitchen that are connected to the first floor residential unit of each building. Each building will consist of three residential units.

Excavation for each new building and the rear cellar-level courtyard will likely extend to a depth of approximately 8 feet below grade for construction of the buildings' cellar levels and foundations. *A thin 3 foot by 15 foot area immediately between each of the*



*five proposed new buildings and the sidewalk does not require excavation for construction of the new buildings.* Assuming an excavation volume of approximately 25 feet (wide) by 100 feet long (length) and 8 feet (deep), a total of approximately 740 cubic yards (1,000 tons) of soil will require excavation per building. The total excavated volume of soil for the entire Site will be approximately 3,700 cubic yards (5,000 tons). The rear cellar level court yard will be capped with concrete.

2. Post-remedial endpoint sampling will be conducted in accordance with RAWP Section 4.2. A map indicating post-remedial End Point Sampling Locations is attached as Addendum 2.
3. Engineering plans signed and stamped by the PE showing the vapor barrier design (cross-section and plan showing horizontal extent), and sub-slab depressurization system design are attached in Addendum 4 .
4. This NYC BCP project involving the removal and transportation of hazardous waste may be subject to the New York State Department of Environmental Conservation's Special Assessment Tax (ECL 27-0923) and Hazardous Waste Regulatory Fees (ECL 72-00402). See DEC's website for more information:  
<http://www.dec.ny.gov/chemical/9099.html>.
5. A CD containing the final RAWP including this approved Stipulation List will be placed in the library that constitutes the primary public repository for project documents.
6. Signage for the project will include a sturdy placard mounted in a publically accessible right of way to building and other permits signage will consist of the NYC BCP Information Sheet (attached Addendum 4) announcing the remedial action. The Information sheet will be laminated and permanently affixed to the placard.
7. Signed and stamped RAWP certification page is attached in Addendum 5.

Sincerely,

**Environmental Business Consultants**



Kevin Brussee

## **Addendum 1**

# Generic Procedures for Management of Underground Storage Tanks identified under the NYC BCP

Prior to Tank removal, the following procedures should be followed:

- Remove all fluid to its lowest draw-off point.
- Drain and flush piping into the tank.
- Vacuum out the “tank bottom” consisting of water product and sludge.
- Dig down to the top of the tank and expose the upper half.
- Remove the fill tube and disconnect the fill, gauge, product, vent lines and pumps. Cap and plug open ends of lines.
- Temporarily plug all tank openings, complete the excavation, remove the tank and place it in a secure location.
- Render the tank safe and check the tank atmosphere to ensure that petroleum vapors have been satisfactorily purged from the tank.
- Clean tank or remove to storage yard for cleaning.
- If the tank is to be moved, it must be transported by licensed waste transporter. Plug and cap all holes prior to transport leaving a 1/8 inch vent hole located at the top of the tank during transport.
- After cleaning, the tank must be made acceptable for disposal at a scrap yard, cleaning the tanks interior with a high pressure rinse and cutting the tank in several pieces.

During the tank and pipe line removal, the following field observations should be made and recorded:

- A description and photographic documentation of the tank and pipe line condition (pitting, holes, staining, leak points, evidence of repairs, etc.).
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation, with a calibrated photoionization detector (PID).

### Impacted Soil Excavation Methods

The excavation of the impacted soil will be performed following the removal of the existing tanks. Soil excavation will be performed in accordance with the procedures described under Section 5.5 of Draft DER-10 as follows:

- A description and photographic documentation of the excavation.
- Examination of the excavation floor and sidewalls for physical evidence of contamination (odor, staining, sheen, etc.).
- Periodic field screening (through bucket return) of the floor and sidewalls of the excavation, with calibrated photoionization detector (PID).

Final excavation depth, length, and width will be determined in the field, and will depend on the horizontal and vertical extent of contaminated soils as identified through physical examination (PID response, odor, staining, etc.). Collection of verification samples will be performed to evaluate the success of the removal action as specified in this document.

The following procedure will be used for the excavation of impacted soil (as necessary and appropriate):

- Wear appropriate health and safety equipment as outlined in the Health and Safety Plan.
- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated.
- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile, or dispose of, separate from the impacted soil.
- If additional UST's are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued trenching around the perimeter to minimize its disturbance.
- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc.) an attempt will be made to remove it, to the extent not limited by the site boundaries or the bedrock surface. If possible, physically impacted soil will be removed

using the backhoe or excavator, segregated from clean soils and overburden, and staged on separated dedicated plastic sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present.

- Excavated soils which are temporarily stockpiled on-site will be covered with tarp material while disposal options are determined. Tarp will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property.

Once the site representative and regulatory personnel are satisfied with the removal effort, verification of confirmatory samples will be collected from the excavation in accordance with DER-10.



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# **Addendum 2** End Point Sampling Plan

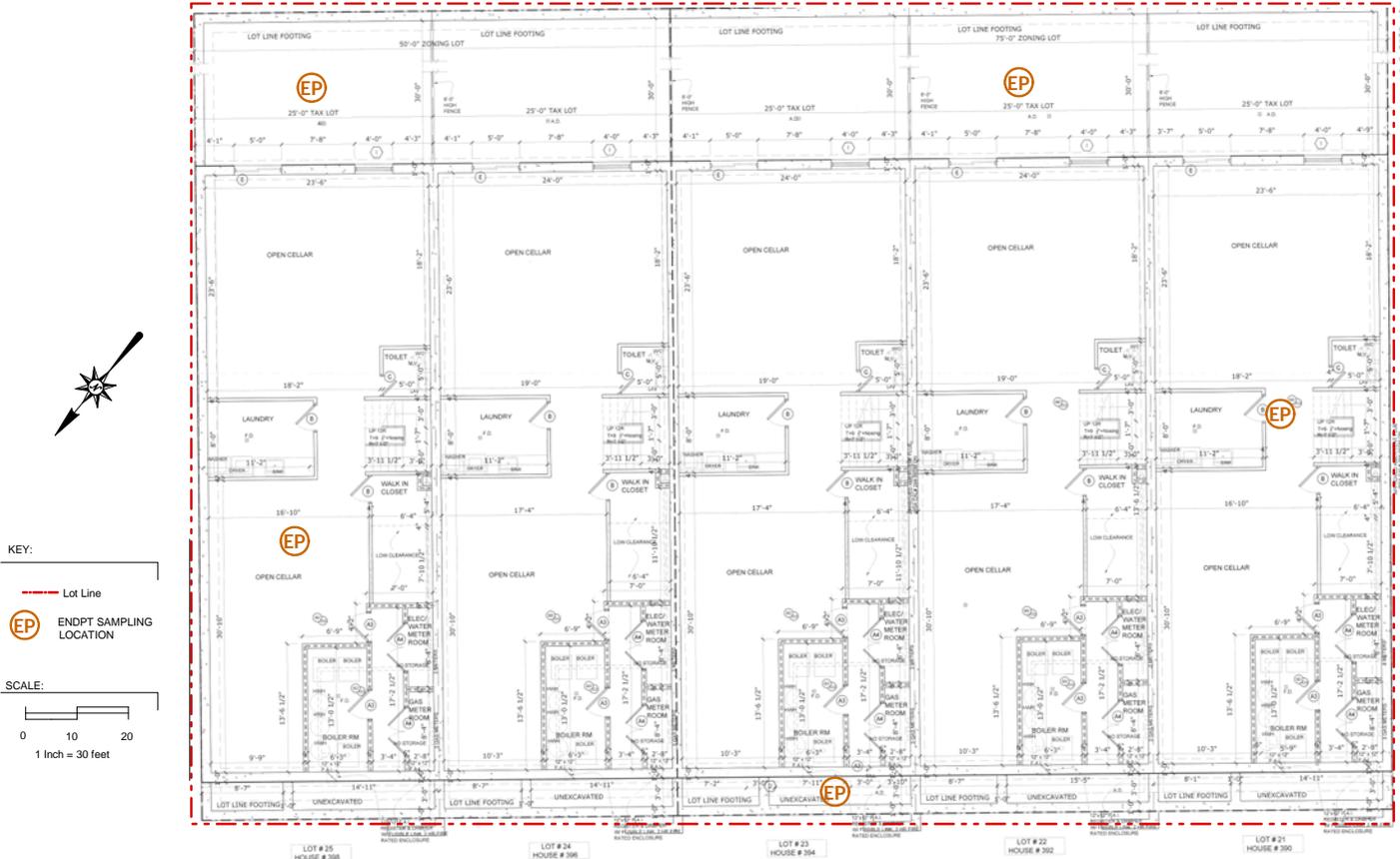


*ENVIRONMENTAL BUSINESS CONSULTANTS*

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RIDGE, NY 11961

PHONE 631.504.6000  
FAX 631.924.2870

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KEY:

--- Lot Line

EP ENDPT SAMPLING LOCATION

SCALE:

0 10 20  
1 Inch = 30 feet

WALLABOUT STREET



**ENVIRONMENTAL BUSINESS CONSULTANTS** Phone 631.504.6000  
180B MIDDLE COUNTRY ROAD, RIDGE, NY 11961 Fax 631.924.2780

390-398 WALLABOUT STREET  
BROOKLYN, NY 11206

**FIGURE 1** ENDPOINT SAMPLING LOCATIONS



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# Addendum 3 Signage



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## NYC Voluntary Cleanup Program

This property is enrolled in the New York City Voluntary Cleanup Program for environmental remediation. This is a voluntary program administered by the NYC Office of Environmental Remediation.

For more information, log on to:

[www.nyc.gov/oer](http://www.nyc.gov/oer)



If you have questions or would like more information, please contact:

Shaminder Chawla at (212) 788-8841  
or email us at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov)

390 Wallabout Street Site  
Site #: 12CVCP056K



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# **Addendum 4** Vapor Barrier and SSDS Design



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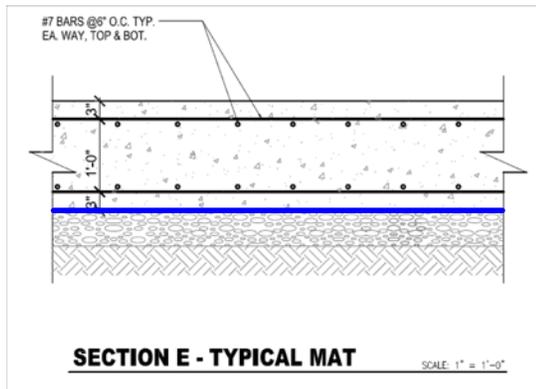
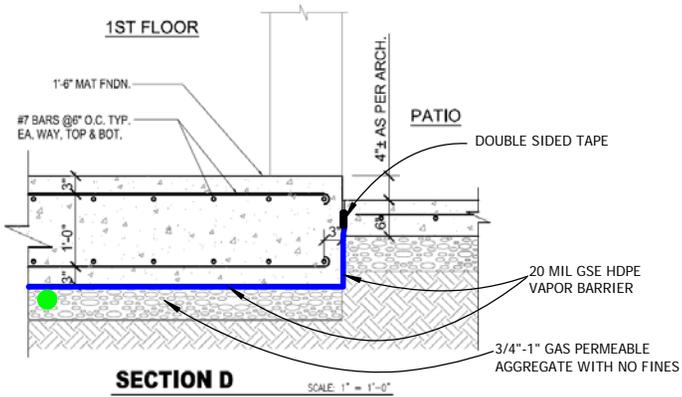
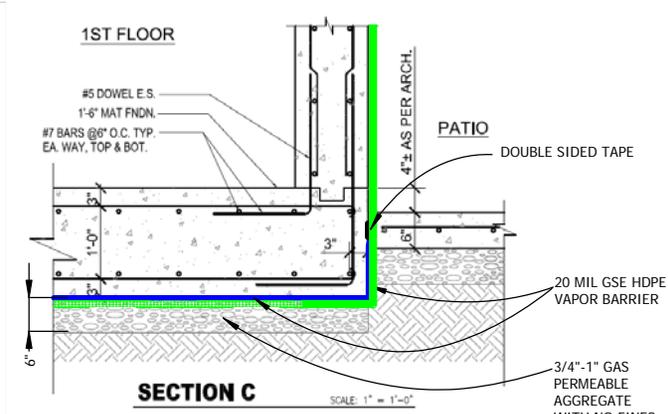
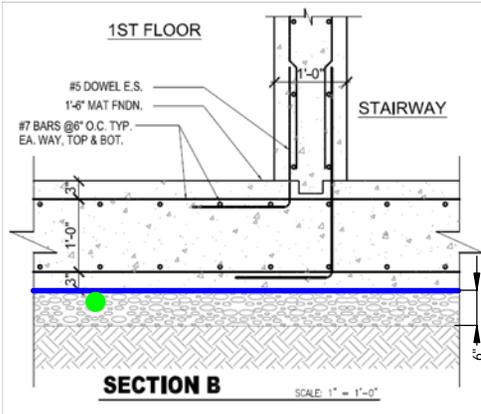
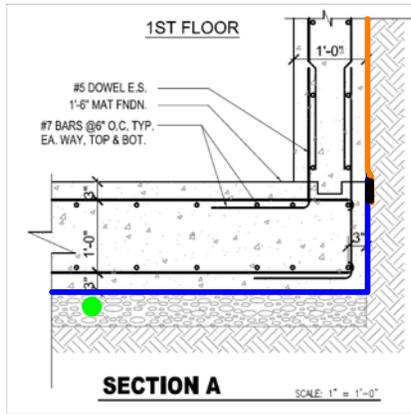


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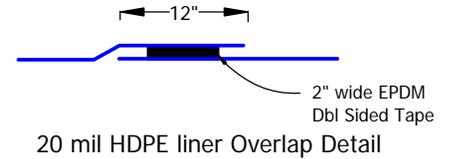
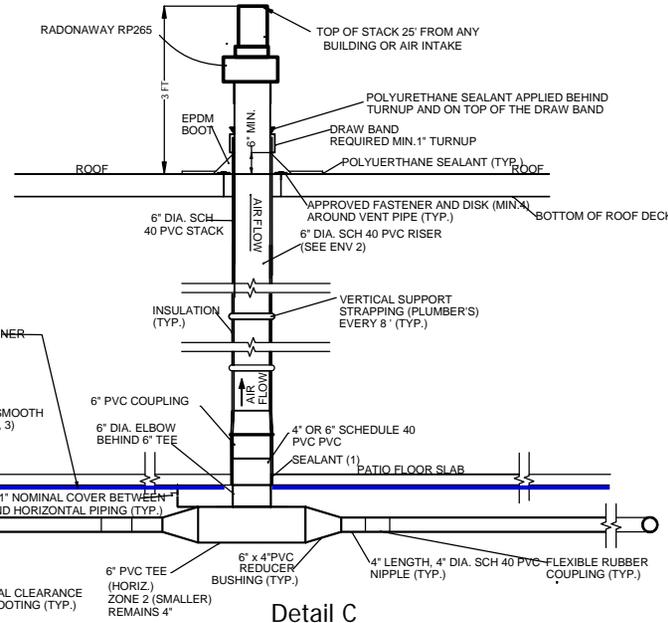


SEAL WITH MANUFACTURER  
SUPPLIED TAPE

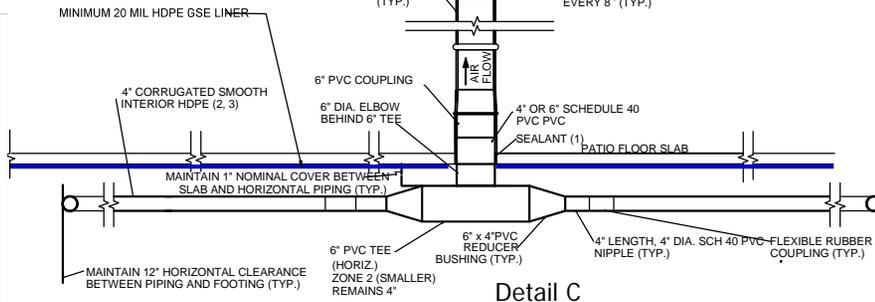
	<p>AMC ENGINEERING PLLC 99 JERICHO TURNPIKE SUITE 300J JERICHO, NY 11753 (516) 417-8588</p>
	<p>PROJECT 390-398 Wallabout Street Brooklyn, NY 11206 Block 2266 Lots 21, 22, 23, 24, 25</p>
<p>TITLE <b>FIGURE 6 SSDS RISER</b></p>	
<p>SEAL &amp; SIGNATURE  </p>	<p>DATE: JUN 11, 2012 PROJECT No: DRAWING BY: AC CHK BY: DWG No: <b>ENV-2.01</b> CADD FILE No: 1 of 3</p>



Detail B



Detail C



**NOTES:**

1. SEAL OPENING WITH ELASTOMERIC JOINT SEALANT AS DEFINED IN ASTM C920.
2. HIGH DENSITY POLYETHYLENE CORRUGATED PERFORATED PIPE WITH SMOOTH INTERIOR WATERWAY. ADS N-12 OR APPROVED EQUAL.
3. WRAP 4" HDPE PIPE WITH GEOTEXTILE FABRIC, GSE NW4 OR APPROVED EQUAL.
4. EBC/AMC MUST PRE-APPROVE ALL FILLMATERIAL BEFORE DELIVERY TO SITE.



AMC ENGINEERING PLLC  
99 JERICHO TURNPIKE  
SUITE 300J  
JERICHO, NY 11753  
(516) 417-8588

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PROJECT  
390-398 Wallabout Street  
Brooklyn, NY 11206  
Block 2266 Lots 21, 22, 23, 24, 25

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TITLE:  
**FIGURE 7  
SSDS DETAILS**

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SEAL & SIGNATURE

DATE: JUN 11, 2012  
PROJECT No:  
DRAWING BY: AC  
CHK BY:  
DWG No:  
**ENV-3.01**  
CADO FILE No: 3 of 3



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# Addendum 5 RAWP Certification Page



*ENVIRONMENTAL BUSINESS CONSULTANTS*

1808 MIDDLE COUNTRY ROAD  
RIDGE, NY 11961

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FAX 631.924.2870

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# 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 Project located at 390 to 398 Wallabout Street in Brooklyn, NY, Site number 12CVCP056K.

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.

Ariel Czemerinski

Name

076508

NYS PE License Number

Signature

5/29/2012

Date



# **REMEDIAL ACTION WORK PLAN**

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Table 1	Imported Backfill and Clean Soil Limits
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## ***FIGURES***

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Figure 1	Site Location Map
Figure 2	Site Plan
Figure 3	Layout of Proposed Site Development
Figure 4	Surrounding Land Usage
Figure 5	SSDS and Vapor Barrier Extent
Figure 6	SSDS and Vapor Barrier Installation Details

## ***APPENDICES***

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Appendix A	Proposed Development Plans
Appendix B	Citizen Participation Plan
Appendix C	Sustainability Statement
Appendix D	Soil Materials Management Plan
Appendix E	Construction Health and Safety Plan
Appendix F	Community Air Monitoring Plan (CAMP)
Appendix G	Vapor Barrier Specifications

## LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
VCA	Voluntary Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer

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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 Project located at 390 to 398 Wallabout Street in Brooklyn, NY, Site number 12CVCP056K.

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



## EXECUTIVE SUMMARY

The Rabsky Group has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 12,500-square foot site located at 390 to 398 Wallabout Street in 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 390 to 398 Wallabout Street in the Williamsburg section in Brooklyn, New York and is identified as Block 2266, Lots 21, 22, 23, 24 and 25 on the New York City Tax Map. **Figure 1** shows the Site location. The Site is 12,500-square feet and is bounded by Wallabout Street to the north, a vacant lot, 2 residential buildings, and a parking lot to the south, a 1-story commercial building and an undeveloped lot to the east, and a construction site to the west. A map of the Site boundary is shown in **Figure 2**. Currently, the undeveloped lots of the Site (Lots 21, 22, 23 and 24) are used as a parking lot for a car and truck rental company, and the Lot developed with a one-story concrete block building (Lot 25) is used as a tire repair facility. Each of the 5 Site Lots is rectangular, consisting of 25 feet of street frontage on Wallabout Street and a depth of 100 feet.

### Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of five identical 4-story apartment buildings. Layout of the proposed Site development is presented in **Figure 3**. The current zoning designation for each of the Site Lots is R7A. R7A is a contextual district that allows residential and community facility buildings. The proposed use is consistent with existing zoning for the property.

The five 25 ft wide tax lots will be developed with identical residential four-story masonry buildings with full cellars. Each of the five buildings will extend approximately 65 feet, meeting both side lot lines. Therefore, the gross building square footage for each building is 8,125 ft<sup>2</sup>.



There will be a rear cellar level walk-out court yard behind each building, that will be extend from the rear of the building to the rear property line. The concrete slab of the cellar will be approximately 6 feet 4 inches below sidewalk level. The street front portion of the cellar will consist of a boiler room, gas meter room, electric meter room and a large open cellar area. The remaining portions of the cellar for each building will consist of two bedrooms, two bathrooms, and a laundry/Passover kitchen that are connected to the first floor residential unit of each building. Each building will consist of three residential units.

Excavation for each new building and the rear cellar-level courtyard will likely extend to a depth of approximately 8 feet below grade for construction of the buildings' cellar levels and foundations. Assuming an excavation volume of approximately 25 feet (wide) by 100 feet long (length) and 8 feet (deep), a total of approximately 740 cubic yards (1,000 tons) of soil will require excavation per building. The total excavated volume of soil for the entire Site will be approximately 3,700 cubic yards (5,000 tons). The rear cellar level court yard will be capped with concrete.

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

### **Summary of the Remedy**

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and implementation of a Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.

3. Establishment of Track 4 Site-Specific SCOs.
4. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs.
5. Collection and analysis of end-point samples to determine attainment of Track 4 Site-Specific SCOs.
6. Construction and maintenance of an engineered composite cover across the entire Site to prevent human exposure to residual soil/fill remaining under the Site.
7. Installation of a vapor barrier system beneath the foundation and sidewalls.
8. Installation and operation of an active sub-slab depressurization system.
9. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
10. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
11. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of any contaminated media on-Site.
12. Removal of underground storage tanks and closure of petroleum spills (if encountered) in compliance with applicable local, State and Federal laws and regulations.
13. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
14. 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.
15. Demarcation of residual soil/fill.
16. Import of materials to be used for backfill and cover in compliance with this plan and in accordance 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 RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, and lists any changes from this RAWP.

19. If Track 1 Unrestricted Use SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual historic fill, including plans for inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
20. If Track 1 Unrestricted use SCOs are not achieved, recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) vegetable gardening and farming; (2) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (3) higher level of land usage without OER-approval.

## COMMUNITY PROTECTION STATEMENT

The Office of Environmental Remediation created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies that show the location of contamination at the Site, and describes the plans to clean up the Site to protect public health and the environment.

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

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

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

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

**Health and Safety Plan.** This cleanup plan includes a Health and Safety Plan 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. This plan includes many protective elements including those discussed below.

**Site Safety Coordinator.** This project has a designated Site safety coordinator to implement the Health and Safety Plan. The 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 to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

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

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and 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 Kevin Brussee at 631-504-6000 or NYC Office of Environmental Remediation Project Manager Hannah Moore 212-788-8841.

**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 EBC Project Manager Kevin Brussee 631-504-6000, the NYC Office of Environmental Remediation Project Manager Hannah Moore 212-788-8841, 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 in the public document repositories located at Bushwick Library (340 Bushwick Avenue).

**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 Office of Environmental Remediation. Requirements that the property owner must comply with are defined in the property's deed. 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

The Rabsky Group has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 390 to 398 Wallabout Street in the Williamsburg section of Brooklyn, New York (the Site). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

## 1.1 Site Location and Current usage

The Site is located at 390 to 398 Wallabout Street in the Williamsburg section in Brooklyn, New York and is identified as Block 2266, Lots 21, 22, 23, 24 and 25 on the New York City Tax Map. **Figure 1** shows the Site location. The Site is 12,500-square feet and is bounded by Wallabout Street to the north, a vacant lot, 2 residential buildings, and a parking lot to the south, a 1-story commercial building and an undeveloped lot to the east, and a construction site to the west. A map of the site boundary is shown in **Figure 2**. Currently, the undeveloped lots of the Site (Lots 21, 22, 23 and 24) are used as a parking lot for a car and truck rental company, and the Lot developed with a one-story concrete block building (Lot 25) is used as a tire repair facility. Each of the 5 Site Lots is rectangular, consisting of 25 feet of street frontage on Wallabout Street and a depth of 100 feet.

## 1.2 Proposed Redevelopment Plan

The proposed future use of the Site will consist of five identical 4-story apartment buildings. Layout of the proposed site development is presented in **Figure 3**. The current zoning designation for each of the Site Lots is R7A. R7A is a contextual district that allows



residential and community facility buildings. The proposed use is consistent with existing zoning for the property.

The five 25 ft wide tax lots will be developed with identical residential four-story masonry buildings with full cellars. Each of the five buildings will extend approximately 65 feet, meeting both side lot lines. Therefore, the gross building square footage for each building is 8,125 ft<sup>2</sup>. There will be a rear cellar level walk-out court yard behind each building, that will be extend from the rear of the building to the rear property line. The concrete slab of the cellar will be approximately 6 feet 4 inches below sidewalk level. The street front portion of the cellar will consist of a boiler room, gas meter room, electric meter room and a large open cellar area. The remaining portions of the cellar for each building will be used for residential and accessory residential space.

Each building will consist of three residential units. Unit #1 consists of the cellar level and first floor, Unit #2 is the second floor and Unit #3 is the third and fourth floors.

Excavation for each new building and rear cellar-level courtyard will likely extend to a depth of approximately 8 feet below grade for construction of the buildings' cellar levels and foundations. Assuming an excavation volume of approximately 25 feet (wide) by 100 feet long (length) and 8 feet (deep), a total of approximately 740 cubic yards (1,000 tons) of soil will require excavation per building. The total excavated volume of soil for the entire Site will be approximately 3,700 cubic yards (5,000 tons). The rear cellar level court yard will be capped with concrete.

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

### **1.3 Description of Surrounding Property**

The area surrounding the Site consists of a mix of residential and commercial properties. **Figure 4** shows the surrounding land usage of the adjacent properties listed below as well as additional properties located up to 500 feet away from the Site. No hospitals, daycare facilities or schools are located within a 250 ft radius of the Site.

Direction	Property Description
<p><b>North</b> – Opposite side of Wallabout Street</p>	<p><u>Block 2250, Lot 33</u> (66 Throop Avenue) – Developed with a 1-story brick industrial/manufacturing building built around 1993.</p> <p><u>Block 2250, Lot 36</u> (313 Wallabout Street) – A 2,500 ft<sup>2</sup> undeveloped lot. The property is owned by John K. Vartoughian.</p> <p><u>Block 2250, Lot 37</u> (311 Wallabout Street) – Developed with a 2-story residential building located along Wallabout Street building around 1901. The building has 3 residential units.</p> <p><u>Block 2250, Lot 38</u> (307 Wallabout Street) – Developed with a 1-story brick industrial/manufacturing building occupying the entire lot. Built in 1993. The property is owned by A. Holding.</p>
<p><b>South</b> – Adjacent properties</p>	<p><u>Block 2266, Lot 36</u> (99 Gerry Street) – A 2,500ft<sup>2</sup> lot that is undeveloped. The property is owned by the NYC Housing Preservation and Development.</p> <p><u>Block 2266, Lot 37</u> (97 Gerry Street) – Developed with a 3-story residential building. Built approximately 1968.</p> <p><u>Block 2266, Lot 38</u> (95 Gerry Street) – Developed with a 1-story industrial building occupying the entire lot. The building is used as a sheet metal workshop.</p> <p><u>Block 2266, Lot 39</u> (93 Gerry Street) – A 2,500 ft<sup>2</sup> undeveloped lot owned by Vinfield Realty Corporation. Lots 39, 40, and 41 are used as a coach bus parking area.</p> <p><u>Block 2266, Lot 40</u> (91 Gerry Street) – A 2,500 ft<sup>2</sup> undeveloped lot owned by Vinfield Realty Corporation. Lots 39, 40, and 41 are used as a coach bus parking area.</p> <p><u>Block 2266, Lot 41</u> (No # Gerry Street or 89 Gerry Street) – A 2,500 ft<sup>2</sup> undeveloped lot owned by Vinfield Realty Corporation. Lots 39, 40, and 41 are used as a coach bus parking area.</p>
<p><b>East</b> – Adjacent properties</p>	<p><u>Block 2266, Lot 29</u> (72 Throop Street) – A 7,500 ft<sup>2</sup> vacant and undeveloped corner lot consisting of 100 feet of frontage on Wallabout Street and 75 feet of frontage on Throop Avenue.</p> <p><u>Block 2266, Lots 30 and 31</u> (74-76 Throop Avenue) – Two 2,500 ft<sup>2</sup> lots</p>

	developed with a single 1-story warehouse building that occupies the entire area of the two lots.
<b>West –</b> Adjacent properties	<u>Block 2266, Lot 20</u> (388 Wallabout Street) – Vacant 2,500 square foot lot owned by the Wallabout Throop Realty Partners.

#### 1.4 Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, Redevelopment Project - 390 to 398 Wallabout Street*”, dated April, 2012 (RIR).

#### Summary of Past Uses of Site and Areas of Concern

A Phase I Environmental Site Assessment was performed by Environmental Business Consultants in January of 2012. Historical information (DOB records, Sanborn Maps and City Directory listings) reviewed for the Site identified the Site as being developed prior to 1887 with mixed use buildings.

##### *Lot 21 (390 Wallabout Street)*

Developed prior to 1887 with a small 1½-story dwelling. By 1904 the property was redeveloped with a 3-story dwelling. By 1976 the entire lot was vacant/undeveloped. The lot has remained undeveloped since.

##### *Lot 22 (392 Wallabout Street)*

Developed prior to 1887 with a small 2-story dwelling located in the front of the lot. A 1½-story building was located in the rear of the lot and a 2-story stable was located in the southwest corner of the lot. The rear buildings were replaced prior to 1918 with a larger 2-story storage building. The lot was undeveloped and vacant by 1965 and has remained undeveloped since.

##### *Lot 23 (394 Wallabout Street)*

Developed prior to 1887 with a small 3-story dwelling located in the front of the lot and a 2-story dwelling in the rear of the lot. In 1904 the 2-story dwelling in the rear yard was labeled as a “tailor”. The rear building was demolished by 1954 and the entire lot was drawn as vacant/undeveloped by 1979.

*Lot 24 (396 Wallabout Street)*

Developed prior to 1887 with a small 1½-story dwelling located in the front of the lot and a 2-story stable in the rear of the lot. By 1904, the lot was redeveloped with a 4-story dwelling that fronted Wallabout Street and a 1-story dwelling in the rear. In the 1950's, the 1-story dwelling in the rear yard was demolished and the 4-story dwelling in the front of the lot was demolished in late 1960's. The lot has remained undeveloped since.

*Lot 25 (398 Wallabout Street)*

Developed prior to 1887 with a small 3-story dwelling located in the front of the lot along Wallabout Street. A 2½-story stable was located in the rear of the lot. However, according to historic Sanborn maps, the lot was undeveloped by 1947. The property remained undeveloped until the 1960's, when a 1-story office/warehouse building was constructed. The building was converted for use as an auto repair facility in the early 1980's. The building is now utilized as a tire repair center.

The AOCs identified for this Site include:

- Historic fill layer is present at the site from grade to 6 to 8 feet below grade.

**Summary of the Work Performed under the Remedial Investigation**

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed 8 soil borings across the entire project Site, and collected 17 soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed 4 groundwater monitoring wells throughout the Site to establish groundwater flow and collected 4 groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed 5 soil vapor probes around Site perimeter and collected 5 samples for chemical analysis.

**Summary of Environmental Findings**

1. Elevation of the property is approximately 14 feet.

2. Depth to groundwater ranges from 8 to 9 feet at the Site.
3. Groundwater flow is generally from South to North beneath the Site.
4. Depth to bedrock is greater than 100 feet at the Site.
5. The stratigraphy of the Site, from the surface down, consists of 5 to 8 feet of urban fill underlain by a brown sand.
6. Soil/fill samples collected during the RI showed no PCBs at detectable concentrations. No VOCs were detected above Unrestricted Use SCOs, as only 1,2,4-trimethylbenzene was detected at a low level (11 ppb) in one sample. Ten SVOCs were detected above Restricted Residential SCOs in the shallow soil horizon, and one shallow soil sample showed relatively high levels of SVOCs (total SVOCs were found to be 1076 ppm) and is believed to be a hotspot. These SVOCs were all PAH compounds and their concentrations, with the exception of the SVOC hotspot, and distributions indicate that they are associated with historic fill material observed in shallow samples. Four pesticides (4,4,4-DDT, 4,4,4-DDE, chlordane, and dieldrin) were detected in shallow soil samples at concentrations above Unrestricted Use SCOs, but well below Restricted Residential SCOs. Six metals exceeded Unrestricted Use SCOs in shallow soil samples, and of these metals, barium (max of 1190 ppm), mercury (max of 18.6 ppm), and lead (max of 863 ppm) also exceeded their respective Restricted Residential SCOs in shallow soil. No SVOCs, Pesticides, or Metals were detected above Unrestricted Use SCOs within the deeper soil samples. Overall, with the exceptions of the mercury and SVOC hotspots, the findings were consistent with observations for other historical fill sites in Brooklyn.
7. Groundwater samples collected during the RI showed chlorinated VOCs in three of four groundwater samples. Trichloroethene (TCE) at a maximum concentration of 18 µg/L and cis-1,2-dichloroethene at a maximum concentration of 41 µg/L were found above their GQSs, and tetrachloroethene (PCE) was found below its GQS at 1.8 µg/L in one sample. No chlorinated VOCs were identified in any of the soil samples collected on Site and are believed to be associated with off-Site impacts. Four SVOCs, all PAHs, were detected above their corresponding GQSs in three of four groundwater samples. The pesticide 4,4,4-DDT was detected in one groundwater sample slightly above its GQS.

Magnesium, manganese, and sodium were the only metals identified in the dissolved groundwater sample from GW4. The three remaining samples were not filtered and also showed total concentrations of lead, arsenic, beryllium, chromium, and nickel above their GQSs. The levels of metals, SVOCs, and pesticides in groundwater are likely the impact of turbid samples, rather than dissolved groundwater quality. The RI indicates that groundwater is not impacted by Site conditions and did not reveal any sources of contaminants on-Site.

8. Soil vapor samples collected during the RI showed petroleum and chlorinated VOCs at low to moderate concentrations. Total petroleum VOCs were identified from 29 to 498  $\mu\text{g}/\text{m}^3$ . PCE was identified in all samples at a maximum concentration of 183  $\mu\text{g}/\text{m}^3$ , TCE was also identified at a maximum concentration of 14  $\mu\text{g}/\text{m}^3$ . These results for TCE and PCE are within the monitoring level ranges of the State DOH soil vapor guidance matrix. Neither PCE nor TCE were detected within any of the soil samples collected at the Site and these low levels suggest a possible off-Site origin.

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

## 2.0 REMEDIAL ACTION OBJECTIVES

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

### Groundwater

- 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 or surface water contamination.

### Soil Vapor

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

### 3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process 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 nine 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; and
- Land use.

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

- Alternative 1 involves
  - Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 has been achieved with post-excavation endpoint sampling. Based on the results of the remedial investigation, it is expected that this alternative would require excavation to a depth of 5 to 8 feet to remove all historic fill at the Site. Excavation for development purposes would take place to a depth of approximately 8 feet. If soil/fill containing analytes at concentrations above Track 1 Unrestricted Use SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building is complete, additional excavation would be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs.

- No engineering or institutional controls can be utilized in a Track 1 cleanup, but installation of a vapor barrier and passive sub-slab depressurization system (SSDS) beneath the basement foundation of the new building would still take place as part of construction to prevent exposures from off-Site soil vapor.
  
- Alternative 2 involves
  - Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-Specific SCOs has been achieved with post-excavation endpoint sampling. Excavation for development purposes would take place to a depth of approximately 8 feet. If soil/fill containing SVOCs or metals 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 is complete, additional excavation would 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 eliminate exposure to remaining soil/fill;
  - Placement of a soil vapor barrier beneath the building slab and along foundation side walls and an active SSDS beneath the foundation due to the presence of off-Site impacts to soil vapor;
  - Establishment of use restrictions including prohibitions on the use of groundwater from the Site and prohibitions on sensitive Site uses, such as farming or vegetable gardening, to eliminate future exposure pathways.
  - Establishment of an approved Site Management Plan to ensure long-term management of these Engineering Controls (ECs) and Institutional Controls (ICs) including the performance of periodic inspections and certification that the controls are performing as they were intended; and
  - Placement of a deed notice to memorialize the remedial action and the ECs/ICs to ensure that future owners of the Site continue to maintain these controls as required.

### **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 ECs or ICs. Protection of public health and the environment must be achieved for all approved remedial actions.

**Alternative 1** would result in removal of all soil/fill with contaminant concentrations above Track 1 Unrestricted Use SCOs. As such, this alternative would be consistent with the RAOs and would provide overall protection of public health and the environment in consideration of current and potential future land use by:

- Eliminating the potential for direct contact with contaminated on-Site soils;
- Minimizing potential exposure to contaminated soils during construction by implementing an approved Soil and Materials Management Plan and Community Air Monitoring Plan (CAMP); and
- Eliminating source areas to prevent future groundwater contamination consistent with remedial action objectives.

Potential post-remediation exposures to on-Site residents from soil vapors remain a concern since the volatile contaminants in groundwater and soil vapor originate from an off-Site source. This will be addressed by the installation of a vapor barrier and passive SSDS beneath the foundation of the new buildings' basements. However, in order to prevent the migration of soil vapor from off-Site sources into the proposed building and to prevent associated inhalation exposures, ECs/ICs are needed. A Track 1 Remedy cannot employ ICs or ECs. Therefore, even though Alternative 1 would provide the maximum protection of public health and the environment based on on-Site contamination, Alternative 1 would not adequately meet the RAOs of preventing exposure to contaminants in soil vapor from off-Site sources and preventing migration of soil vapor into occupied structures without ECs/ICs that can be monitored in the long-term.

**Alternative 2** will be protective of human health and the environment by excavating the historic fill at the Site and ensuring all remaining soil at the Site meets Track 4 Site-Specific SCOs. The potential for human and environmental exposure to the elevated levels of metals, SVOCs and pesticides present in the fill on-Site will be eliminated by excavation of all soils with parameters in excess of Track 4 Site-Specific SCOs, disposing of excavated materials off-Site and backfilling as needed with certified clean fill/topsoil. Potential post-remediation exposures to on-Site residents from soil vapors remain a concern since the volatile contaminants in groundwater originate from an off-Site source. This will be addressed by the installation of a vapor barrier and SSDS beneath the foundation of the new buildings' basements.

The Alternative 2 would achieve comparable protections of human health and the environment to Alternative 1 by removing soil/fill with contaminant concentrations above Track 4 SCOs as well as placement of ECs/ICs, including a composite cover system, vapor barrier, and active SSDS. As such, this alternative would be consistent with the RAOs and would provide overall protection of public health and the environment in consideration of current and potential future land use by:

- Minimizing the potential for direct contact with contaminated on-Site soils by implementing an approved Soil and Materials Management Plan and CAMP during remediation;
- Minimizing the risk of contamination leaching into groundwater;
- Preventing direct contact with groundwater;
- Minimizing the potential for direct contact with contaminated on-Site soils once construction is complete by establishing a composite cover system over the entire Site and implementing ICs; and
- Preventing migration of soil vapors into occupied structures and associated inhalation exposures by installing a vapor barrier and active SSDS, in conjunction with the composite cover system.

### **3.2. Balancing Criteria**

#### **Compliance with Standards, Criteria and Guidance (SCGs)**

Alternative 1 would address the chemical-specific SCGs for soil by establishment of Track 1 Unrestricted Use SCOs and attainment of these standards for on-Site soil. Alternative 2 would address the chemical-specific SCGs for soil through removal to Track 4 Site-Specific SCOs. Compliance with groundwater SCGs will not be affected by either remedial alternative, as groundwater contamination is not associated with an on-Site source. Alternative 2 would address soil vapor SCGs by mitigation against soil vapor intrusion through the use of ECs/ICs.

### **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 Alternative 1 and 2 would result in short-term impacts associated with excavation, handling, load out of materials, and truck traffic. The volume of soil to be removed is high in both alternatives but marginally higher for the Track 1 alternative. However, focused attention to means and methods during the remedial action during the removal action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of these activities.

### **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 ECs.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site

contamination by permanently removing all impacted soils. However, without ECs/ICs, Alternative 1 would not prevent exposure to off-Site soil vapor contamination.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs, establishing a composite cover system across the Site with a vapor barrier and active SSDS, establishing use restrictions, establishing a SMP to ensure long-term management of ECs/ICs, and placing a deed restriction to memorialize these controls for the long term. Establishment of an SMP and a deed restriction will ensure that this protection remains effective for the long-term. The SMP will ensure long-term effectiveness of all ECs/ICs by requiring periodic inspection and certification that these controls and use restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy will provide continued high level of protection in perpetuity.

### **Reduction of toxicity, mobility, or volume of contaminated material**

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

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by meeting Track 1 Unrestricted Use SCOs. Alternative 2 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil to a depth of approximately 8 feet bgs, and remaining soil/fill would meet Track 4 Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on Site.

### **Implementability**

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the

selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

The techniques, materials and equipment to implement Alternatives 1 and 2 are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of hazardous waste and petroleum spill sites.

The use of a vapor barrier is a common, highly effective method of preventing vapor intrusion when combined with a depressurization, venting or positive pressure system. The installation of a vapor barrier and SSDS beneath the entire basement slab of the new buildings are easily implemented during building construction.

### **Cost effectiveness**

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

Costs associated with Alternative 1 and Alternative II are comparable (approximately \$325,000). This cost estimate includes the following elements and assumptions:

- Excavate to a depth of 8 ft within an 12,500 ft<sup>2</sup> area;
- Disposal of 3,700 cy (5,000 tons) of excavated soil as nonhazardous;
- Backfilling with certified or virgin materials;
- Installation of a vapor barrier and SSDS beneath the building's basements slab foundations.
- HASP and CAMP monitoring for the duration of the remedial activities.

However, the costs associated with the Alternative 1 would be marginally higher than Alternative 2 in that a higher volume of soil/fill may be required to be excavated for off-Site

disposal to achieve a Track 1 status over the entire Site. Alternative 2 would have higher long term Site management costs due to the requirement for periodic inspections.

### **Community Acceptance**

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

This RAWP will be subject to a 30-day public comment period to determine if the community has any comments on the presented remedial alternatives and selected remedy. Public comments are will be considered by OER during the plan approval process. Both remedial approaches involve substantial elimination of contaminated media and are expected to be acceptable to the community.

### **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 R7A zoning. Following remediation, the Site will meet either Unrestricted Use SCOs or Site-Specific SCOs which is appropriate for its planned multi-tenant residential use. However, the Track 1 alternative does not allow ECs or ICs that would provide protection against off-Site vapor migration which would be needed for residential use.

### **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.

Alternatives 1 and 2 would also seek to utilize recycled materials such as recycled concrete aggregate (RCA) for backfilling where feasible. 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.

## **4.0 REMEDIAL ACTION**

### **4.1 Summary of Preferred Remedial Action**

The preferred remedial action alternative is Alternative 2, 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:

#### Site-Specific remedial elements

1. Establishment of Track 4 Site-Specific SCOs.
2. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs.
3. Collection and analysis of end-point samples to determine whether Track 1 Unrestricted Use or Track 4 Site-Specific SCOs are achieved.
4. Construction and maintenance of an engineered composite cover across the entire Site to prevent human exposure to residual soil/fill remaining under the Site.
5. Installation of a vapor barrier system beneath the foundation and sidewalls.
6. Installation and operation of an active sub-slab depressurization system.

#### All other remedial elements

7. Preparation of a Community Protection Statement and implementation of a Citizen Participation Plan.
8. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
9. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
10. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.

11. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of any contaminated media on-Site.
12. Removal of underground storage tanks and closure of petroleum spills (if encountered) in compliance with applicable local, State and Federal laws and regulations.
13. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
14. 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.
15. Demarcation of residual soil/fill.
16. Import of materials to be used for backfill and cover in compliance with this plan and in accordance 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 RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, and lists any changes from this RAWP.
19. If Track 1 Unrestricted Use SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual historic fill, including plans for inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
20. If Track 1 Unrestricted Use SCOs are not achieved, recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) vegetable gardening and farming; (2) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (3) higher level of land usage without OER-approval.

## 4.2 Soil Cleanup Objectives and Soil/Fill Management

Track 4 Site-Specific SCOs are proposed for the Site. The Track 4 Site Specific SCOs are:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	250 ppm
Lead	1200 ppm
Mercury	2.5 ppm
Barium	750 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in **Appendix D**. The entire Site will be excavated to a depth of approximately 8 feet to install the new building foundation and cellar and construct the rear cellar level courtyard.

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

### Estimated Soil/Fill Removal Quantities

The total quantity of fill expected to be excavated and disposed off-Site is 5,000 tons. Excavation of clean native soil from below the historic fill layer is not anticipated but may occur if encountered above 8 feet below grade.

Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

### End-Point Sampling

Remedial actions under this plan will be performed in conjunction with remedial performance end-point sampling. Sampling and testing will be performed promptly following materials removal and completed prior to Site development activities. To evaluate attainment of Track 4 Site-Specific SCOs, samples will be collected and analyzed for SVOCs and TAL Metals (Lead, Barium, and Mercury only). For areas where Track 1 Unrestricted Use SCOs are pursued, endpoint samples will be analyzed for the full list of VOCs, SVOCs, PCBs, Pesticides, and Metals.

If hotspots are identified during the remedial action or construction, hotspot removal actions under this plan will be performed in conjunction with remedial end-point sampling. End-point sampling frequency will consist of the following:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
  - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
  - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination. For assessment of attainment of Track 1 Unrestricted Use SCOs, the RI provided endpoint data to within Unrestricted Use SCOs at both 8 to 10 feet and 10 to 12 feet below grade across the Site.

As a part of redevelopment, the entire Site will require excavation to approximately 8 feet below grade for construction of the new building and rear cellar-level walk-out court yard. Therefore,

the five soil samples collected at the Site from 10 to 12 feet below grade and the three soil samples collected at the Site from 8 to 10 feet below grade represent end point samples.

New York State ELAP certified labs will be used for all end point sample analyses. Labs for end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end point sample results and will include all data including non-detects and applicable standards and/or guidance values. End point samples will be analyzed for trigger analytes (those for which SCO exceedence is identified) utilizing the following methodology:

Soil analytical methods will include:

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

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

### **Quality Assurance/Quality Control**

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

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

Dedicated disposable sampling materials will be used for the collection endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1

for every eight samples collected. Decontamination of non-dedicated sampling equipment will consist of the following:

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

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

### **Import and Reuse of Soils**

Import of soils onto the property and reuse of soils already on-Site will be performed in conformance with the Soil/Materials Management Plan in **Appendix D**. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 0 tons. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is 0 tons.

### **4.3 Engineering Controls**

Engineering Controls are employed in the remedial action to address residual materials remaining at the Site. The Site has 3 primary Engineering Control Systems. These are composite cover system, soil vapor barrier, and sub-slab depressurization system.

#### **Composite Cover System**

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. The entire property will be covered by an engineered permanent cover system. This cover system will be comprised of a concrete-building slab (minimum thickness of 4 inches) that will be constructed over the entire site (below each building and in the rear cellar level courtyards).

The composite cover system is 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.

### **Vapor Barrier**

Migration of soil vapor will be mitigated with a combination of building slab and vapor barrier. A high density polyethylene vapor barrier liner (HDPE) will be installed over the SSDS prior to pouring the building's concrete slab. The vapor barrier will consist of a 20 mil HDPE geomembrane liner manufactured by GSE Lining Technologies of North America, or equivalent. The vapor barrier will extend throughout the entire area occupied by the footprint of the new buildings which is to be constructed at the Site. 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 seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

The extent of the proposed vapor barrier membrane is provided in **Figure 5**. Installation details (penetrations, joints, etc.) with respect to the proposed building foundation, footings, slab, and sidewalls are provided in **Figure 6**. Product specification sheets are provided in **Appendix G**. The Remedial Closure Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturer's certificate of warranty.

### **Sub-Slab Depressurization System**

Migration of soil vapor will be mitigated with the construction of an active sub-slab depressurization system. The SSDS will consist of three separate loops installed beneath the slab of the new buildings. The three SSDS loops beneath the five buildings provide the correct coverage in accordance with USEPA sub-slab depressurization design specifications which

recommend a separate vent loop for every 4,000 ft<sup>2</sup> of slab area. The layout plan for the SSDS system is provided as **Figure 5**. Design details of the SSDS are provided as **Figure 6**.

The horizontal vent line is to be constructed of a continuous loop of perforated 4-inch HDPE smooth interior pipe fitted with a filter sock. Fill material around the horizontal vent piping will be RCA or virgin-mined, ½ inch to ¾ inch gravel. The horizontal pipe will extend to an adjacent utility chase-way where it will be piped to the roof via a 6-inch schedule 40 PVC line. An in-line radon style blower will be fitted to the 6-inch line at the roof. The exhaust stack from the blower will be located a minimum of 10 feet from windows and ventilation inlets.

#### **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 Declaration of Covenant and Restrictions (DCR) assigned to the property by the title holder and will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR.

Institutional Controls for this remedial action are:

- Recording of an OER-approved Declaration of Covenant and Restrictions (DCR) with the City Register or county clerk, as appropriate. The DCR will include a description of all ECs and ICs, will summarize the requirements of the Site Management Plan, and will note that the property owner and property owner's successors and assigns must comply with the DCR and the approved SMP. The recorded DCR will be submitted in the Remedial Action Report. The DCR will be recorded prior to OER issuance of the Notice of Completion;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that

impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted annually and will comply with RCNY §43-1407(1)(3).

- Vegetable gardens and farming on the Site are prohibited;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use.
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for restricted 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 SMP describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by the DCR and this RAWP. The SMP is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the DCR and the SMP 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 SMP will be based on a calendar year and certification reports will be due for submission to OER by March 31 of the year following the reporting period.

#### **4.6 Qualitative Human Health Exposure Assessment**

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). The objective of the qualitative exposure assessment is to identify potential receptors to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

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

#### **Known and Potential Sources**

Historic fill material is present at the Site from grade to a depth of 5 to 8 feet below grade. Based on the results of the RIR, the contaminants of concern found are:

##### Soil

- Metals, including barium, lead, and mercury, exceeding Track 2 Restricted Residential SCOs; and
- PAHs exceeding Track 2 Restricted Residential SCOs.

##### Groundwater

- Metals, including sodium, manganese, and magnesium, exceeding GQS (Unfiltered samples and also showed total concentrations of lead, arsenic, beryllium, chromium, and nickel above their GQSs);
- Chlorinated VOCs, including cis-1,2-dichloroethene, trichloroethene, and tetrachloroethene.

- Pesticide 4,4,4-DDT in unfiltered groundwater
- PAH SVOCs in unfiltered groundwater exceeding their GQSs;

#### Soil vapor

- Chlorinated VOCs detected at low to moderate concentrations, including TCE and PCE.

### **Nature, Extent, Fate and Transport of Contaminants**

SVOCs and metals are present in the historic fill material throughout the Site. Metal contaminants found in soil were not found in filtered groundwater above their respective GQSs. The metal contaminants that were found in on-Site filtered groundwater (magnesium, manganese, and sodium) are linked with regional impacts, rather than any on-Site source. Unfiltered groundwater also contains metals, pesticides, and PAH SVOCs. These metals, pesticides, and PAH SVOCs are expected to be linked with turbidity, and this will be confirmed prior to the start of the remedial action by completing one additional groundwater sample for the full list of analytes (filtered and unfiltered for metals).

The chlorinated VOCs that were identified in groundwater and soil gas beneath the Site were not found in any on-Site soil sample and are known contaminants from a nearby up-gradient source. Although remedial activity has been completed at the up-gradient property, it is likely that low level VOCs will continue to migrate toward the Site for some time.

### **Receptor Populations**

On-Site Receptors - The Site is currently used as a car rental facility and tire repair shop, so potential human receptors are Site representatives, workers, and child and adult visitors. During construction, on-Site receptors will include Site representatives, construction workers and visitors. After construction, on-Site receptors will include child and adult 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 .25 mile) – existing and future
5. Schools (up to .25 mile) – existing and future

## **Potential Points of Exposure**

### Current conditions

The Site is currently used as a car rental lot and a tire repair shop. The surface of the tire repair shop is capped with concrete, limiting potential points of contact with soil/fill in that area, and the surface of the car rental lot consists of exposed soil which is a potential point of contact with surface soils. Groundwater is not exposed at the Site, and because the Site is served by the public water supply, groundwater is not used at the Site.

Soil gas could intrude into and accumulate in the tire repair building. The remainder of the Site is open air.

### Construction/ Remediation Activities

Once redevelopment activities begin, on-Site workers will come into direct contact with surface and subsurface soils. Groundwater is not expected to be encountered during construction/ remediation. There will be no structures/enclosures on-Site where vapor could accumulate.

### Proposed Future Conditions

Once the remedial actions and redevelopment of the Site have been completed, the site will be fully capped with a concrete slab. Therefore, there will be no potential points of contact with any remaining soil/ fill on-Site. Groundwater will not be exposed or accessible at the site, and because the site is served by the public water supply, groundwater will not be used at the Site. Soil vapor intrusion into the building will be mitigated by the composite cover system, vapor barrier, and active SSDS beneath the building. Long term assurance of these protections will be achieved by Site inspections and periodic certifications under an approved SMP.

## **Potential Routes of Exposure**

Potential On-Site Exposures: An exposure route is the mechanism by which a receptor comes into contact with a chemical. Three potential primary routes exist by which chemicals can enter the body:

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

### **Overall Human Health Exposure Assessment**

Based upon this analysis, a potential exposure pathway currently exists for Site visitors and workers through exposure to historic fill on the uncapped portions of the Site lots. During remedial construction, on-Site and off-Site exposures to contaminated dust from contaminated fill will be addressed by preventing access to the Site, through implementation of soil/materials management, stormwater pollution prevention, through dust controls, and through the implementation of the Community Air Monitoring Program and a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways. The vapor barrier, active SSDS and composite cover will interrupt any remaining exposure pathways. Continued protection after the remedial action will be achieved by the implementation of Site management including periodic inspection and certification of the performance of remedial controls.

## **5.0 REMEDIAL ACTION MANAGEMENT**

### **5.1 Project Organization and Oversight**

Principal personnel who will participate in the remedial action Kevin Brussee, 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 Kevin Brussee, 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 personnel. Additional safety training may be added depending on the tasks performed.

Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

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

### **5.5 Community Air Monitoring Plan**

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

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

### **VOC Monitoring, Response Levels, and Actions**

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work.

Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

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

### **Particulate Monitoring, Response Levels, and Actions**

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The

equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

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

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

## **5.6 Agency Approvals**

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

## **5.7 Site Preparation**

### **Pre-Construction Meeting**

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

### **Mobilization**

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility

mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

### **Utility Marker Layouts, Easement Layouts**

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

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

### **Equipment and Material Staging**

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

### **Stabilized Construction Entrance**

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

## **Truck Inspection Station**

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the NYC VCP Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

## **5.8 Traffic Control**

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site will be southwest on Wallabout Street to Union Avenue and then north on Union Avenue to Interstate 278 - Brooklyn Queens Expressway.

## **5.9 Demobilization**

Demobilization will include:

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

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

## **5.10 Reporting and Record Keeping**

### **Daily Reports**

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

include:

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

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the RAR.

### **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.

### **5.13 Data Usability Summary report**

The primary objective of a Data Usability Summary Report (DUSR) is to determine whether or not data meets the site specific criteria for data quality and data use. The DUSR provides an evaluation of analytical data without third party data validation. The DUSR for post-remedial samples collected during implementation of this RAWP will be included in the RAR.

## 6.0 REMEDIAL ACTION REPORT

A 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.
- Recorded Declaration of Covenants and Restrictions.
- Reports and supporting material will be submitted in digital form.

## **Remedial Action Report Certification**

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

*I, \_\_\_\_\_, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the Site located at 390 to 398 Wallabout Street in Brooklyn, NY, OER Project #12CVCP056K.*

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

## 7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 6 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	10	1
Record Declaration of Covenants and Restrictions	28	3
Submit Remedial Action Report	20	-

# **TABLES**



**TABLE 1 - LIST OF PROPOSED SCOS**

<b>Contaminant</b>	<b>CAS Number</b>	<b>Unrestricted Use</b>
<b>Metals</b>		
Arsenic	7440-38-2	13 <sup>c</sup>
Barium	7440-39-3	350 <sup>c</sup>
Beryllium	7440-41-7	7.2
Cadmium	7440-43-9	2.5 <sup>c</sup>
Chromium, hexavalent <sup>e</sup>	18540-29-9	1 <sup>b</sup>
Chromium, trivalent <sup>e</sup>	16065-83-1	30 <sup>c</sup>
Copper	7440-50-8	50
Total Cyanide <sup>e, f</sup>		27
Lead	7439-92-1	63 <sup>c</sup>
Manganese	7439-96-5	1600 <sup>c</sup>
Total Mercury		0.18 <sup>c</sup>
Nickel	7440-02-0	30
Selenium	7782-49-2	3.9 <sup>c</sup>
Silver	7440-22-4	2
Zinc	7440-66-6	109 <sup>c</sup>
<b>PCBs/Pesticides</b>		
2,4,5-TP Acid (Silvex) <sup>f</sup>	93-72-1	3.8
4,4'-DDE	72-55-9	0.0033 <sup>b</sup>
4,4'-DDT	50-29-3	0.0033 <sup>b</sup>
4,4'-DDD	72-54-8	0.0033 <sup>b</sup>
Aldrin	309-00-2	0.005 <sup>c</sup>
alpha-BHC	319-84-6	0.02
beta-BHC	319-85-7	0.036
Chlordane (alpha)	5103-71-9	0.094

<b>Contaminant</b>	<b>CAS Number</b>	<b>Unrestricted Use</b>
delta-BHC <sup>g</sup>	319-86-8	0.04
Dibenzofuran <sup>f</sup>	132-64-9	7
Dieldrin	60-57-1	0.005 <sup>c</sup>
Endosulfan I <sup>d,f</sup>	959-98-8	2.4
Endosulfan II <sup>d,f</sup>	33213-65-9	2.4
Endosulfan sulfate <sup>d,f</sup>	1031-07-8	2.4
Endrin	72-20-8	0.014
Heptachlor	76-44-8	0.042
Lindane	58-89-9	0.1
Polychlorinated biphenyls	1336-36-3	0.1
<b>Semivolatile organic compounds</b>		
Acenaphthene	83-32-9	20
Acenaphthylene <sup>f</sup>	208-96-8	100 <sup>a</sup>
Anthracene <sup>f</sup>	120-12-7	100 <sup>a</sup>
Benz(a)anthracene <sup>f</sup>	56-55-3	1 <sup>c</sup>
Benzo(a)pyrene	50-32-8	1 <sup>c</sup>
Benzo(b)fluoranthene <sup>f</sup>	205-99-2	1 <sup>c</sup>
Benzo(g,h,i)perylene <sup>f</sup>	191-24-2	100
Benzo(k)fluoranthene <sup>f</sup>	207-08-9	0.8 <sup>c</sup>
Chrysene <sup>f</sup>	218-01-9	1 <sup>c</sup>
Dibenz(a,h)anthracene <sup>f</sup>	53-70-3	0.33 <sup>b</sup>
Fluoranthene <sup>f</sup>	206-44-0	100 <sup>a</sup>
Fluorene	86-73-7	30
Indeno(1,2,3-cd)pyrene <sup>f</sup>	193-39-5	0.5 <sup>c</sup>
m-Cresol <sup>f</sup>	108-39-4	0.33 <sup>b</sup>
Naphthalene <sup>f</sup>	91-20-3	12
o-Cresol <sup>f</sup>	95-48-7	0.33 <sup>b</sup>

Contaminant	CAS Number	Unrestricted Use
p-Cresol <sup>f</sup>	106-44-5	0.33 <sup>b</sup>
Pentachlorophenol	87-86-5	0.8 <sup>b</sup>
Phenanthrene <sup>f</sup>	85-01-8	100
Phenol	108-95-2	0.33 <sup>b</sup>
Pyrene <sup>f</sup>	129-00-0	100
<b>Volatile organic compounds</b>		
1,1,1-Trichloroethane <sup>f</sup>	71-55-6	0.68
1,1-Dichloroethane <sup>f</sup>	75-34-3	0.27
1,1-Dichloroethene <sup>f</sup>	75-35-4	0.33
1,2-Dichlorobenzene <sup>f</sup>	95-50-1	1.1
1,2-Dichloroethane	107-06-2	0.02 <sup>c</sup>
cis -1,2-Dichloroethene <sup>f</sup>	156-59-2	0.25
trans-1,2-Dichloroethene <sup>f</sup>	156-60-5	0.19
1,3-Dichlorobenzene <sup>f</sup>	541-73-1	2.4
1,4-Dichlorobenzene	106-46-7	1.8
1,4-Dioxane	123-91-1	0.1 <sup>b</sup>
Acetone	67-64-1	0.05
Benzene	71-43-2	0.06
n-Butylbenzene <sup>f</sup>	104-51-8	12
Carbon tetrachloride <sup>f</sup>	56-23-5	0.76
Chlorobenzene	108-90-7	1.1
Chloroform	67-66-3	0.37
Ethylbenzene <sup>f</sup>	100-41-4	1
Hexachlorobenzene <sup>f</sup>	118-74-1	0.33 <sup>b</sup>
Methyl ethyl ketone	78-93-3	0.12
Methyl tert-butyl ether <sup>f</sup>	1634-04-4	0.93
Methylene chloride	75-09-2	0.05

<b>Contaminant</b>	<b>CAS Number</b>	<b>Unrestricted Use</b>
n - Propylbenzene <sup>f</sup>	103-65-1	3.9
sec-Butylbenzene <sup>f</sup>	135-98-8	11
tert-Butylbenzene <sup>f</sup>	98-06-6	5.9
Tetrachloroethene	127-18-4	1.3
Toluene	108-88-3	0.7
Trichloroethene	79-01-6	0.47
1,2,4-Trimethylbenzene <sup>f</sup>	95-63-6	3.6
1,3,5-Trimethylbenzene <sup>f</sup>	108-67-8	8.4
Vinyl chloride <sup>f</sup>	75-01-4	0.02
Xylene (mixed)	1330-20-7	0.26

All soil cleanup objectives (SCOs) are in parts per million (ppm).

#### Footnotes

<sup>a</sup> The SCOs for unrestricted use were capped at a maximum value of 100 ppm. See [Technical Support Document \(TSD\)](#), section 9.3.

<sup>b</sup> For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.

<sup>c</sup> For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.

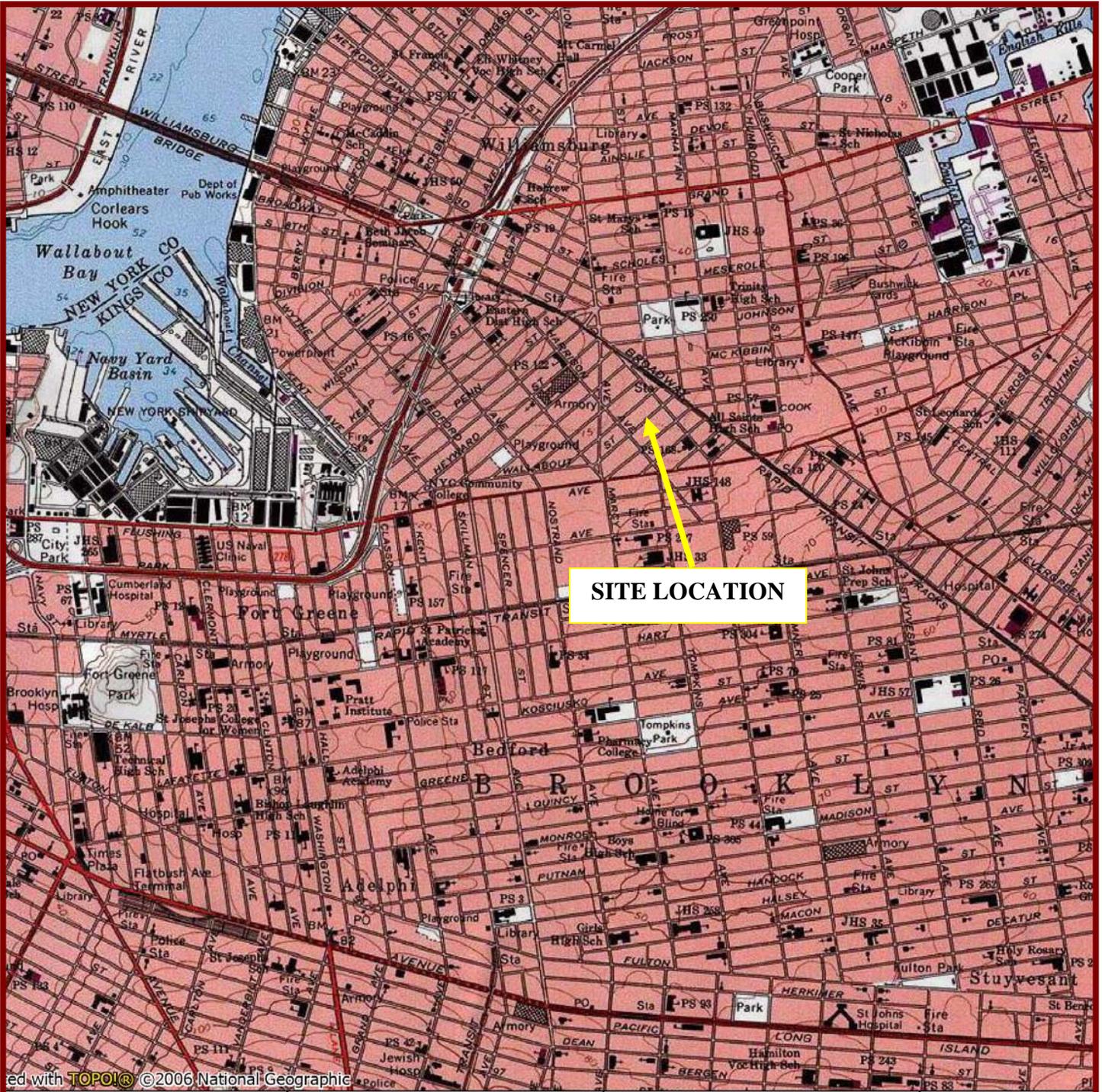
<sup>d</sup> SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.

<sup>e</sup> The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

<sup>f</sup> Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with "NS". Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.

# **FIGURES**

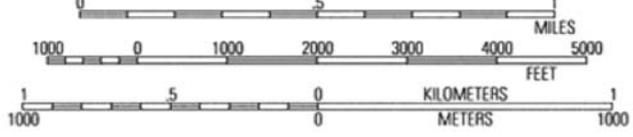




**SITE LOCATION**

Map created with TOPOLOG ©2006 National Geographic

73°58.00' W      73°58.000' W      73°57.000' W      WGS84 73°56.000' W



Phone 631.504.6000  
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390-398 WALLABOUT STREET  
BROOKLYN, NEW YORK 11206

FIGURE 1 - SITE LOCATION MAP

76 Throop Avenue  
1-story commercial building

**LOT 31**

99 Gerry Street  
Vacant

**LOT 36**

97 Gerry Street  
3-story residential building

**LOT 37**

95 Gerry Street  
1-story commercial building

**LOT 38**

93 Gerry Street  
Parking Lot

**LOT 39**

91 Gerry Street  
Parking Lot

**LOT 40**

89 Gerry Street  
Parking Lot

**LOT 41**

74 Throop Avenue  
1-story commercial building

**LOT 30**



72 Throop Avenue  
Undeveloped

1-Story  
Masonry  
Building

388 Wallabout St  
Under Construction

**LOT 29**

**LOT 25**

**LOT 24**

**LOT 23**

**LOT 22**

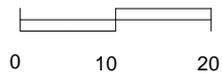
**LOT 21**

**LOT 20**

25'

125'

SCALE:



1 Inch = 20 feet

KEY:

--- Lot Line

**WALLABOUT STREET**



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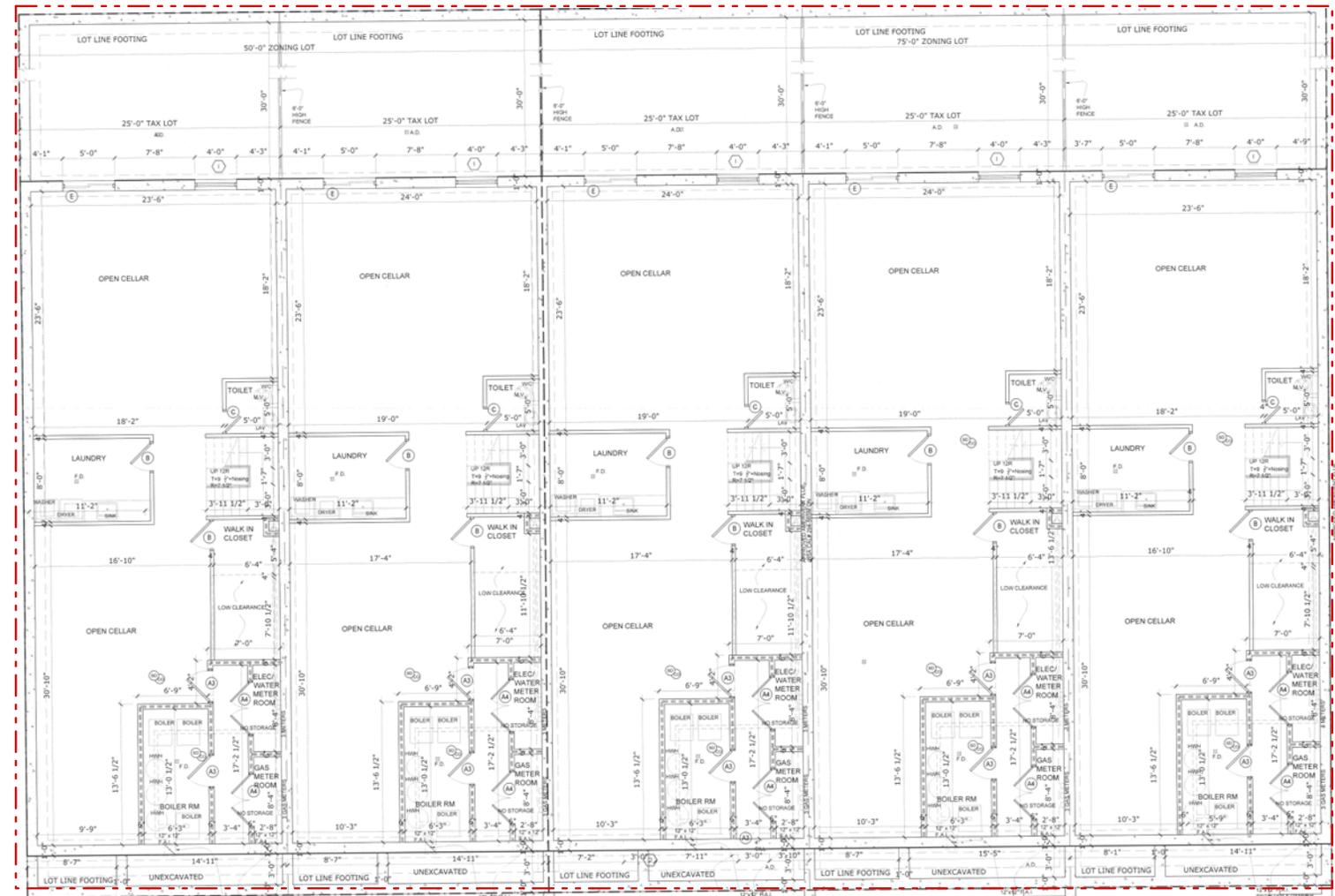
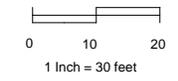
**FIGURE 2 SITE BOUNDARY**



KEY:

--- Lot Line

SCALE:



LOT # 25 HOUSE # 398  
 LOT # 24 HOUSE # 396  
 LOT # 23 HOUSE # 394  
 LOT # 22 HOUSE # 392  
 LOT # 21 HOUSE # 390

### WALLABOUT STREET

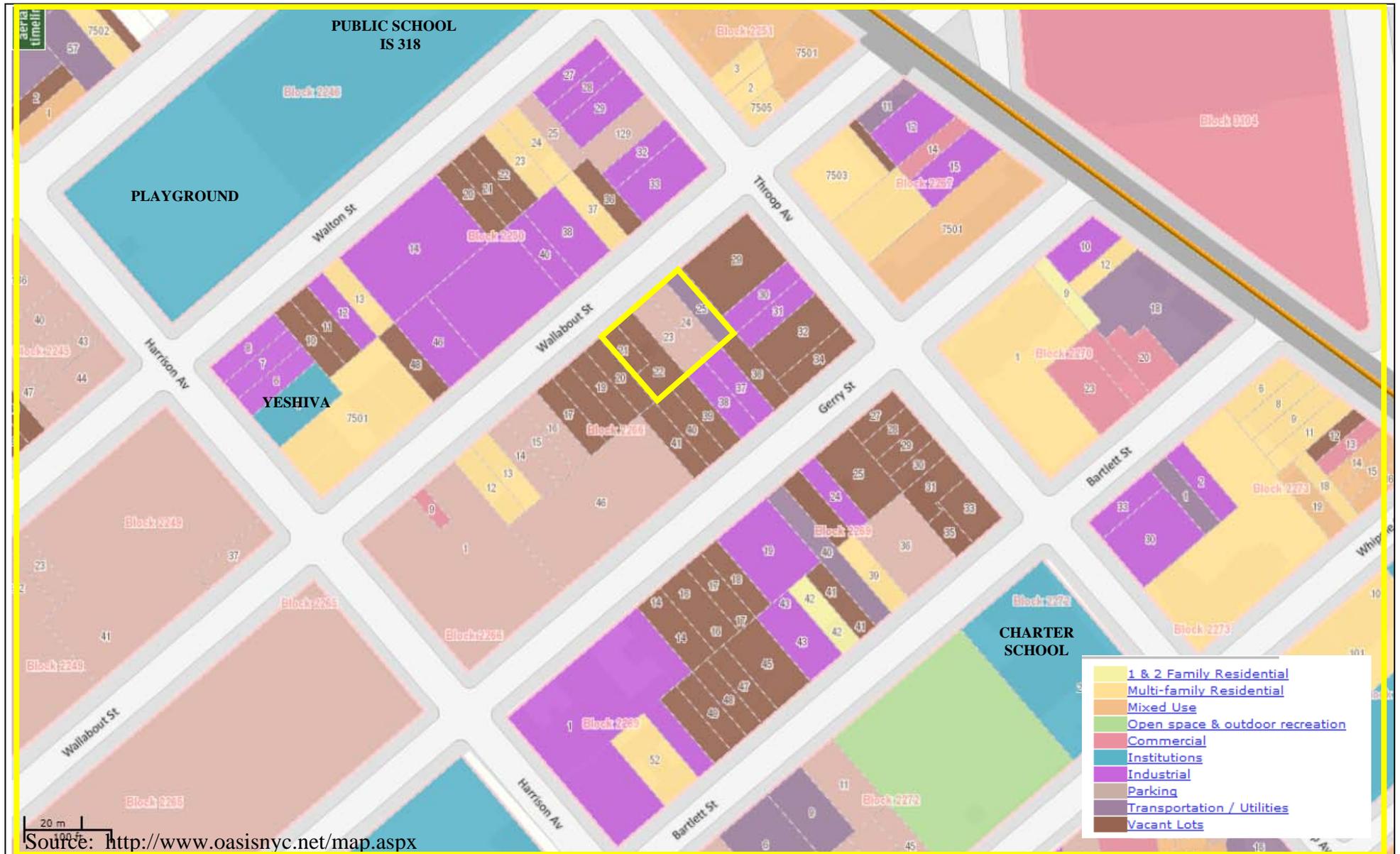


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 BROOKLYN, NY 11206

## FIGURE 3 REDEVELOPMENT LAYOUT



**FIGURE 4**  
**SURROUNDING LAND USE MAP**

390-398 WALLABOUT STREET, BROOKLYN NY  
 HAZARDOUS MATERIALS REMEDIAL INVESTIGATION REPORT

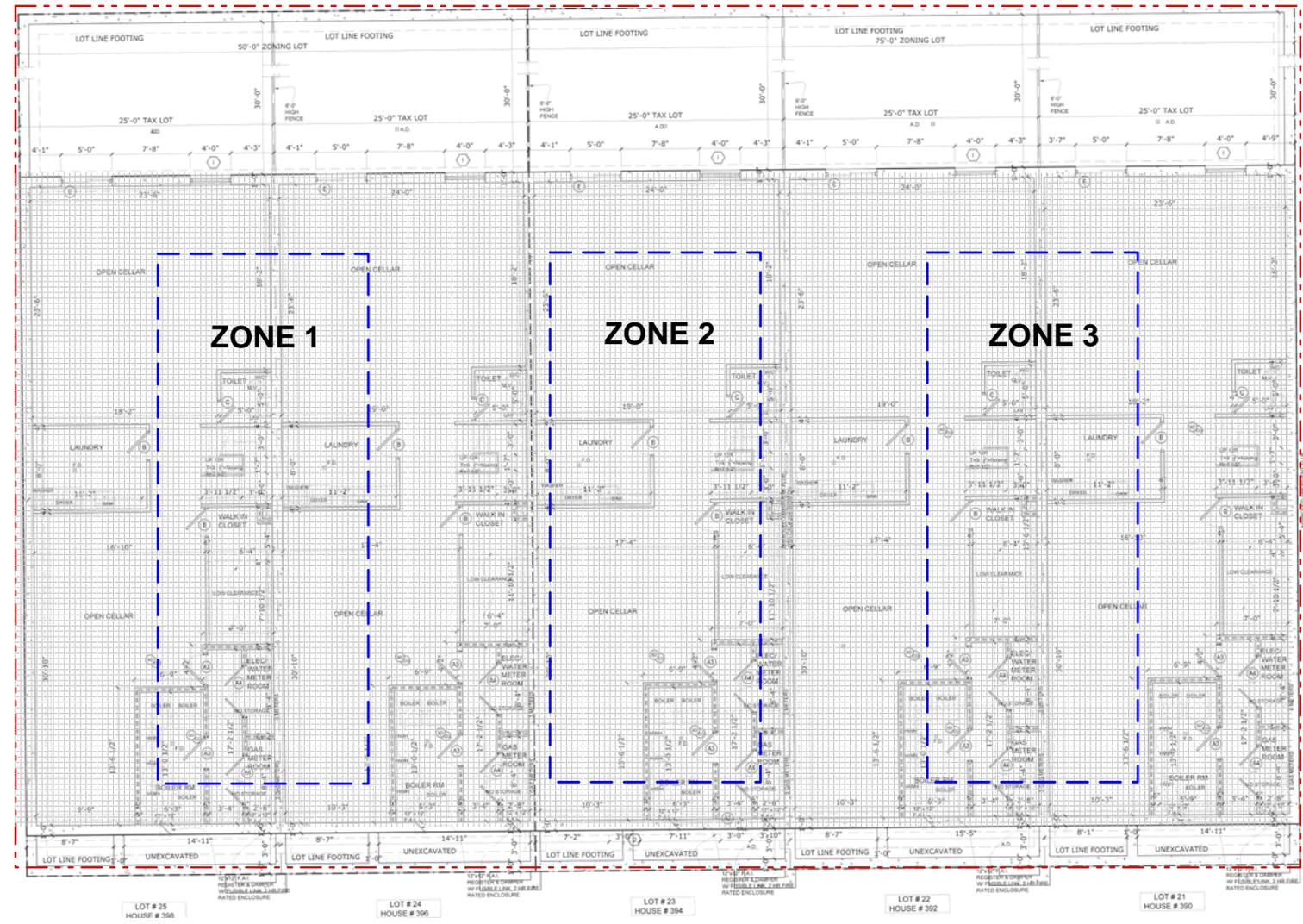


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KEY:

- Lot Line
  - SSDS Piping Loop
  - Vapor Barrier
- SCALE:
- 
- 1 Inch = 30 feet



**WALLABOUT STREET**



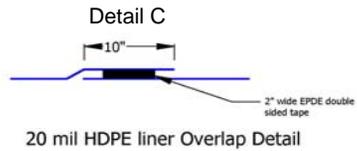
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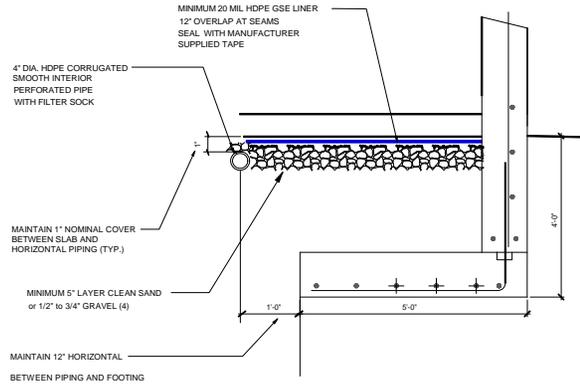
**FIGURE 5**  
**SSDS & VAPOR BARRIER LAYOUT**

**NOTES:**

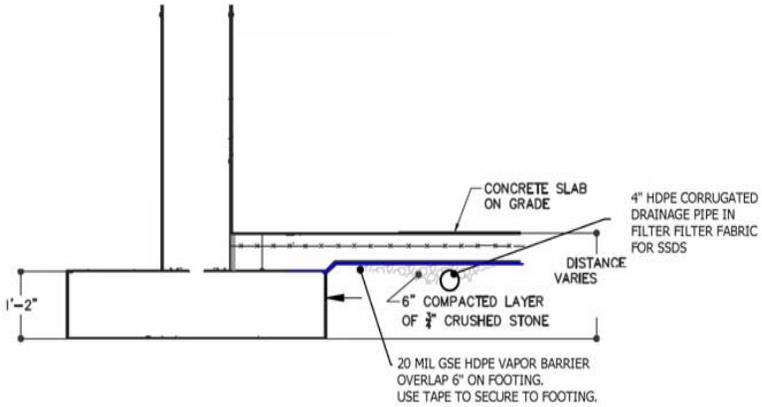
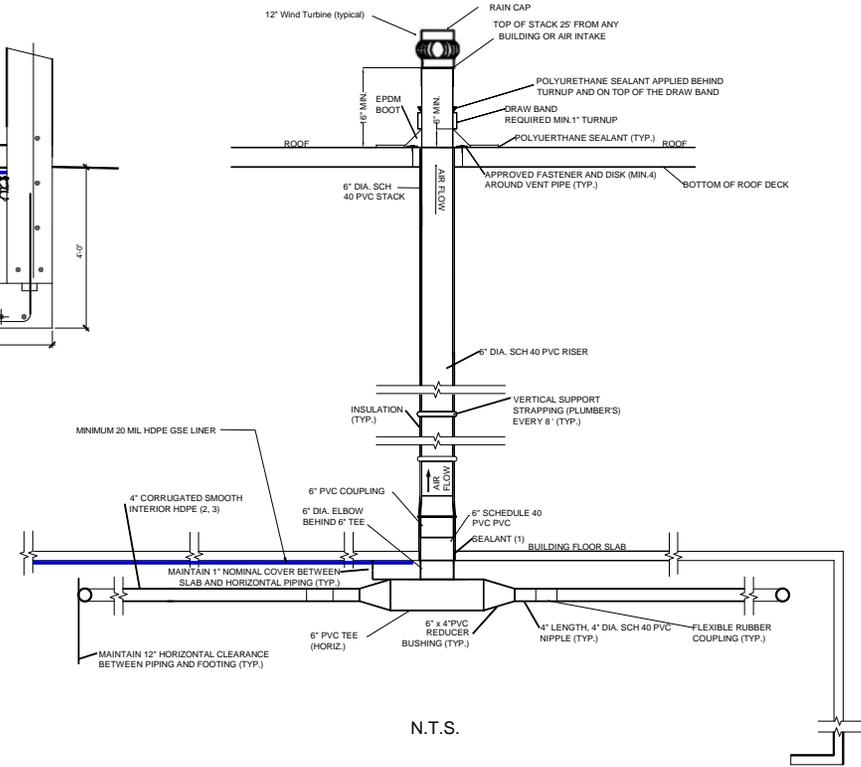
1. SEAL OPENING WITH ELASTOMERIC JOINT SEALANT AS DEFINED IN ASTM C520.
2. HIGH DENSITY POLYETHYLENE CORRUGATED PERFORATED PIPE WITH SMOOTH INTERIOR WATERWAY. ADS N-12 OR APPROVED EQUAL.
3. WRAP 4" HDPE PIPE WITH GEOTEXTILE FABRIC, GSE NW4 OR APPROVED EQUAL.
4. EBC MUST PRE-APPROVE ALL FILLMATERIAL BEFORE DELIVERY TO SITE.



**Detail A**



**Detail B**



**Detail D**

## APPENDIX A

### REDEVELOPMENT PLANS

**LEGEND**

- MASONRY WALL = 4" THK. FACE BRICK W/ 10" or 8" APPROVED TYPE LOAD BEARING CONC. BLOCK, FURRED W/ 3 5/8" METAL STUDS @ 16" O.C. W/ 3 1/2" FIBERGLASS BATT INSULATION (R-11) BETWEEN STUDS & (1) LAYER FC #60, 5/8" THK. G.W.B., (3) HR FIRE RATED
- EXTERIOR WALL  
GA FILE NO. WP 8250  
GYPSUM WALLBOARD, STEEL STUDS, GYPSUM SHEATHING, METAL LATH, CEMENT-LIME STUCCO, MINERAL FIBER INSULATION  
EXTERIOR SIDE ONE LAYER 7" GYPSUM SHEATHING APPLIED AT RIGHT ANGLES TO STEEL STUDS 16" O.C. SELF-FURRING METAL LATH 3/4 LB. ATTACHED THROUGH SHEATHING TO STUDS WITH 1/2" TYPE S-12 DRYWALL SCREWS 8" O.C. 1" PORTLAND CEMENT-LIME STUCCO APPLIED OVER LATH  
INTERIOR SIDE ONE LAYER 7" FOL BACKED PROPRIETARY TYPE X GYPSUM WALLBOARD OR GYPSUM VENEER BASE APPLIED PARALLEL TO STUDS WITH 1" TYPE S-12 DRYWALL SCREWS 8" O.C. 3" MINERAL FIBER INSULATION, 2.0 PCF. IN STUD SPACE (R-13)
- 3 5/8" METAL STUDS @ 16" O.C. W/ (2) LAYERS, FC #60, 5/8" THK. G.W.B. ON BOTH SIDES, (2) HR FIRE RATED, BSA CAL #301-60 SM  
GA FILE NO. WP 1521, 45-49 STC SOUND
- 3 5/8" METAL STUDS @ 16" O.C. W/ (1) LAYER, FC #60, 5/8" THK. G.W.B. ON BOTH SIDES, (1) HR FIRE RATED, BSA CAL #301-60 SM  
GA FILE NO. WP 1072, 40-44 STC SOUND
- 8" APPROVED TYPE LOAD BEARING CONCRETE BLOCK WALL
- POURED CONCRETE FOUNDATION WALL, ON CONCRETE FOOTING.
- MASONRY EQUIVALENT WALL  
SEE SHEET A003 - BSA CALL # 542-68-SM - STC 50 TO 54
- SMOKE & CARBON MONOXIDE DETECTOR (SEE NOTES)
- MECHANICAL VENT., 50 CFM FOR BATHROOM, 75 CFM FOR LAUNDRY ROOM & 125 CFM FOR KITCHEN, 4 CHANGES PER HOUR.
- ILLUMINATED DIRECTIONAL EXIT SIGN W/ 6" H. LETTERS  
ILLUMINATED DIRECTIONAL EXIT SIGN W/ 6" HIGH AND 2" WIDE LETTERS. EXIT SIGN SHALL BE ILLUMINATED AT ALL TIMES
- DOOR KEY (SEE SCHEDULE)
- WINDOW KEY (SEE SCHEDULE)

**ZONING ANALYSIS**

PROPERTY DATA:  
ADDRESS: 396-398, BROOKLYN, N.Y.  
BLOCK # 2266  
LOT # 24 & 25  
CB # 301  
BTN # 3850965  
ZONING MAP # 13b  
ZONING LOT AREA: 50'-0" x 100'-0" = 5,000 SF  
ZONING DISTRICT: R7A (INCLUSIONARY HOUSING AREA - APPENDIX F, map 4)

**(ZR 42-00) PERMITTED USE GROUPS:**  
2 RESIDENTIAL, 4 COMMUNITY FACILITY.

**SCOPE OF WORK:**  
PROPOSED NEW 4-STORY & CELLAR MASONRY BUILDING, PROPOSED RESIDENTIAL UG-2, OG-R-2 ON THE CELLAR THRU FOURTH FLOOR, CONSTRUCTION CLASSIFICATION IIA.

**ZONING ANALYSIS:**  
PROPOSED AS RESIDENTIAL, PERMITTED FLOOR AREA RATIO:  
(ZR 23-144) & (ZR 23-952) BASE F.A.R. = 3.45, MAX FLOOR AREA = 5,000 X 3.45 = 17,250 SF

**PROPOSED RESIDENTIAL FLOOR AREA:**  
FIRST FLOOR = 50'-0" x 65'-0" = 3,250 S.F.  
SECOND FLOOR = 50'-0" x 65'-0" = 3,250 S.F.  
THIRD FLOOR = 50'-0" x 65'-0" = 3,250 S.F.  
FOURTH FLOOR = 50'-0" x 65'-0" = 3,250 S.F.  
TOTAL FLOOR AREA = 13,000 SF / 17,250 S.F. OK

**PERMITTED MAXIMUM LOT COVERAGE**  
(ZR 23-145) PERMITTED = 65%, THEREFORE = 0.65 x 5,000 = 3,250 S.F.  
PROPOSED LOT COVERAGE = 3,250 S.F. = 3,250 S.F. OK

**DENSITY**  
(ZR 23-22) MAX F.A. / 680, THEREFORE 17,250 / 680 = 25.3 = 25 D.U.  
PROPOSED D.U. = 6 x 25 OK

**STREET WALL LOCATION:**  
(ZR 23-633 (a)(1)) SAME AS STREET WALL OF EXISTING BUILDING WITHIN 150'-0" LOCATED ON THE SAME BLOCK

PROPOSED STREET WALL LOCATION = 4'-0" OK

**SIDEYARDS**  
(ZR 23-462(c)) SIDE YARDS = 0'-0" OR 8'-0" MIN. IF ANY  
PROPOSED SIDEYARDS = 0'-0" OK

**REAR YARD:**  
(ZR 23-47) RESIDENTIAL INTERIOR LOT = 30'-0"  
PROPOSED REAR YARD = 31'-0" OK

**PERMITTED HEIGHT AND SETBACK:**  
(ZR 23-633(b)(c))  
MIN BASE HEIGHT = 40'-0"  
MAX BASE HEIGHT = 65'-0"  
MAX BLDG HEIGHT = 80'-0"  
SETBACK BEYOND BASE HEIGHT = 15'-0"  
PROPOSED BASE HEIGHT = 42'-11"  
PROPOSED SETBACK = N/R

**REQUIRED PARKING:**  
(ZR 25-23) RESIDENTIAL, R7A, REQUIRED PARKING = 50% OF PROPOSED D.U.  
PROPOSED D.U. = 0.5 x 6 = 3 SPACES REQUIRED  
(ZR 25-261) WAIVER FOR DEVELOPMENTS OR ENLARGEMENTS  
ZONING DISTRICT R7A, MIN # OF PARKING SPACES WAIVED = 5 SPACES  
REQUIRED = 3 + 5, THEREFORE RESIDENTIAL PARKING IS WAIVED  
NO PARKING PROPOSED

**BICYCLE PARKING:**  
(ZR 25-811) FOR ENCLOSED BICYCLE PARKING SPACE:  
UG 2 RESIDENTIAL 1 per D.U. PROPOSED UNITS = 6 / 2 = 3, THEREFORE = 3 SPACES REQUIRED  
BUT WHEN BUILDINGS CONTAINING LESS THAN 10 D.U.  
BICYCLE PARKING IS WAIVED

**- QUALITY HOUSING PROGRAM**  
(ZR 28-11) BULK REGULATIONS  
SEE ART II, CHAPTER 3 & 4 BULK REGULATIONS  
**ZR 28-21**  
ALL DWELLING UNITS SHALL HAVE A MINIMUM 400 S.F. AREA  
PROPOSED MIN. SIZE OF D.U. = 1,350 S.F. appx  
**ZR 28-22**  
REQ'D: ALL WINDOWS IN THE RESIDENTIAL PORTION OF THE DEVELOPMENT SHALL BE DOUBLE GLAZED  
PROP'D: ALL PROPOSED RESIDENTIAL WINDOWS TO BE DOUBLE GLAZED  
**ZR 28-23**  
DEVELOPMENT WITH 9 OR MORE D.U. PER VERTICAL CIRCULATION CORE TO PROVIDE REFUSE STORAGE DISPOSAL  
PROPOSED # OF D.U. PER VERTICAL CIRCULATION CORE = 3 < 9, NONE REQ'D  
**ZR 28-24**  
REQUIRED: 1 W/M PER 20 D.U. & 1 DRYER PER 20 D.U.  
PROPOSED ALL DWELLING UNITS WITH LAUNDRY WITHIN THE APARTMENT  
**ZR 28-25**  
DAYLIGHT IN CORRIDORS  
50% OF F.A. TO BE DEDUCTED IF WINDOW WITH NON TINTED GLAZED AREA OF 20 S.F. IS PROVIDED  
WINDOW TO BE VISIBLE FROM 50% OF CORRIDOR  
LOCATED AT LEAST 20'-0" FROM A WALL OR A SIDE OR REAR LOT LINE MEASURED IN A HORIZONTAL PLANE AND PERPENDICULAR TO THE ROUGH OPENING OF THE WINDOW  
PROPOSED WITH DAYLIGHT IN CORRIDOR BUT NO DEDUCTION TAKEN

**PROPOSED NEW BUILDING (6 D.U.)**

**BLOCK 2266**



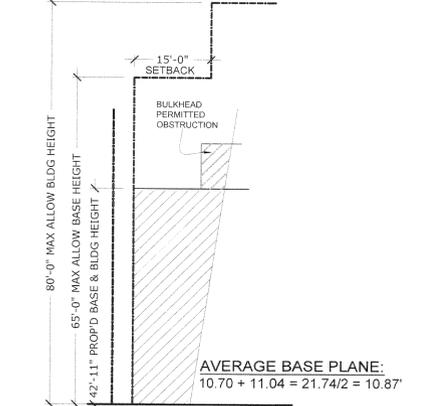
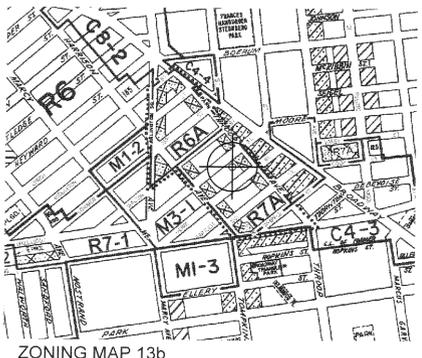
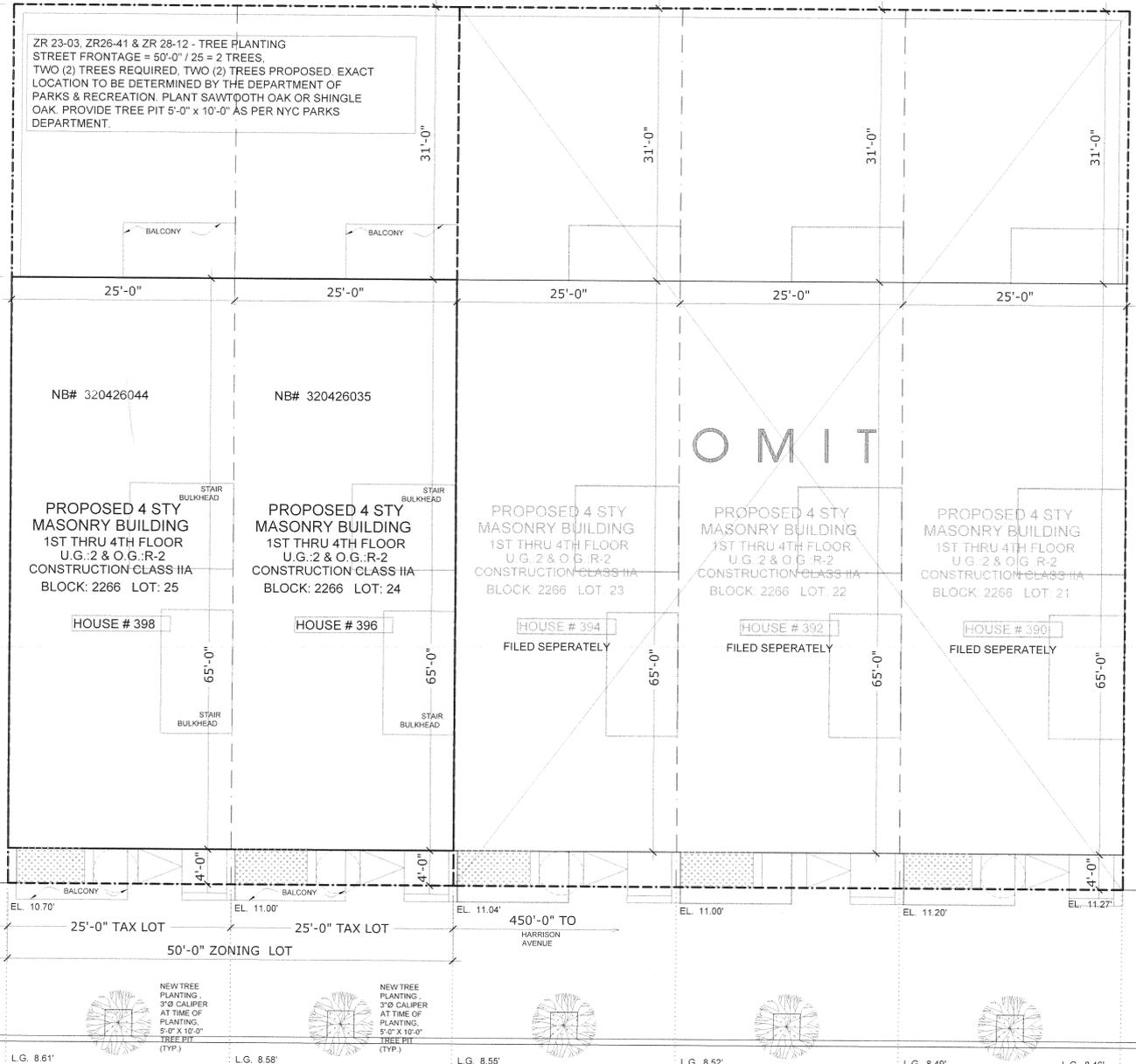
**THROOP AVENUE**  
70'-0" NARROW STREET

VACANT LOT

**SITE PLAN**  
SCALE: 1/8" = 1'-0"

**SPECIAL INSPECTIONS**

- SPECIAL INSPECTION ITEMS:**
- STRUCTURAL STEEL - WELDING
  - STRUCTURAL STEEL - ERECTION & BOLTING
  - STRUCTURAL COLD-FORMED STEEL
  - CONCRETE - CAST-IN-PLACE
  - MASONRY
  - SOILS - SITE PREPARATION
  - SOILS - INVESTIGATIONS (BORINGS/TEST PITS)
  - EXTERIOR INSULATION FINISH SYSTEMS (EIFS)
  - MECHANICAL SYSTEMS
  - EXCAVATION - SHEETING, SHORING, AND BRACING
  - SITE STORM DRAINAGE DISPOSAL AND DETENTION SYSTEM INSTALLATION
  - FIRESTOP, DRAFTSTOP, AND FIREBLOCK SYSTEMS
  - CONCRETE TEST CYLINDERS
  - CONCRETE DESIGN MIX
  - FOOTING AND FOUNDATION
  - ENERGY CODE COMPLIANCE INSPECTIONS



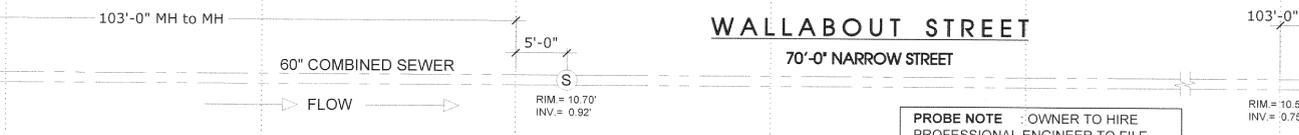
**HEIGHT & SETBACK (ZR 23-633(d))**  
SCALE: 1/16" = 1'-0"

**Panos Vikatos R.A.**  
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Little Neck Hills ny 11362  
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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, SUB CONTRACTORS, 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, WRITTEN DIMENSIONS ON THIS DRAWING SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS. SHOP DETAILS MUST BE SUBMITTED TO THIS OFFICE FOR REVIEW BEFORE PROCEEDING WITH FABRICATION.

**TABLE 601**  
**FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (hours)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V <sup>1</sup>	
	A	B	A <sup>d</sup>	B	A <sup>d</sup>	B		A <sup>d</sup>	B
Structural frame <sup>a</sup> Including columns, girders, trusses	3 <sup>b</sup>	2 <sup>b</sup>	1	0	1	0	HT	1	0
Bearing walls Exterior <sup>c, e</sup> Interior	3	2	1	0	2	2	2	1	0
Nonbearing walls and partitions Exterior					See Table 602				
Nonbearing walls and partitions Interior <sup>c</sup>	0	0	0	0	0	0	See Section 602.4.6	0	0
Floor construction <sup>b</sup> Including supporting beams and joists	2	2	1	0	1	0	HT	1	0
Roof construction Including supporting beams and joists	1 1/2 <sup>c</sup>	1 <sup>c</sup>	1 <sup>c</sup>	0 <sup>c</sup>	1 <sup>c</sup>	0	HT	1 <sup>c</sup>	0



**SEPERATE APPLICATIONS**

- SPRINKLERS
  - BUILDERS PAVEMENT PLAN
  - MECHANICAL
  - STRUCTURES
- DRAWING LIST**
- Z-001.00 SITE PLAN & ZONING ANALYSIS
  - A-001.00 CELLAR FLOOR PLAN
  - A-002.00 FIRST FLOOR PLAN
  - A-003.00 SECOND FLOOR PLAN
  - A-004.00 THIRD FLOOR PLAN
  - A-005.00 FOURTH FLOOR PLAN
  - A-006.00 ROOF PLAN
  - A-007.00 CROSS SECTION
  - A-008.00 LONGITUDINAL SECTION
  - A-009.00 ELEVATIONS
  - A-010.00 RISER DIAGRAMS & SCHEDULES
  - A-011.00 NOTES
  - A-012.00 TYPICAL DETAILS
  - A-013.00 H.C. DETAILS
  - EN-001.00 ENERGY COMPLIANCE REPORT
  - EN-002.00 ENERGY COMPLIANCE REPORT

**ABBREVIATIONS**

- AT BOARD
- CB CONCRETE BLOCK
- CL CLOSET
- CONC. CONCRETE
- DR DOWN
- DN DOWN
- DWU DWELLING UNIT
- DWG DRAWING
- F.P.S.C. FIRE PROOF SELF CLOSING
- FT. FOOT (FEET)
- GYP GYPSUM
- LAV LAVATORY
- GH GREEN HOUSE
- LN LINEN
- MTL METAL
- RD ROOF DRAIN
- RM ROOM
- S.F. SQUARE FEET
- STL STEEL
- TYP TYPICAL
- W/ WITH
- WC WATER CLOSET
- WD WOOD
- WD WASHER / DRYER
- W.M. WASHING MACHINE

**PROBE NOTE** : OWNER TO HIRE PROFESSIONAL ENGINEER TO FILE STRUCTURAL DRAWINGS

**NOTE:**  
THERE IS NO CONFLICT FOR THE CONSTRUCTION OF BUILDING WITHIN ANY SUBWAY LINES

**NOTE:**  
ENTIRE BUILDING TO BE FULLY SPRINKLERED SPRINKLERS TO BE FILED UNDER A SEPERATE APPLICATION - PRIOR TO SIGN OFF

**ENERGY NOTE:**  
" TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2010 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE."

**PROJECT TITLE**  
**NEW BUILDING**  
WALLABOUT STREET  
BROOKLYN, NY

**DRAWING TITLE** STICKER  
SITE PLAN  
ZONING NOTES  
SCALE : AS NOTED

**RELEASE STATUS OF DRAWING** ISSUED:

- SCHEMATIC DESIGN
- DESIGN DEVELOPMENT
- PROGRESS PRINT
- PARTIAL RELEASE
- FULL RELEASE
- REVISION

**SEAL & SIGNATURE**

**DATE** 12/20/11  
**PROJECT No** 018-11  
**DRAWING BY**  
**CHECKED BY**  
**DWG No** 1 OF 11  
**Z-001.00**

NOT VALID FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT AND APPROVED BY THE DEPARTMENT OF BUILDINGS

**LEGEND**

- MASONRY WALL = 4" THK. FACE BRICK W/ 10" or 8" APPROVED TYPE LOAD BEARING CONC. BLOCK, FURRED W/ 3 5/8" METAL STUDS @ 16" O.C. W/ 3 1/2" FIBERGLASS BATT INSULATION (R-11) BETWEEN STUDS & (1) LAYER FC #60, 5/8" THK. G.W.B. (3) HR FIRE RATED
- EXTERIOR WALL  
GA FILE NO. WP 8250  
GYPSUM WALLBOARD, STEEL STUDS, GYPSUM SHEATHING, METAL LATH, CEMENT-LIME STUCCO, MINERAL FIBER INSULATION  
EXTERIOR SIDE: ONE LAYER F GYPSUM SHEATHING APPLIED AT RIGHT ANGLES TO STEEL STUDS 16" O.C. SELF-FURRING METAL LATH, 3/4 LB. ATTACHED THROUGH SHEATHING TO STUDS WITH 2" TYPE S-12 DRYWALL SCREWS 8" O.C. 1" PORTLAND CEMENT-LIME STUCCO APPLIED OVER LATH  
INTERIOR SIDE: ONE LAYER F OIL BACKED PROPRIETARY TYPE X GYPSUM WALLBOARD OR GYPSUM VENEER BASE APPLIED PARALLEL TO STUDS WITH 1" TYPE S-12 DRYWALL SCREWS 8" O.C. 3" MINERAL FIBER INSULATION 2.0 PCF. IN STUD SPACE. (R-13)
- 3 5/8" METAL STUDS @ 16" O.C. W/ (2) LAYERS, FC #60, 5/8" THK. G.W.B. ON BOTH SIDES, (2) HR FIRE RATED, BSA CAL #301-60 SM GA FILE NO. WP 1521, 45-49 STC SOUND
- 3 5/8" METAL STUDS @ 16" O.C. W/ (1) LAYER, FC #60, 5/8" THK G.W.B. ON BOTH SIDES, (1) HR FIRE RATED, BSA CAL #301-60 SM GA FILE NO. WP 1072, 40-44 STC SOUND
- 8" APPROVED TYPE LOAD BEARING CONCRETE BLOCK WALL
- POURED CONCRETE FOUNDATION WALL, ON CONCRETE FOOTING.
- MASONRY EQUIVALENT WALL  
SEE SHEET A003 - BSA CALL # 542-68-SM - STC 50 TO 54
- SMOKE & CARBON MONOXIDE DETECTOR (SEE NOTES)
- MECHANICAL VENT., 50 CFM FOR BATHROOM, 75 CFM FOR LAUNDRY ROOM & 125 CFM FOR KITCHEN, 4 CHANGES PER HOUR.
- ILLUMINATED DIRECTIONAL EXIT SIGN W/ 6" H. LETTERS  
ILLUMINATED DIRECTIONAL EXIT SIGN W/ 6" HIGH AND 2" WIDE LETTERS. EXIT SIGN SHALL BE ILLUMINATED AT ALL TIMES
- DOOR KEY (SEE SCHEDULE)
- WINDOW KEY (SEE SCHEDULE)

**ZONING ANALYSIS**

**PROPERTY DATA:**  
ADDRESS: 390-392-394, BROOKLYN, N.Y.  
BLOCK # 2266  
LOT # 21, 22 & 23  
CB # 301  
BIN # 3850965  
ZONING MAP # 13b  
ZONING LOT AREA: 75'-0" x 100'-0" = 7,500 SF  
ZONING DISTRICT: R7A (INCLUSIVE HOUSING AREA - APPENDIX F, map 4)

**(ZR 42-00) PERMITTED USE GROUPS:**  
2 RESIDENTIAL, 4 COMMUNITY FACILITY.

**SCOPE OF WORK:**  
PROPOSED NEW 4-STORY & CELLAR MASONRY BUILDING, PROPOSED RESIDENTIAL UG-2, O.G.-R-2 ON THE CELLAR THRU FOURTH FLOOR, CONSTRUCTION CLASSIFICATION IIA.

**ZONING ANALYSIS:**  
PROPOSED AS RESIDENTIAL, PERMITTED FLOOR AREA RATIO:  
(ZR 23-144) & (ZR 23-952) BASE F.A.R. = 3.45; MAX FLOOR AREA = 7,500 X 3.45 = 25,875 SF

**PROPOSED RESIDENTIAL FLOOR AREA:**  
FIRST FLOOR = 75'-0" x 65'-0" = 4,875 S.F.  
SECOND FLOOR = 75'-0" x 65'-0" = 4,875 S.F.  
THIRD FLOOR = 75'-0" x 65'-0" = 4,875 S.F.  
FOURTH FLOOR = 75'-0" x 65'-0" = 4,875 S.F.  
TOTAL FLOOR AREA = 19,500 SF + 25,875 S.F. = 45,375 SF

**PERMITTED MAXIMUM LOT COVERAGE**  
(ZR 23-145) PERMITTED = 65%. THEREFORE = 0.65 x 7,500 = 4,875 S.F.  
PROPOSED LOT COVERAGE = 4,875 S.F. = 4,875 S.F. OK

**DENSITY**  
(ZR 23-22) MAX F.A. / 680, THEREFORE 25,875 / 680 = 38 D.U.  
PROPOSED D.U. = 9 x 38 OK

**STREETWALL LOCATION:**  
(ZR 23-633 (a)(1)) SAME AS STREETWALL OF EXISTING BUILDING WITHIN 150'-0" LOCATED ON THE SAME BLOCK

**PROPOSED STREETWALL LOCATION = 4'-0" OK**

**SIDEYARDS**  
(ZR 23-462(c)) SIDE YARDS = 0'-0" OR 8'-0" MIN. IF ANY  
PROPOSED SIDEYARDS = 0'-0" OK

**REAR YARD:**  
(ZR 23-47) RESIDENTIAL INTERIOR LOT = 30'-0"  
PROPOSED REAR YARD = 31'-0" OK

**PERMITTED HEIGHT AND SETBACK:**  
(ZR 23-633(b)(c))  
MIN BASE HEIGHT = 40'-0" PROPOSED BASE HEIGHT = 42'-11"  
MAX BASE HEIGHT = 65'-0" PROPOSED BASE HEIGHT = 42'-11"  
MAX BLDG HEIGHT = 80'-0" PROPOSED BLDG HEIGHT = 42'-11"  
SETBACK BEYOND BASE HEIGHT = 15'-0" PROPOSED SETBACK = N/R

**REQUIRED PARKING:**  
(ZR 25-23) RESIDENTIAL, R7A, REQUIRED PARKING = 50% OF PROPOSED D.U.  
PROPOSED D.U. = 0.5 x 9 = 4.5 = 5 SPACES REQUIRED  
(ZR 25-24.1) WAIVER FOR DEVELOPMENTS OR ENLARGEMENTS  
ZONING DISTRICT R7A, MIN # OF PARKING SPACES WAIVED = 5 SPACES  
REQUIRED = 5 + 5, THEREFORE RESIDENTIAL PARKING IS WAIVED  
NO PARKING PROPOSED

**BICYCLE PARKING:**  
(ZR 25-811) FOR ENCLOSED BICYCLE PARKING SPACE:  
UG 2 RESIDENTIAL 1 per 2 D.U. PROPOSED UNITS = 9 / 2 = 4.5, THEREFORE = 5 SPACES  
REQUIRED  
BUT WHEN BUILDINGS CONTAINING LESS THAN 10 D.U.  
BICYCLE PARKING IS WAIVED

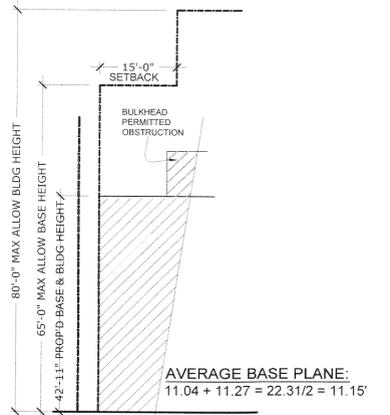
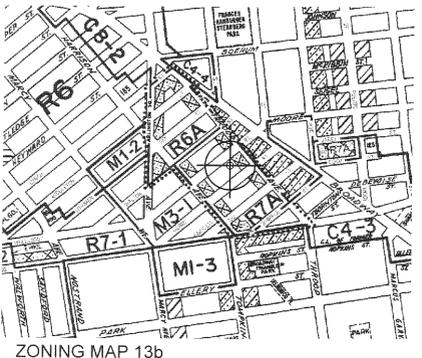
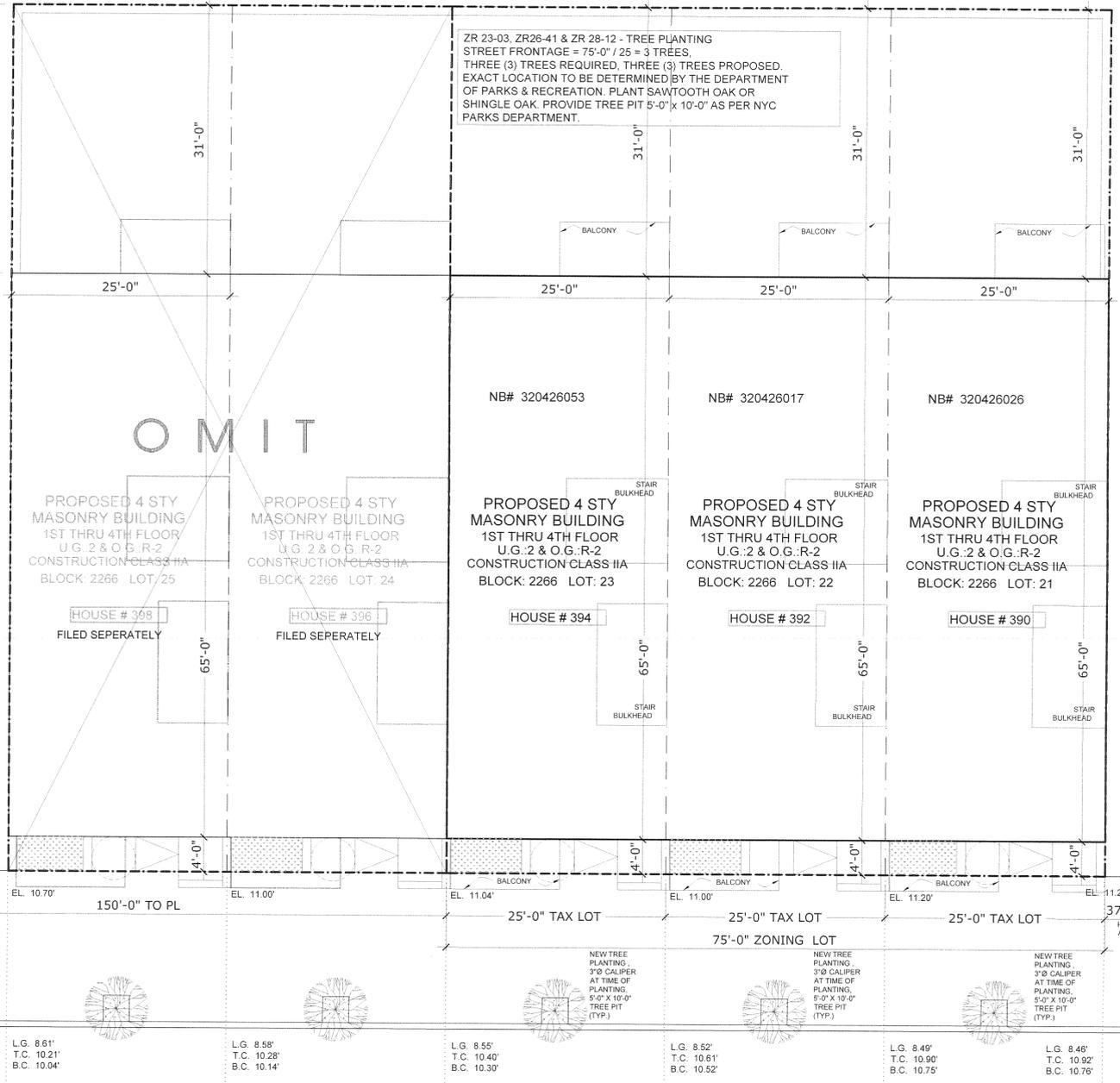
**- QUALITY HOUSING PROGRAM**  
ZR 28-11 BULK REGULATIONS  
SEE ART II, CHAPTER 3 & 4 BULK REGULATIONS  
ZR 28-21  
ALL DWELLING UNITS SHALL HAVE A MINIMUM 400 S.F. AREA  
PROPOSED MIN. SIZE OF D.U. = 1,350 S.F. appx  
ZR 28-22  
REQD: ALL WINDOWS IN THE RESIDENTIAL PORTION OF THE DEVELOPMENT SHALL BE DOUBLE GLAZED  
PROP'D: ALL PROPOSED RESIDENTIAL WINDOWS TO BE DOUBLE GLAZED  
ZR 28-23  
DEVELOPMENT WITH 9 OR MORE D.U. PER VERTICAL CIRCULATION CORE TO PROVIDE REFUSE STORAGE DISPOSAL  
PROPOSED # OF D.U. PER VERTICAL CIRCULATION CORE = 3 < 9, NONE REQ'D  
ZR 28-24  
REQUIRED: 1 W/M PER 20 D.U. & 1 DRYER PER 20 D.U.  
PROPOSED ALL DWELLING UNITS WITH LAUNDRY WITHIN THE APARTMENT  
ZR 28-25  
DAYLIGHT IN CORRIDORS  
50% OF F.A. TO BE DEDUCTED IF WINDOW WITH NON TINTED GLAZED AREA OF 20 SF IS PROVIDED  
WINDOW TO BE VISIBLE FROM 50% OF CORRIDOR  
LOCATED AT LEAST 20'-0" FROM A WALL OR A SIDE OR REAR LOT LINE MEASURED IN A HORIZONTAL PLANE AND PERPENDICULAR TO THE ROUGH OPENING OF THE WINDOW  
PROPOSED WITH DAYLIGHT IN CORRIDOR BUT NO DEDUCTION TAKEN

**PROPOSED NEW BUILDING (9 D.U.)**

**BLOCK 2266**

**THROOP AVENUE**  
70'-0" NARROW STREET

VACANT LOT



**HEIGHT & SETBACK (ZR 23-633(d))**  
SCALE: 1/16" = 1'-0"

**Panos Vikatos R.A.**  
249-33 Beech Knoll Ave  
Little Neck Hills ny 11362  
(917) 412-7105 pvarchitct@gmail.com

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**PROJECT TITLE**  
**NEW BUILDING**  
WALLABOUT STREET  
BROOKLYN, NY

**DRAWING TITLE** STICKER  
**SITE PLAN**  
**ZONING**  
**NOTES**  
SCALE: AS NOTED

**RELEASE STATUS OF DRAWING** ISSUED:  
 SCHEMATIC DESIGN  
 DESIGN DEVELOPMENT  
 PROGRESS PRINT  
 PARTIAL RELEASE  
 FULL RELEASE  
 REVISION

**SEAL & SIGNATURE**  
**REGISTERED ARCHITECT**  
**PANOS VIKATOS**  
NO. 034934  
STATE OF NEW YORK

**DATE** 12/20/11  
**PROJECT No** 018-11  
**DRAWING BY**  
**CHECKED BY**  
**DWG No** 1 OF 11  
**Z-**  
**001.00**

**TABLE 601**  
**FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (hours)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV		TYPE V <sup>1</sup>	
	A	B	A <sup>d</sup>	B	A <sup>d</sup>	B	HT	A <sup>d</sup>	B	
Structural frame <sup>a</sup> Including columns, girders, trusses	3 <sup>b</sup>	2 <sup>b</sup>	1	0	1	0	HT	1	0	
Bearing walls Exterior <sup>c</sup> Interior	3 3 <sup>b</sup>	2 2 <sup>b</sup>	1 1	0 0	2 1	2 0	2 1/HT	1 1	0 0	
Nonbearing walls and partitions Exterior					See Table 602					
Nonbearing walls and partitions Interior <sup>c</sup>	0	0	0	0	0	0	See Section 602.4.6	0	0	
Floor construction <sup>b</sup> Including supporting beams and joists	2	2	1	0	1	0	HT	1	0	
Roof construction Including supporting beams and joists	1 1/2 <sup>c</sup>	1 <sup>c</sup>	1 <sup>c</sup>	0 <sup>c</sup>	1 <sup>c</sup>	0	HT	1 <sup>c</sup>	0	

- SPECIAL INSPECTIONS**  
SPECIAL INSPECTION ITEMS
- STRUCTURAL STEEL - WELDING BC 1704.3.1 BC 1704.3.1
  - STRUCTURAL STEEL - ERECTION & BOLTING BC 1704.3.2, BC 1704.3.3 BC 1704.3.4
  - STRUCTURAL COLD-FORMED STEEL BC 1704.4
  - CONCRETE - CAST-IN-PLACE BC 1704.5
  - MASONRY BC 1704.7.1 BC 1704.7.1
  - SOILS - SITE PREPARATION BC 1704.7.4 BC 1704.7.4
  - SOILS - INVESTIGATIONS (BORINGS/TEST PITS) BC 1704.12 BC 1704.12
  - EXTERIOR INSULATION FINISH SYSTEMS (EIFS) BC 1704.15
  - MECHANICAL SYSTEMS BC 1704.19, BC 3304.4.1
  - EXCAVATION - SHEETING, SHORING, AND BRACING BC 1704.20
  - SITE STORM DRAINAGE DISPOSAL AND DETENTION SYSTEM INSTALLATION BC 1704.25 BC 1704.25
  - FIRESTOP, DRAFTSTOP, AND FIREBLOCK SYSTEMS TR-2 BC 1905.6 BC 1905.6
  - CONCRETE TEST CYLINDERS TR-3 BC 1905.3 BC 1905.3
  - CONCRETE DESIGN MIX
  - PROGRESS INSPECTION ITEMS:
  - FOOTING AND FOUNDATION TR-8 BC 109.3.1 BC 109.3.5
  - ENERGY CODE COMPLIANCE INSPECTIONS

**SEPERATE APPLICATIONS**

- SPRINKLERS
  - BUILDERS PAVEMENT PLAN
  - MECHANICAL
  - STRUCTURES
- DRAWING LIST**
- Z-001.00 SITE PLAN & ZONING ANALYSIS
  - A-001.00 CELLAR FLOOR PLAN
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  - A-003.00 SECOND FLOOR PLAN
  - A-004.00 THIRD FLOOR PLAN
  - A-005.00 FOURTH FLOOR PLAN
  - A-006.00 ROOF PLAN
  - A-007.00 CROSS SECTION
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**ABBREVIATIONS**

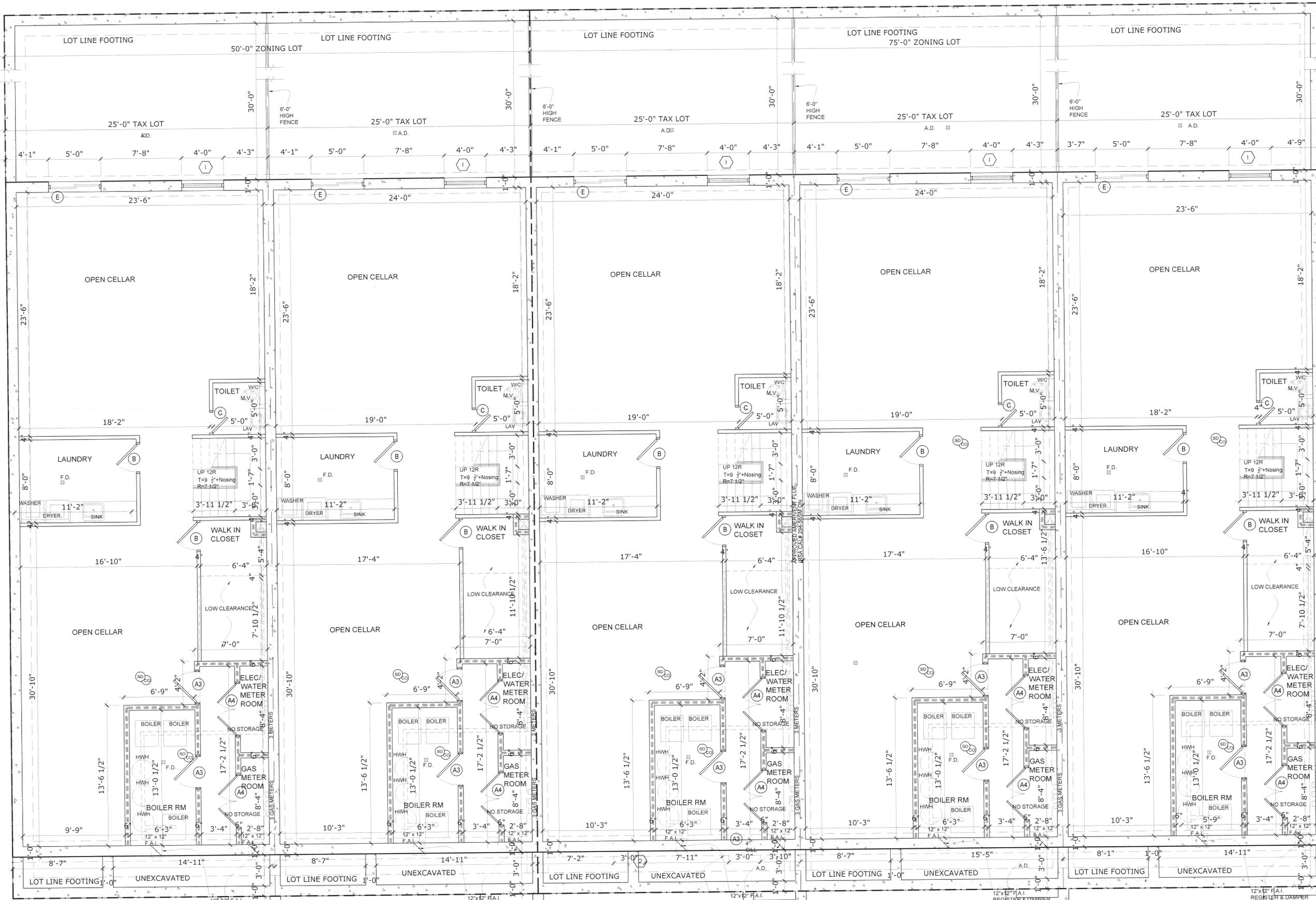
- @ AT
- CB BOARD
- C.B CONCRETE BLOCK
- CL CLOSET
- CONC. CONCRETE
- DR DRAIN
- DN DOWN
- DW DWELLING UNIT
- DWG DRAWING
- F.P.S.C. FIRE PROOF SELF CLOSING
- FT. FOOT (FEET)
- GYP GYPSUM
- LAV LAVATORY
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- LN LINEN
- MTL METAL
- RD ROOF DRAIN
- RM ROOM
- S.F. SQUARE FEET
- STL STEEL
- TYP. TYPICAL
- W WITH
- WC WATER CLOSET
- WD WOOD
- WD WASHER / DRYER
- W.M. WASHING MACHINE

**PROBE NOTE** : OWNER TO HIRE PROFESSIONAL ENGINEER TO FILE STRUCTURAL DRAWINGS

**NOTE:**  
THERE IS NO CONFLICT FOR THE CONSTRUCTION OF BUILDING WITHIN ANY SUBWAY LINES

**NOTE:**  
ENTIRE BUILDING TO BE FULLY SPRINKLERED. SPRINKLERS TO BE FILED UNDER A SEPERATE APPLICATION - PRIOR TO SIGN OFF

**ENERGY NOTE:**  
" TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2010 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE."



- BOILER ROOM NOTES**
1. ANY CHANGE OF HEATING APPARATUS TO BE FILED PRIOR TO INSTALLATION.
  2. GAS VENT TO BE AMERIVENT FLUE BSA CAL# 294-965M.
  3. PROVIDE MASONRY FOUNDATION UNDER AMERIVENT FLUE.
  4. PROVIDE MINIMUM 18" CLEARANCE BETWEEN BOILERS & ENCLOSING WALL OR PARTITIONS. PROVIDE 3'-0" CLEARANCE IN FRONT OF BOILER/ FURNACE FOR MAINTENANCE.
  5. PROVIDE 4" CONCRETE SLAB, ELECTRIC LIGHT & FLOOR DRAIN IN BOILER ROOM.
  6. PROVIDE TWO (2) LAYERS 5/8" SHEETROCK, TYPE 'X' ON THE CEILING.
  7. REFER TO LEGEND FOR BOILER ROOM ENCLOSURE PARTITIONS.
  8. NO METERS, DUMBWATER SHAFTS, ELEVATOR SHAFTS, INTERIOR STAIR OR REQUIRED OUTSIDE CELLAR ENTRANCE TO BE LOCATED WITHIN BOILER ROOM.
  9. BOILER ROOM DOOR TO BE ONE (1) 1/2 HOUR TEST FIREPROOF SELF-CLOSING, BOARD OF STANDARDS & APPEALS APPROVED TYPE.
  10. NO STORAGE PERMITTED WITHIN BOILER ROOM. 11. PROVIDE 12"x12" FIXED REGISTER WITH B.S.A. APPROVED TYPE FIRE DAMPER WITH FUSIBLE LINK 12. INSTALLATION OF EQUIPMENT SHALL COMPLY WITH B.S.A./M.E.A. APPROVAL, BUILDING CODE REQUIREMENTS, DEPARTMENT OF BUILDINGS RULES & REGULATION, AND MANUFACTURER'S SPECIFICATIONS (LATEST EDITION).

CHAPTER 3 - USE & OCCUPANCY CLASSIFICATION  
 OCCUPANCY CLASSIFICATION  
 RESIDENTIAL R-2

TABLE 503 - 2008 NYC CONSTRUCTION CODE  
 ALLOWABLE HEIGHT & BUILDING AREA  
 GROUP R-2 & TYPE OF CONSTRUCTION IIA  
 -> 6 STORIES AND U.L. S.F.

BC 1009.1 - 2008 NYC CONSTRUCTION CODE  
 STAIRWELL WIDTH, NOT LESS THAN 44" BUT EXCEPTIONS:  
 1. NOT LESS THAN 36"  
 1.2 WHEN R-2 OCCUPANCY % LESS THAN 12% HEIGHT AND  
 LESS THAN 30 OCCUPANTS PER FLOOR

**HOT WATER HEATER**  
 MANUF. AO SMITH : PG230246  
 MEA # 182-78-E VOLII  
 CAPACITY = 75,000 BTU'S

**BOILER**  
 MANUF. BURNHAM, MODEL : ALP080  
 MEA # 77-07-E  
 CAPACITY = 80,000 BTU'S  
 MIN. EFFICIENCY REQUIREMENT AS PER 503.2.3(5)  
 BOILER < 300,000 BTU, GAS FIRED -> MIN EFFICIENCY = 80% AFUE  
 PROPOSED UNIT EFFICIENCY = 95% AFUE

**THERMOSTATIC CONTROLS (TYPICAL TO ALL FLOORS)**  
 THE SUPPLY OF HEATING AND/OR COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE

**CELLAR FLOOR PLAN**

SCALE: 1/4"=1'-0"  
 ENTIRE BUILDING TO BE FULLY SPRINKLERED

**Panos Vikatos R.A.**  
 249-33 Beech Knoll Ave  
 Little Neck Hills, ny 11362  
 (917) 412-7105 pvarchitect@gmail.com

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, SUB-CONTRACTORS, OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURES OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. WRITTEN DIMENSIONS ON THIS DRAWING SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS. SHOP DETAILS MUST BE SUBMITTED TO THIS OFFICE FOR REVIEW BEFORE PROCEEDING WITH FABRICATION.

PROJECT TITLE  
**NEW BUILDING**  
 WALLABOUT STREET  
 BROOKLYN, NY

DRAWING TITLE  
**CELLAR FLOOR PLANS**

RELEASE STATUS OF DRAWING  
 SCHEMATIC DESIGN  
 DESIGN DEVELOPMENT  
 PROGRESS PRINT  
 PARTIAL RELEASE  
 FULL RELEASE  
 REVISION

SEAL & SIGNATURE  
  
 DATE 12/20/11  
 PROJECT No 018-11  
 DRAWING BY  
 CHECKED BY  
 DWG No 2 OF 11

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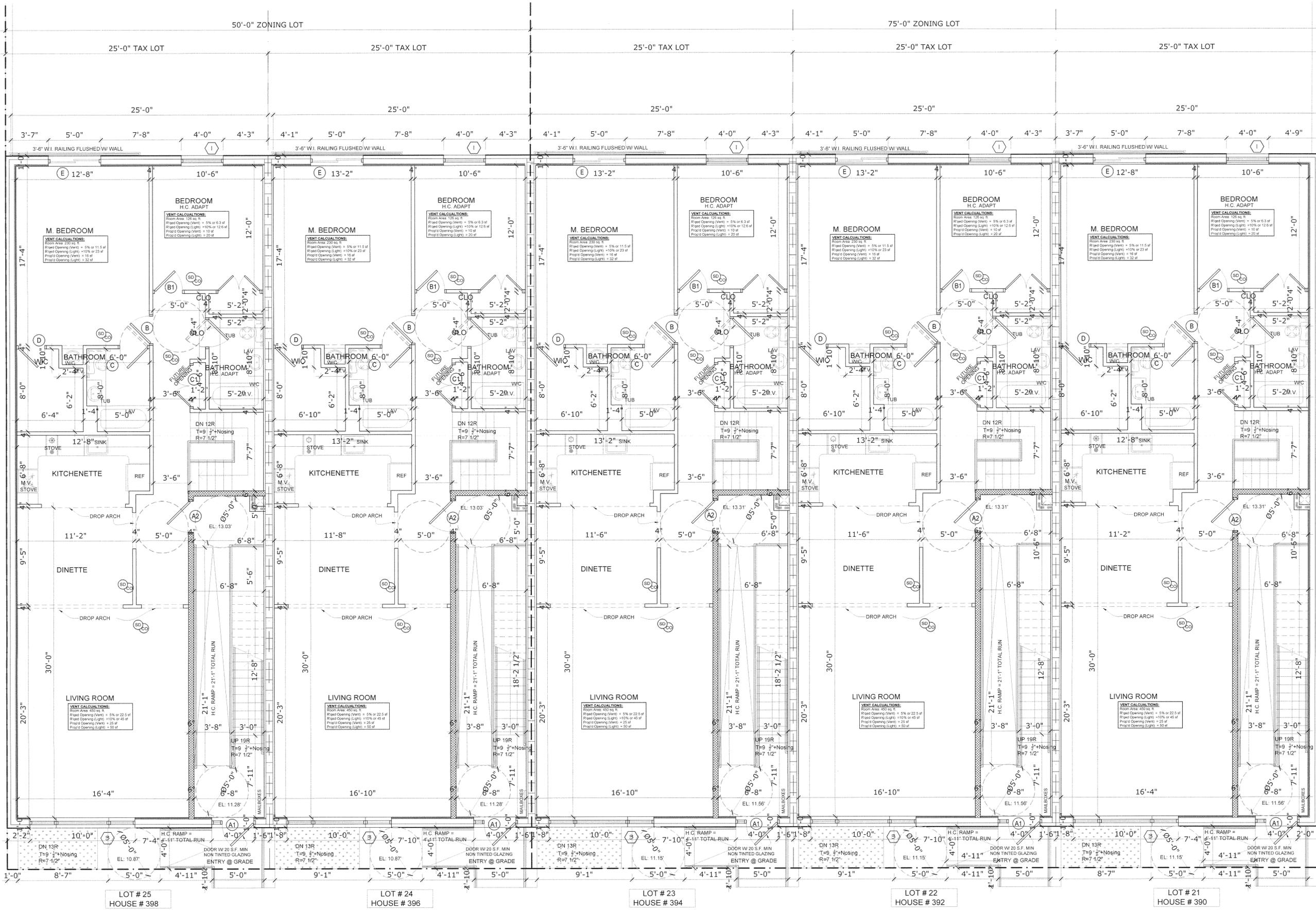
LOT # 25  
HOUSE # 398

LOT # 24  
HOUSE # 396

LOT # 23  
HOUSE # 394

LOT # 22  
HOUSE # 392

LOT # 21  
HOUSE # 390



**STAIR NOTES: (ALL STAIRS COMPLY WITH BC 1009)**

1. MIN. TREAD = 9 1/2"; MAX. RISER = 7 3/4"
2. PROVIDE HANDRAILS AS FOLLOWS:  
- 1 5/8" Ø PIPE RAILING @ WALLS  
- 2-1 5/8" Ø PIPE RAILS BETWEEN NEWEL POST
3. THE MIN. HEADROOM IN ALL PARTS OF THE STAIR ENCLOSURE SHALL NOT BE LESS THAN 5'-8" MEASURED VERTICALLY FROM TREAD NOSING OR FROM THE FLOOR SURFACE OF THE LANDING PLATFORM.
4. STAIR TO BE CONSTRUCTED OF NON-COMBUSTIBLE MATERIALS

**BC 1018 - 2008 NYC CONSTRUCTION CODE**  
NUMBER OF EXITS, MINIMUM # OF EXITS FOR SPACES WITH OCCUPANT LOAD OF 1-500 PERSONS → 2 EXITS REQUIRED BUT AS PER TABLE 1018.2, OCCUPANCY R-2, NOT EXCEEDING 6 STORIES IN HEIGHT AND 2,000 S.F. PER FLOOR, ONE EXIT PER FLOOR IS PERMITTED

**CHAPTER 3 - USE & OCCUPANCY CLASSIFICATION**  
OCCUPANCY CLASSIFICATION  
RESIDENTIAL R-2

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**PROJECT TITLE**  
NEW BUILDING  
WALLABOUT STREET  
BROOKLYN, NY

**DRAWING TITLE** STICKER  
FIRST FLOOR PLANS  
SCALE: AS NOTED

**RELEASE STATUS OF DRAWING** ISSUED:

- SCHEMATIC DESIGN
- DESIGN DEVELOPMENT
- PROGRESS PRINT
- PARTIAL RELEASE
- FULL RELEASE
- REVISION

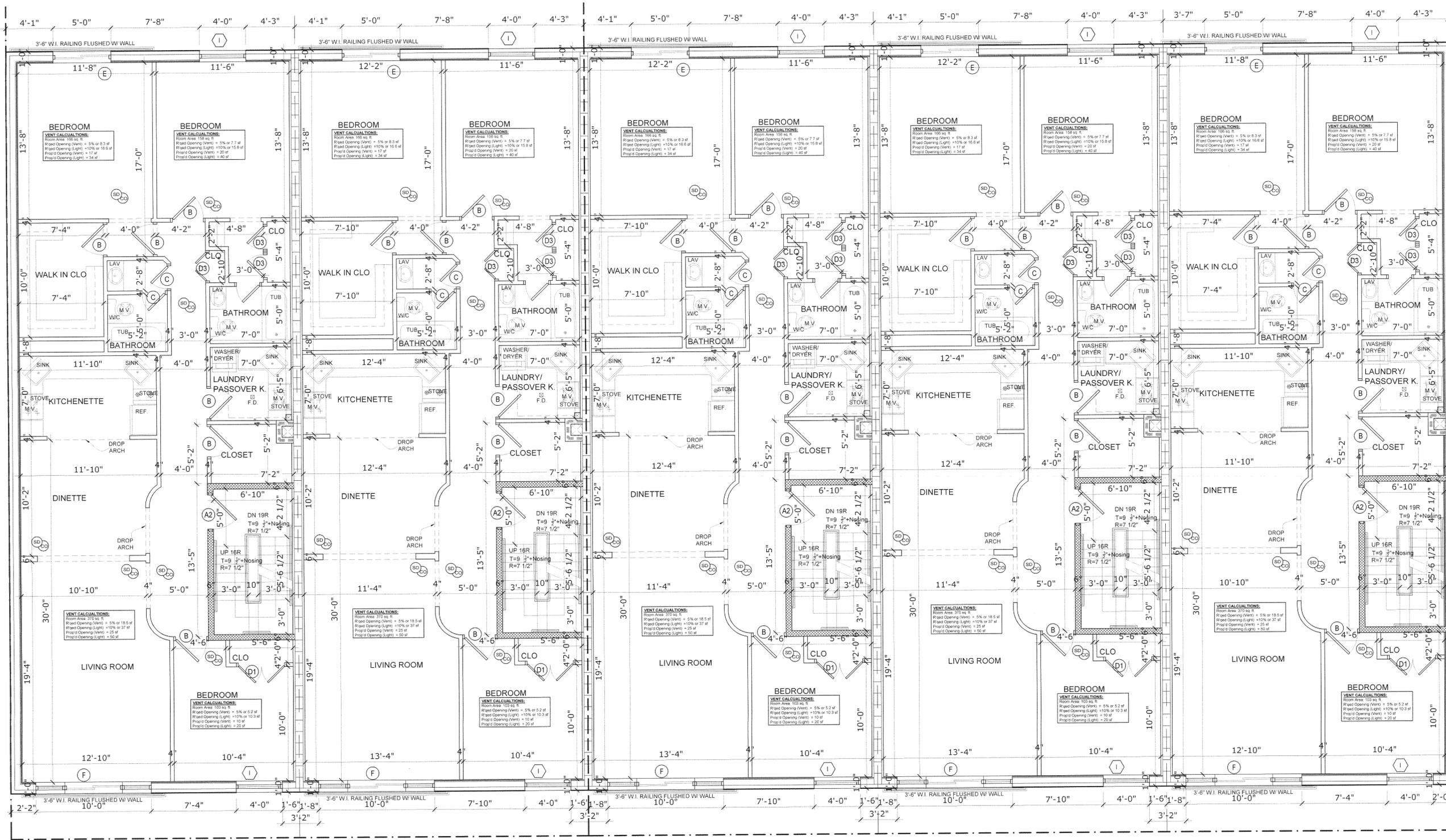
**SEAL & SIGNATURE**  
  
**DATE** 12/20/11  
**PROJECT No** 018-11  
**DRAWING BY**  
**CHECKED BY**  
**DWG No** 3 OF 11

**THERMOSTATIC CONTROLS (TYPICAL TO ALL FLOORS)**  
THE SUPPLY OF HEATING AND/OR COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE

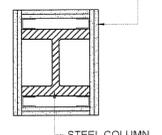
**FIRST FLOOR PLAN**  
SCALE: 1/4"=1'-0"

ENTIRE BUILDING TO BE FULLY SPRINKLERED

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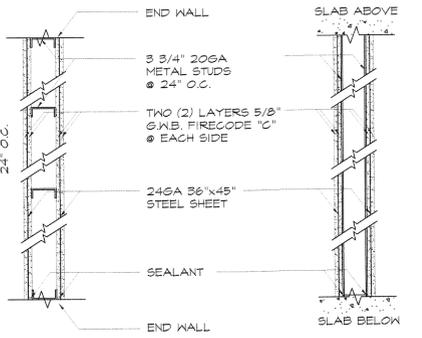


1 5/8" METAL STUDS w/ (2) LAYERS, FC #60, 5/8" THK G.W.B. ON BOTH SIDES, (2) HR FIRE RATED, BSA CAL #301-60 SM



**COLUMN PROTECTION DETAIL**

SCALE: 1/4"=1'



PLAN SECTION

**MASONRY EQUIVALENT WALL**

SCALE: 1"=1'-0"

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**PROJECT TITLE**  
 NEW BUILDING  
 WALLABOUT STREET  
 BROOKLYN, NY

**DRAWING TITLE**  
 STICKER  
 SECOND FLOOR PLANS

SCALE: AS NOTED

RELEASE STATUS OF DRAWING	ISSUED:
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<input type="checkbox"/> DESIGN DEVELOPMENT	_____
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<input type="checkbox"/> PARTIAL RELEASE	_____
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<input type="checkbox"/> REVISION	_____

SEAL & SIGNATURE \_\_\_\_\_ DATE 12/20/11

PROJECT No 018-11

DRAWING BY \_\_\_\_\_

CHECKED BY \_\_\_\_\_

DWG No 4 OF 11

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**SECOND FLOOR PLAN**

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

ENTIRE BUILDING TO BE FULLY SPRINKLERED

**THERMOSTATIC CONTROLS (TYPICAL TO ALL FLOORS)**  
 THE SUPPLY OF HEATING AND/OR COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE

- STAIR NOTES: (ALL STAIRS COMPLY WITH BC 1009)**
- MIN. TREAD = 9 1/2", MAX. RISER = 7 3/4"
  - PROVIDE HANDRAILS AS FOLLOWS:  
 - 1 5/8" Ø PIPE RAILING @ WALLS  
 - 2-1 5/8" Ø PIPE RAILS BETWEEN NEWEL POST
  - THE MIN. HEADROOM IN ALL PARTS OF THE STAIR ENCLOSURE SHALL NOT BE LESS THAN 6'-8" MEASURED VERTICALLY FROM TREAD NOSING OR FROM THE FLOOR SURFACE OF THE LANDING OR PLATFORM
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**CHAPTER 3 - USE & OCCUPANCY CLASSIFICATION**  
 OCCUPANCY CLASSIFICATION  
 RESIDENTIAL R-2

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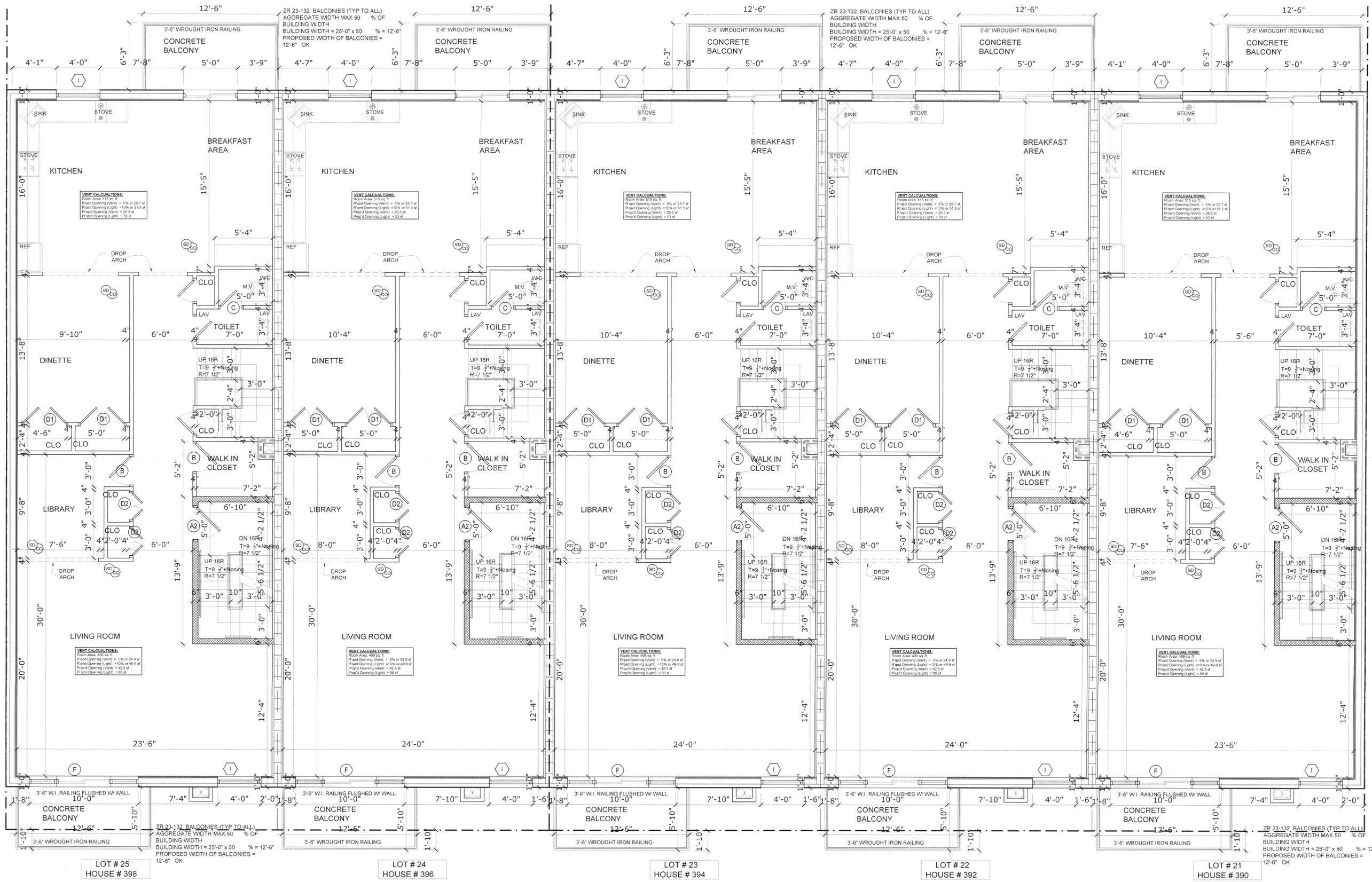
LOT # 25  
HOUSE # 398

LOT # 24  
HOUSE # 396

LOT # 23  
HOUSE # 394

LOT # 22  
HOUSE # 392

LOT # 21  
HOUSE # 390



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**PROJECT TITLE**  
 NEW BUILDING  
 WALLABOUT STREET  
 BROOKLYN, NY

**DRAWING TITLE** | **STICKER**  
 THIRD FLOOR PLANS

SCALE : AS NOTED

RELEASE STATUS OF DRAWING	ISSUED:
<input type="checkbox"/> SCHEMATIC DESIGN	
<input type="checkbox"/> DESIGN DEVELOPMENT	
<input type="checkbox"/> PROGRESS PRINT	
<input type="checkbox"/> PARTIAL RELEASE	
<input type="checkbox"/> FULL RELEASE	
<input type="checkbox"/> REVISION	

**SEAL & SIGNATURE** | **DATE** 12/20/11

**PROJECT No** 018-11

**DRAWING BY**

**CHECKED BY**

**DWG No** 5 OF 11

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NOT VALID FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT AND APPROVED BY THE DEPARTMENT OF BUILDINGS

**THIRD FLOOR PLAN**

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

ENTIRE BUILDING TO BE FULLY SPRINKLERED

**THERMOSTATIC CONTROLS (TYPICAL TO ALL FLOORS)**  
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**STAIR NOTES: (ALL STAIRS COMPLY WITH BC 1009)**

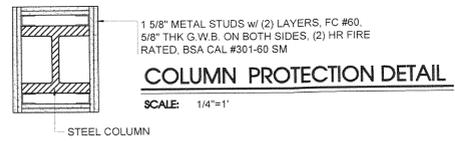
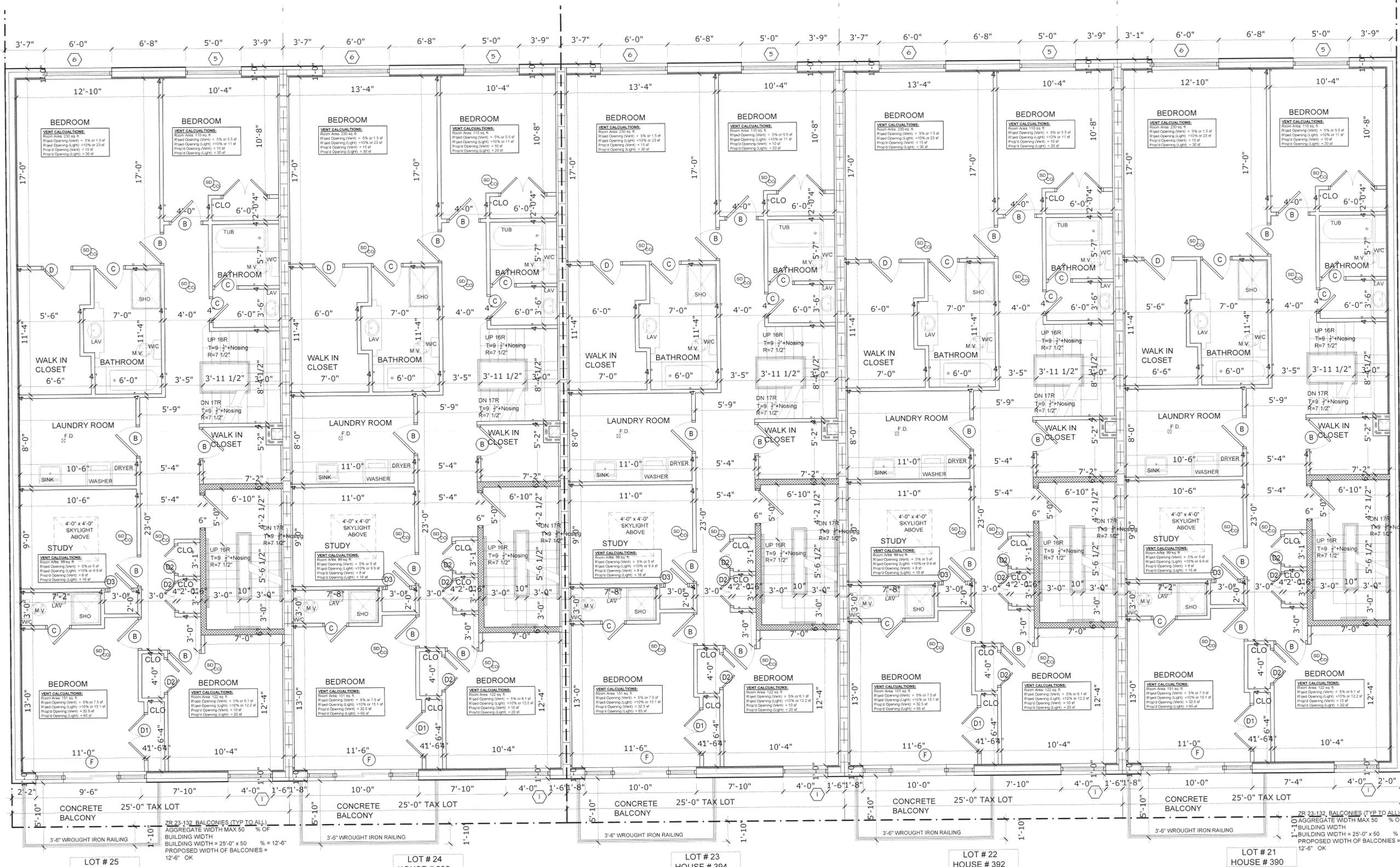
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PROJECT TITLE  
**NEW BUILDING**  
WALLABOUT STREET  
BROOKLYN, NY

DRAWING TITLE  
**STICKER**

FOURTH FLOOR PLANS

SCALE: AS NOTED

RELEASE STATUS OF DRAWING ISSUED:

SCHEMATIC DESIGN

DESIGN DEVELOPMENT

PROGRESS PRINT

PARTIAL RELEASE

FULL RELEASE

REVISION

SEAL & SIGNATURE

DATE 12/20/11

PROJECT No 018-11

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CHECKED BY

DWG No 6 OF 11

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REGISTERED ARCHITECT  
PANOS VIKATOS  
NO. 034254  
STATE OF NEW YORK

NOT VALID FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT AND APPROVED BY THE DEPARTMENT OF BUILDINGS

**FOURTH FLOOR PLAN**

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

ENTIRE BUILDING TO BE FULLY SPRINKLERED

**THERMOSTATIC CONTROLS (TYPICAL TO ALL FLOORS)**  
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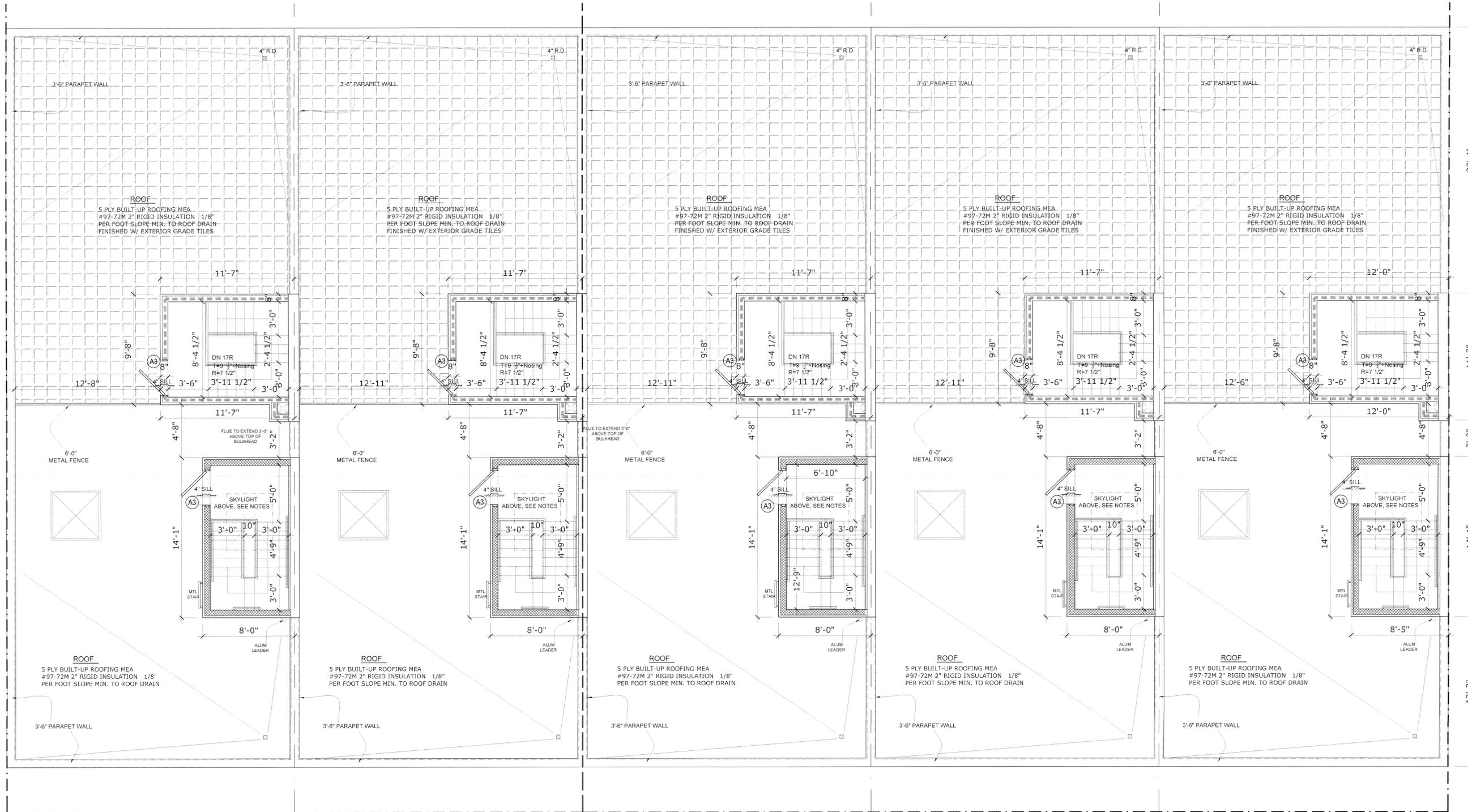
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ZR 23-132, BALCONIES (TYP TO ALL) AGGREGATE WIDTH MAX 50 % OF BUILDING WIDTH  
BUILDING WIDTH = 25'-0" x 50 % = 12'-6"  
PROPOSED WIDTH OF BALCONIES = 12'-6" OK

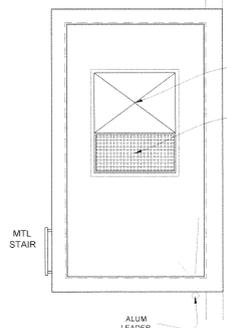
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PROPOSED WIDTH OF BALCONIES = 12'-6" OK

LOT # 25 HOUSE # 398      LOT # 24 HOUSE # 396      LOT # 23 HOUSE # 394      LOT # 22 HOUSE # 392      LOT # 21 HOUSE # 390



**ROOF PLAN**

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

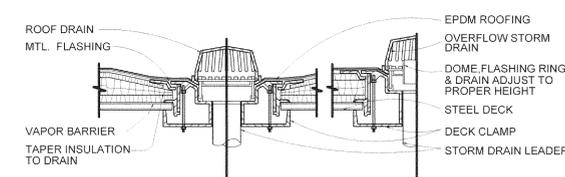


**SMOKE VENT CALCULATIONS AS PER BC 910.5**  
 AREA OF SHAFT = 12'-9" x 6'-10" = 87.1 S.F.  
 SMOKE VENT DIMENSION AS PER BC 910.5.2:  
 87.1 x 0.035 = 3.1 S.F. OR OR 446.4 S.I.

PROPOSED 4'-0" x 5'-0" SKYLIGHT OF TOTAL AREA 20 S.F. OR 2,880 S.I.  
 20 S.F. x 1/3 = 6.67 S.F. OR 960 S.I. > 72 S.I.  
 THEREFORE 4'-0" x 2'-0" (8 S.F. OR 1152 S.I.) FIXED LOUVER TO SERVE AS SMOKE VENT  
 THE REMAINING PORTION OF 4'-0" x 3'-0" TO BE A SKYLIGHT GLAZED WITH PLAIN GLASS NOT  
 MORE THAN 1/8 INCH THICK OR WITH PLASTIC GLAZING

**BULKHEAD PLAN & SMOKE VENT DETAILS**

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



**ROOF DRAIN**

SCALE: 3/4"=1'-0"

**CONTROLLED FLOW NOTES**

1. PROVIDE 3" BUILT-UP CONTROL-FLOW ROOF DRAIN; 2 ROOF DRAINS FOR 10,000 S.F. OR LESS OF ROOF AREA; 4 ROOF DRAINS FOR MORE THAN 10,000 S.F. OF ROOF AREA.
2. THE WATER DEPTH ON THE ROOF SHALL NOT EXCEED 3" IN DEPTH, DURING A 10 YEAR REQUENCY STORM.
3. FLASHING SHALL EXTEND AT LEAST 6" ABOVE THE ROOF LEVEL.
4. SCUPPERS SHALL BE PLACED IN THE PARAPET WALL 4" ABOVE THE ROOF LEVEL.
5. SEPERATE STORM & SANITARY DRAINAGE SYSTEMS WILL BE INSTALLED WITHIN THE BUILDING.

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PROJECT TITLE  
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 WALLABOUT STREET  
 BROOKLYN, NY

DRAWING TITLE  
**ROOF PLANS**

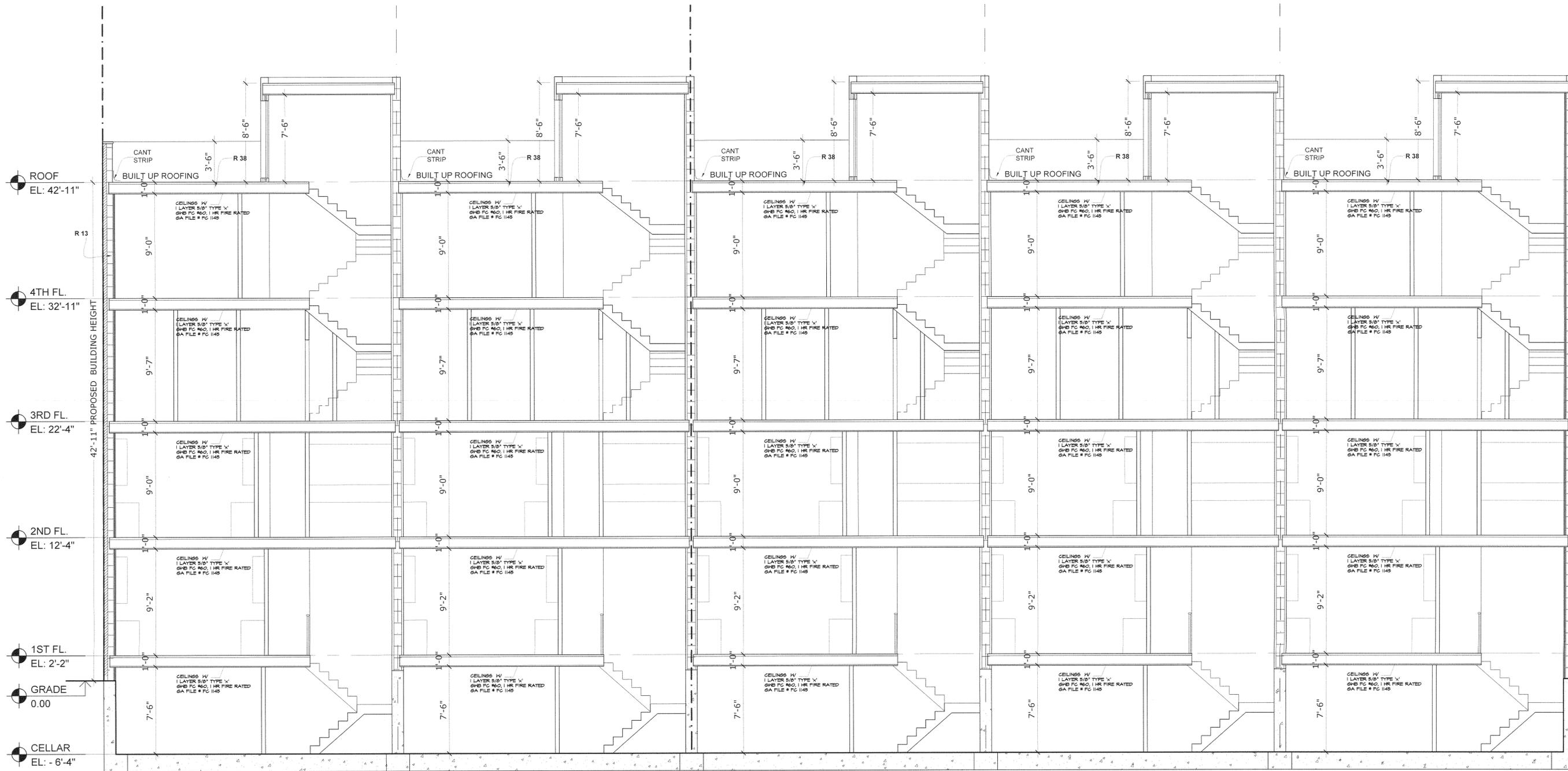
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SCALE : AS NOTED

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 PROJECT No 018-11  
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REFER TO STRUCTURAL DRAWINGS FOR DETAILED SIZE AND DEPTH OF FOUNDATION

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REFER TO STRUCTURAL DRAWINGS FOR DETAILED SIZE AND DEPTH OF FOUNDATION

LOT # 25  
HOUSE # 398

LOT # 24  
HOUSE # 396

LOT # 23  
HOUSE # 394

LOT # 22  
HOUSE # 392

LOT # 21  
HOUSE # 390

**CROSS SECTION**

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

**Panos Vikatos R.A.**  
 249-33 Beech Knoll Ave  
 Little Neck Hills, ny 11362  
 (917) 412-7105 pvarchitect@gmail.com

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PROJECT TITLE  
**NEW BUILDING**  
 WALLABOUT STREET  
 BROOKLYN, NY

DRAWING TITLE  
**CROSS SECTIONS**

STICKER

SCALE : AS NOTED

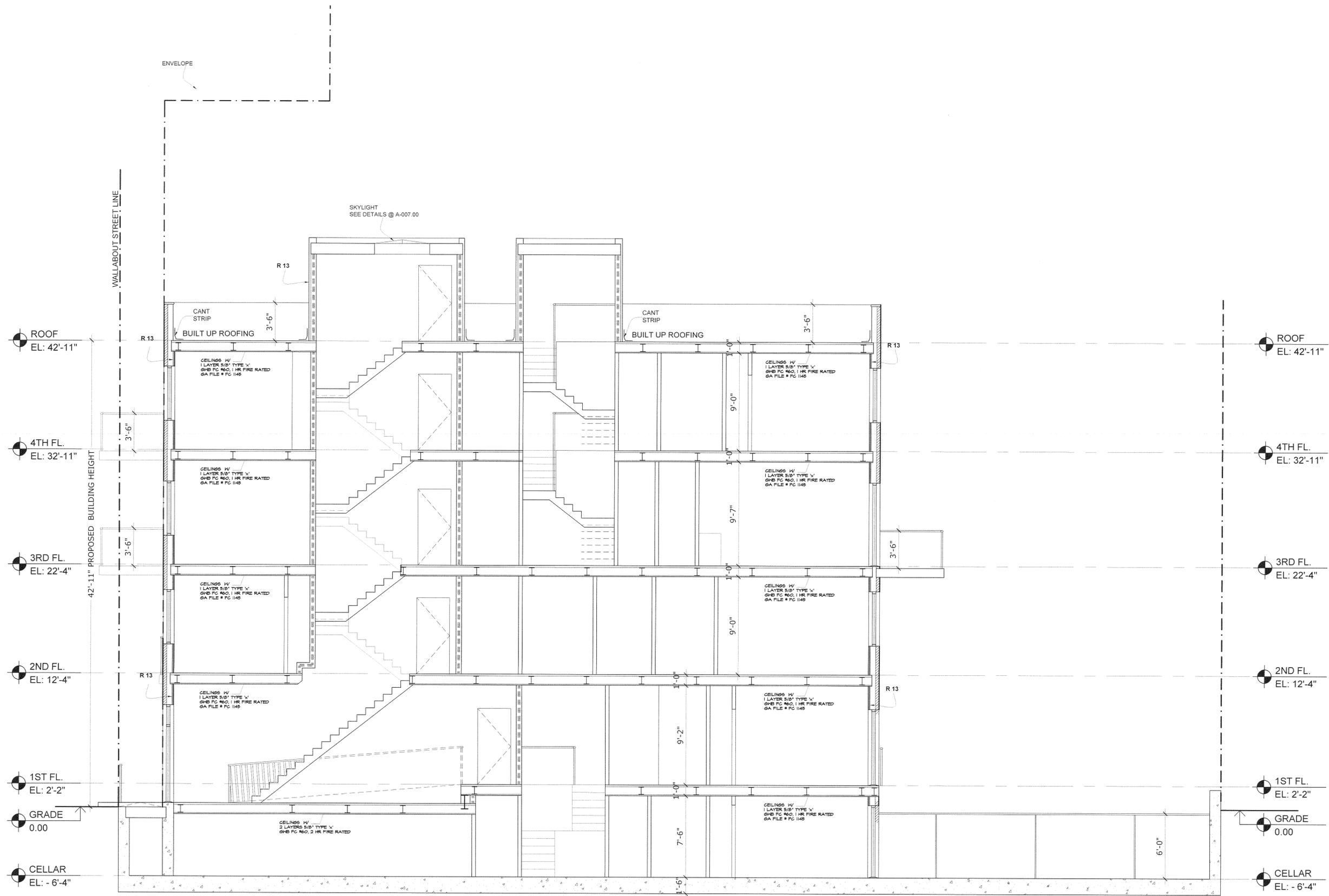
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DATE 12/20/11  
 PROJECT No 018-11  
 DRAWING BY \_\_\_\_\_  
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REFER TO STRUCTURAL DRAWINGS FOR DETAILED SIZE AND DEPTH OF FOUNDATION

**CROSS SECTION**

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

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PROJECT TITLE  
**NEW BUILDING**  
 WALLABOUT STREET  
 BROOKLYN, NY

DRAWING TITLE  
**LONGITUDINAL SECTION**

SCALE : AS NOTED	
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	DWG No 9 OF 11
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	008.00

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**WALLABOUT STREET ELEVATION**

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



**REAR ELEVATION**

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

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**NEW BUILDING**  
 WALLABOUT STREET  
 BROOKLYN, NY

DRAWING TITLE  
**ELEVATIONS**

STICKER

SCALE : AS NOTED

RELEASE STATUS OF DRAWING ISSUED:

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PROJECT No 018-11

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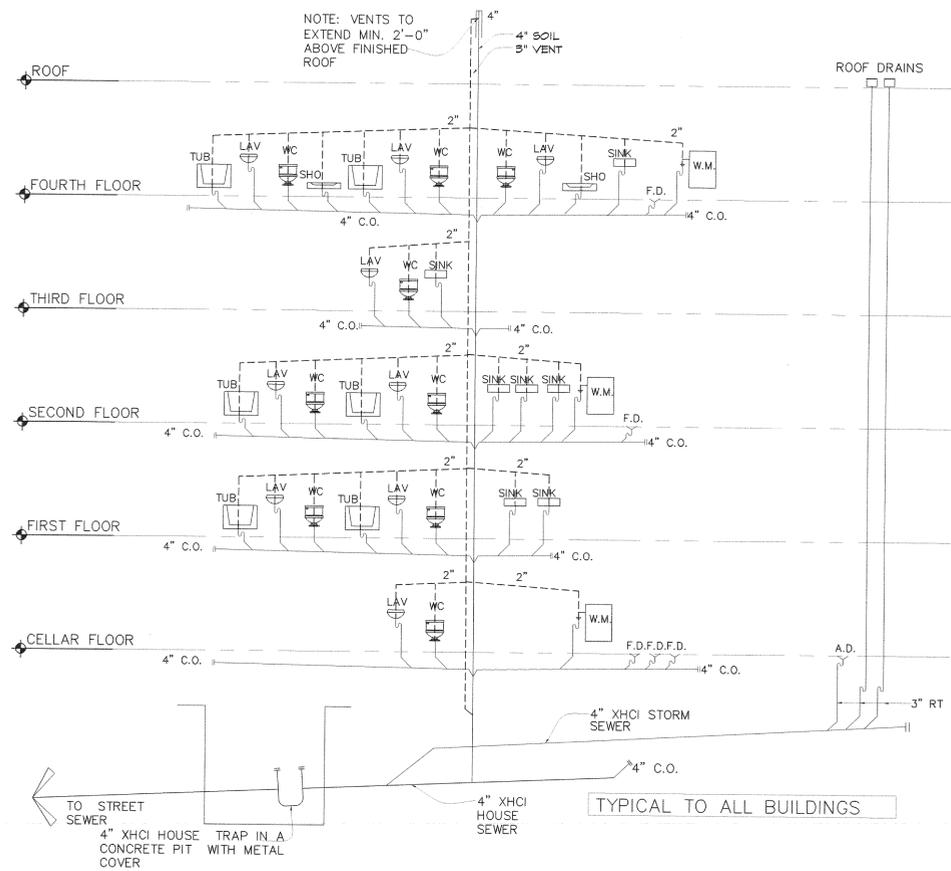
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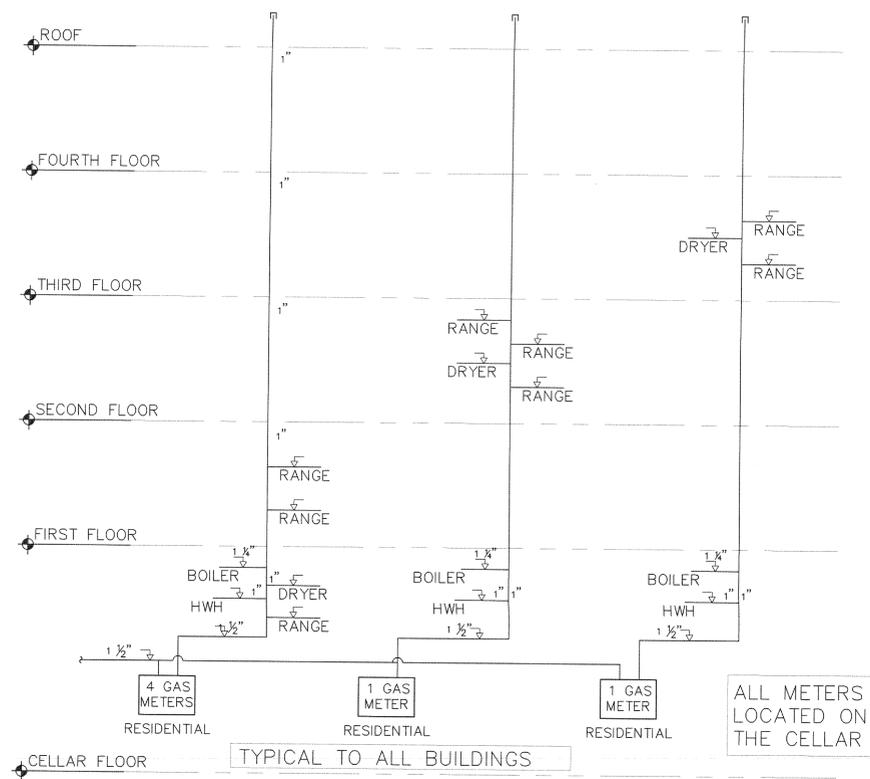
**PLUMBING RISER DIAGRAM**

SCALE: NTS AS PER NYCPC 106.5

SYMBOL	ABBR	DESCRIPTION	S/ W	V	HW	CW
	SINK	18 GA. STAINLESS STEEL WITH DRAIN 1 OR 2 COMPARTMENTS KITCHEN SINK	2"	1 1/2"	1/2"	1/2"
	LAV	LAVATORY SELF-RIMMING SET IN COUNTER TOP WITH CENTER SET & OPEN DRAIN	1 1/2"	1 1/2"	1/2"	1/2"
	WC	WATER CLOSET FLUSH TANK FLOOR MOUNTED WHITE WITH OPEN FRONT SOLID PLASTIC SEAT - VITREOUS CHINA	4"	2"		3/4"
	TUB	CAST IRON WITH ENAMEL FINISH BATH TUB	1/2"	1 1/2"	1/2"	1/2"
	WM	WASHING MACHINE PROVIDED BY OWNER PROVIDE AMERICAN STANDARD VACUUM BREAKER (MEA#40-70M)	2"	1 1/2"	1/2"	1/2"
	SHO	SHOWER WITH PRECAST RECEPTOR	2"	1 1/2"	1/2"	1/2"

**PLUMBING NOTES**

1. COMPLETE PLUMBING SYSTEM & DRAINAGE SYSTEM INSTALLATION SHALL COMPLY WITH ARTICLE 16 & RS16-1.
2. PROVIDE CLEANOUT AT BASE OF ALL STACKS.
3. PROVIDE AIR CHAMBERS AT TOP OF WATER RISERS MIN 18" TO 1" DIAMETER.
4. STANDARD WEIGHT BLACK STEEL PIPE FOR GAS SYSTEM WITH GALVANIZED STEEL FITTINGS.
5. FLOOR DRAINS SHALL BE PROVIDED WITH REMOVABLE STRAINER AS PER RS 16.
6. TRAPS FOR FLOOR DRAINS SHALL BE DEEP SEAL TYPE.
7. ROOF GUTTERS SHALL BE AS PER RS 16-19.
8. PLUMBING CONTRACTOR SHALL VERIFY ALL INVERT AND EXISTING CONDITIONS PRIOR TO THE INSTALLATION OF NEW WORK.
9. ALL HOT AND COLD WATER LINES TO BE INSULATED WITH 1" FIBERGLASS FOIL BACKED.
10. PROVIDE SHUT OFF VALVES ON ALL WATER SUPPLIES IN FIXTURE.
11. PURGE ALL WATER AND GAS LINES BEFORE FINAL CONNECTIONS.



**GAS RISER DIAGRAM**

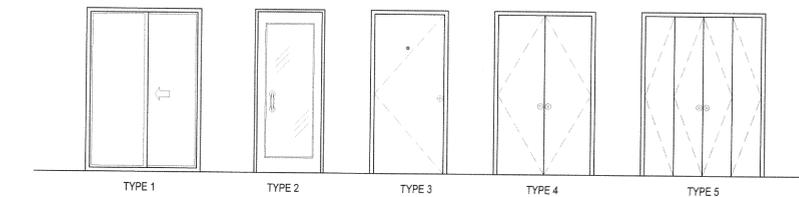
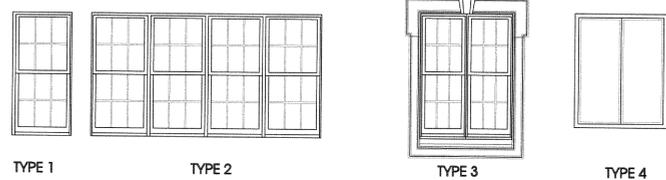
SCALE: NTS AS PER FGC 106.5

WINDOW SCHEDULE							
SYMBOL	SIZE	TYPE	MATERIAL	MANUF.	REMARKS	U VALUE	SHGC
1	4'-0" x 5'-0"	1	VINYLG	-	CASEMENT	0.4	0.4
2	3'-0" x 3'-0"	4	VINYLG	-	CASEMENT	0.4	0.4
3	10'-0" x 5'-0"	2	VINYLG	-	CASEMENT	0.4	0.4
4	4'-0" x 3'-6"	1	VINYLG	-	CASEMENT	0.4	0.4
5	5'-0" x 5'-0"	3	VINYLG	-	CASEMENT	0.4	0.4
6	6'-0" x 5'-0"	4	VINYLG	-	CASEMENT	0.4	0.4

ALL WINDOWS DOUBLE GLAZED

**WINDOW SCHEDULE**

SCALE: NTS



**DOOR SCHEDULE**

SYMBOL	SIZE UNIT	MATERIAL	FRAME	SADDLE	TYPE	REMARKS	U VALUE	SHGC
(A1)	3'-0" X 8'-0"	GLASS/AL.	ALUM.	ALUM.	1	MAIN ENTRANCE W/ 20 S.F. MIN. GLAZING	0.85	0.4
(A2)	3'-0" X 6'-8"	STEEL	STEEL	ALUM.	4	UNIT ENTRY W/ PEEP HOLE & LOCK		
(A3)	3'-0" X 6'-8"	STEEL	STEEL	-	4	STAIRWELL / STORAGE / MECH		
(A4)	(2) 2'-0" X 7'-0"	STEEL	STEEL	-	3	METER ROOMS		
(A5)	3'-0" X 6'-8"	STEEL	STEEL	-	4			
(C)	2'-0" X 6'-8"	WOOD	-	-	-	TOILET / BATHROOM		
(B)	2'-8" X 6'-8"	WOOD	-	-	4	BEDROOM		
(B1)	21'-0" X 6'-8"	WOOD	-	-	4	H.C. BEDROOM		
(C1)	2'-10" X 6'-8"	WOOD	-	-	4	H.C. TOILET		
(D)	2'-0" X 6'-8"	WOOD	-	-	4	W.I.C.		
(D1)	(2) 1'-6" X 6'-8"	WOOD	-	-	5	CLOSET		
(D2)	(2) 2'-0" X 6'-8"	WOOD	-	-	5	CLOSET		
(D3)	1'-6" X 6'-8"	WOOD	-	-	4	LINEN		
(E)	(2) 2'-6" X 7'-0"	GLASS/AL.	ALUM.	ALUM.	2	SLIDING DOOR	0.55	0.4
(F)	(2) 2'-0" X 7'-8"	GLASS/AL.	ALUM.	ALUM.	3	BALCONY W/ SIDELIGHTS	0.55	0.4

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PROJECT TITLE  
**NEW BUILDING**  
 WALLABOUT STREET  
 BROOKLYN, NY

DRAWING TITLE  
 RISERS  
 DOOR / WINDOW  
 SCHEDULES  
 SCALE : AS NOTED

STICKER

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## **APPENDIX B**

### **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and The Rabsky Group 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, The Rabsky Group 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, Hannah Moore, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at 212-442-6372 or (212) 788-8841.

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

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

**Repositories.** A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to 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 Rabsky Group will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Repository Name: Bushwick Library

Repository Address: 340 Bushwick Avenue, Brooklyn, NY

Repository Telephone Number: 718-602-1348

Repository Hours of Operation:

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

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

**Identify Issues of Public Concern.** The major issues of concern to the public will be potential impacts of nuisance odors and dust during the disturbance of historic fill soils at the Site. This work will be performed in accordance with procedures which will be specified under a detailed

Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to monitor the potential for exposure including a Construction Health and Safety Plan and a Community Air Monitoring Plan are required components of the remedial program. Implementation of these plans will be under the direct oversight of the New York City Office 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 The Rabsky Group, reviewed and approved by OER prior to distribution and mailed by The Rabsky Group. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

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

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

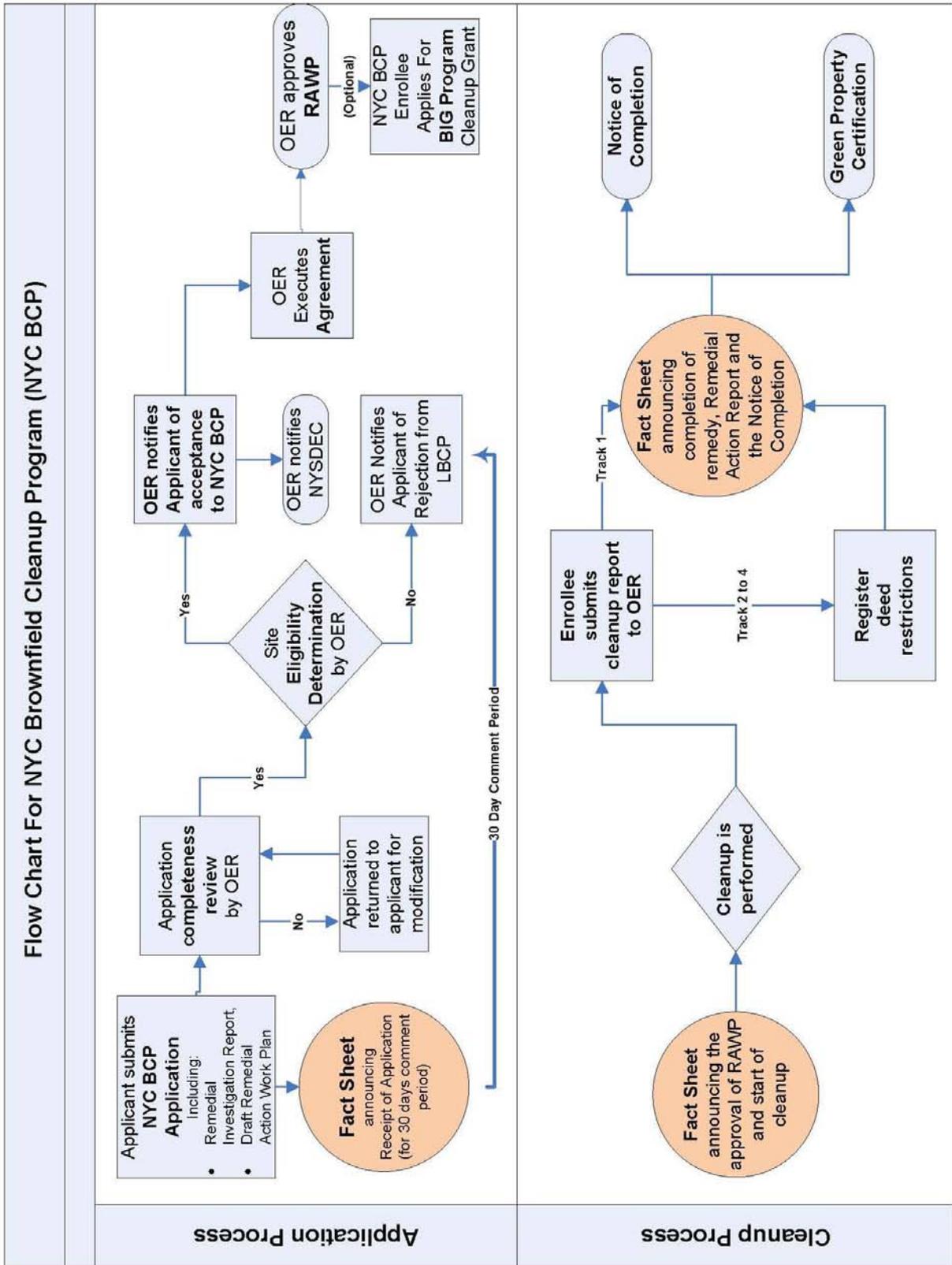
Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes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

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

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

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

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



## APPENDIX C

### SUSTAINABILITY STATEMENT

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

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

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

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

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

The project will reduce the consumption of virgin materials by substituting recycled concrete aggregate for mined gravel and/or sand backfill whenever possible. An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

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

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

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

**Paperless Voluntary Cleanup Program.** The Rabsky Group 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.** The Rabsky Group 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.

## **APPENDIX D**

### **SOIL/MATERIALS MANAGEMENT PLAN**

#### **1.1 SOIL SCREENING METHODS**

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

#### **1.2 STOCKPILE METHODS**

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

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

#### **1.3 CHARACTERIZATION OF EXCAVATED MATERIALS**

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

#### **1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE**

The PE/QEP overseeing the remedial action will:

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

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

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

### **1.5 OFF-SITE MATERIALS TRANSPORT**

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes will be southwest on Wallabout Street to Union Avenue and then north on Union Avenue to Interstate 278 - Brooklyn Queens Expressway. This routing takes into account the following factors: (a) limiting transport through residential areas and past

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

## **1.6 MATERIALS DISPOSAL OFF-SITE**

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

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

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

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be

reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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

### 1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in **Table 1**. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed.

It is common to reuse clean soil at the site for use as backfill around footings and other foundation structures. If on-Site material is to be reused for these purposes at the Site, soil piles no greater than 500 cubic yards are to be staged on and under 5-mil polyethylene sheeting while awaiting sampling. Each soil pile will undergo a testing program to confirm the soil meets Track 1 Unrestricted Use Soil Cleanup Objectives prior to reuse on-site. Confirmation testing of clean soils will be as follows:

Analysis	Frequency	Sample Type
SVOCs (PAHs)	1 per 500 yd <sup>3</sup>	Composite of 5-point grab
TAL Metals	1 per 500 yd <sup>3</sup>	Composite of 5-point grab

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Pesticides	1 per 500 yd <sup>3</sup>	Composite of 5-point grab
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Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the Site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

## 1.8 DEMARCATION

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

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

## 1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in **Table 1**.

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

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

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

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

### **Source Screening and Testing**

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

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

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

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the

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

### **1.10 FLUIDS MANAGEMENT**

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

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

### **1.11 STORM-WATER POLLUTION PREVENTION**

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

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

## **1.12 CONTINGENCY PLAN**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

## **1.13 ODOR, DUST AND NUISANCE CONTROL**

### **Odor Control**

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

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

### **Dust Control**

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

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.

- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

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

### **Other Nuisances**

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

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

**Appendix E**  
**Construction Health and Safety Plan**



**REDEVELOPMENT PROJECT**  
**390 - 398 WALLABOUT STREET**  
**BROOKLYN, NEW YORK**

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**CONSTRUCTION**  
**HEALTH AND SAFETY PLAN**

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MARCH 2012

*Prepared for:*  
The Rabsky Group, LLC  
39 Heyward Street  
Brooklyn, NY 11211

*Prepared By:*

**EBC**

**ENVIRONMENTAL BUSINESS CONSULTANTS**

1808 Middle Country Road  
Ridge, NY 11961

## HEALTH AND SAFETY PLAN

Site: **Redevelopment Project - TRG**

Location: **390-398 Wallabout Street, Brooklyn, NY**

Prepared By: **ENVIRONMENTAL BUSINESS CONSULTANTS**

Date Prepared: **March, 2012**

Version: **1**

Revision: **0**

Project Description:

Waste types: Solid

Characteristics: Semi-Volatile Organic Compounds, metals, and pesticides – in historic fill (Grade to 5 to 8 feet of soil)

Overall Hazard: Low

ENVIRONMENTAL BUSINESS CONSULTANTS (EBC) AND EBC'S SUBCONTRACTORS DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION.

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## STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to risks from hazardous materials during the Remedial Activities planned for 390 to 398 Wallabout Street, Brooklyn, New York.

This HASP, 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 HASP 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. The General Contractor and their subcontractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees. The General contractor has the option of adopting this HASP or providing its own for the planned scope of work under the Remedial Action Plan.



## 1.0 INTRODUCTION

This document describes the health and safety guidelines developed by Environmental Business Consultants (EBC) for implementation of a Remedial Action Plan at Redevelopment Project located at 390 to 398 Wallabout Street, Brooklyn, NY, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes during the removal of underground storage tanks and the excavation and loading of contaminated soil. 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 subsurface sample collection activities and is based on the best information available. The CHASP may be revised by EBC at the request of The Rabsky Group (“the owner”) and/or the New York State Department of Environmental Conservation (NYSDEC) or New York City Office of Environmental Remediation (NYCOER) 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 Scope

This CHASP addresses the potential hazards related to the site Remedial Action Plan (RAP). The RAP activities are as described below:

- 1) Site mobilization of General Contractor (GC) and Subcontractors to install the building foundation.
  - a) Excavate top 1 to 8 feet of historic fill from Site.
  - b) Excavate as necessary for installation of new building's foundation.

### 1.2 Application

The HASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- General Contractor
- EBC employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

### 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 HASP. 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 Construction Health and Safety Plan are:

Name	Title	Address	Contact Numbers
Mr. Kevin Brussee	EBC Project Manager	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000 Cell (631) 338-1749
Mr. Kevin Waters	EBC Site Safety Officer	1808 Middle Country Road Ridge, NY 11961	(631) 504-6000

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

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

1. Educating personnel about information in this CHASP and other safety requirements to be observed during site operations, including, but not limited to, decontamination procedures, designation of work zones and levels of protection, air monitoring, fit testing, and emergency procedures dealing with fire and first aid.
2. Coordinating site safety decisions with the project manager.
3. Designating exclusion, decontamination and support zones on a daily basis.
4. Monitoring the condition and status of known on-site hazards and maintaining and implementing the air quality monitoring program specified in this CHASP.
5. Maintaining the work zone entry/exit log and site entry/exit log.
6. Maintaining records of safety problems, corrective measures and documentation of chemical exposures or physical injuries (the site safety officer will document these conditions in a bound notebook and maintain a copy of the notebook on-site).

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

## 2.0 SITE BACKGROUND AND SCOPE OF WORK

The Site is located at 390 to 398 Wallabout Street in the Williamsburg section in Brooklyn, New York and is identified as Block 2266 and Lots 21, 22, 23, 24 and 25 on the New York City Tax Map. The Site is 12,500-square feet and is bounded by Wallabout Street to the north, Block 2266 and Lots 36, 37, 38, 39 and 40 (99 to 91 Gerry Street) to the south, Block 2266 and Lot 29 (72 Throop Avenue) and Lot 30 (74 Throop Avenue) to the east, and Block 2266 and Lot 20 (388 Wallabout Street) to the west. Currently, the undeveloped lots of the Site (Lots 21, 22, 23 and 24) are used as a parking lot for a car and truck rental company, and the Lot developed with a one-story concrete block building (Lot 25) is used as a tire repair facility. Each of the 5 Site Lots is rectangular, consisting of 25 feet of street frontage on Wallabout Street and a depth of 100 feet.

### 2.1 Prior Investigations

#### 2.1.1 Phase I Environmental Site Assessment

A Phase I Environmental Site Assessment (ESA) was completed by Environmental Business Consultants in January of 2012 (revised Feb 2012). EBC noted the former/current use of the Site as an auto repair facility as a recognized environmental condition.

#### 2.1.2 Remedial Investigation Report

EBC performed a subsurface investigation at the Site consisting of the installation of eight soil borings (B1-B8) to collect 17 soil samples, the installation of four temporary groundwater monitoring wells to collect four groundwater samples, and the installation of five soil vapor implants to collect five soil vapor samples.

For each of the eight soil borings, soil samples were collected continuously from grade to a final depth of 12 or 15 feet below existing grade using a four or five-foot steel macro-core sampler with acetate liners and Geoprobe direct-push equipment. Soil recovered from each of the soil borings was field screened for the presence of VOCs with a photo-ionization detector (PID) and visually inspected for evidence of contamination. No PID readings above background concentrations were obtained from any the of soil borings with the exception of PID readings of approximately 20 ppmv noted in soil boring B2 at 4 to 12 feet below grade. The laboratory results of the two soil samples collected from that interval showed only a slight detection of naphthalene (12 ppb) in one of the samples.

Soil/fill samples collected during the RI showed no PCBs at a detectable concentration.

No VOCs were detected within any of the soil samples above Unrestricted Use SCOs, but the following VOCs were detected below Track 1 Unrestricted Use (Track 1) SCOs; naphthalene in B2(7-9) at 12 ppb, naphthalene in B6(0-2) at 1,200 ppb, naphthalene in B8(0-2) at 6.9 ppb, and 1,2,4-trimethylbenzene at 11 ppb.

Ten SVOCs were detected above Restricted Residential SCOs and all were found in the shallow soil horizon. None of the same SVOCs were detected within the soil samples collected at the 8 to 10 foot and 10 to 12 foot intervals. These SVOCs were all PAH compounds and their concentrations and distribution indicate that they are associated with historic fill material observed in shallow samples.

Three metals (barium, mercury, and lead) were detected above Track 2 Restricted Residential SCOs in just six of the eight shallow soil samples. Lead exceeded Track 2 Restricted Residential SCOs in six shallow samples with concentrations ranging up to 863 ppm. Barium exceeded Track 2 Restricted Residential SCOs in three shallow samples with concentrations ranging up to 1,190 ppm. Mercury exceeded Track 2 Restricted Residential SCOs in two shallow samples; the highest concentration was 18.6 ppm. Three additional metals (copper, nickel and zinc) were detected within one or more of the shallow soil samples at a concentration above Unrestricted Use SCOs. No metals were detected above Unrestricted Use SCOs in any of the deep samples. Overall, soil testing results were unremarkable and were consistent with observations for other historical fill sites in Brooklyn. The RI did not reveal any contaminant source areas on this property.

The pesticides 4,4,4-DDT, 4,4,4-DDE, chlordane, and/or dieldrin were detected within five of the eight shallow soil samples at a concentration above Unrestricted Use SCOs. No pesticides were detected within any of the deep soil samples.

Groundwater samples collected during the RI showed chlorinated VOCs tetrachloroethylene (PCE), tetrachloroethylene (TCE), and cis-1,2-dichloroethylene were detected within one or more of the four groundwater samples. PCE was only detected within GW1 at a concentration of 1.8 ppb, which is below the New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS) of 5.0 ppb. TCE was detected within GW1 at 2 ppb, GW3 at 1.2 ppb, which is below the GQS of 5.0 ppb, but TCE was detected within GW4 at 18 ppb, which exceeded the GQS. Cis-1,2-dichloroethylene was detected above its corresponding GQS in GW1 (14 ppb), GW3 (5.7 ppb), and GW4 (41 ppb).

Four SVOCs were detected above their corresponding GQS within GW2, GW3 and GW4, and an additional six SVOCs were detected within the four groundwater samples but at a concentration below their corresponding GQS. The concentration of each of the SVOCs are not indicative of an on-Site spill/release.

The pesticide 4,4,4-DDT was detected within one of the four groundwater samples (GW2) at a concentration of 0.16 ppb, which is above the GQS of 0.11 ppb. No other pesticides were detected within the four groundwater samples.

The total concentration of arsenic, beryllium, chromium and nickel were detected above their GQS in GW3. In addition, the total concentration of concentrations of iron, manganese, lead and sodium were detected above their corresponding GQS in three of the four groundwater samples. The total concentration of magnesium was detected above its GQS in GW4. These findings are consistent with regional impacts and not impacts from site conditions. The RI indicates that groundwater is not impacted by site conditions and did not reveal any sources of contaminants onsite.

Soil vapor samples collected during the RI showed a wide range of petroleum and chlorinated volatile organic compounds at relatively low concentrations. Most petroleum compounds were detected at trace concentrations and almost all below 10 ug/m<sup>3</sup>. PCE and TCE ranged from 0.11 to 2.77 ug/m<sup>3</sup> and 0.1 to 1.9 ug/m<sup>3</sup>, respectively, with most findings in the range of typical ambient air quality levels in NYC. These results were all well below the monitoring levels for

PCE and TCE in the State DOH soil vapor guidance matrix. Neither PCE nor TCE were detected within any of the soil and groundwater samples collected at the Site and these low levels suggest a possible offsite origin.

## 2.2 Redevelopment Plans

The five 25 ft wide tax lots will be developed with identical residential four-story masonry buildings with full cellars. Each of the five buildings will extend approximately 65 feet, meeting both side lot lines. Therefore, the gross building square footage for each building is 8,125 ft<sup>2</sup>. There will be a rear cellar level walk-out court yard behind each building, that will be approximately 35 feet deep. The concrete slab of the cellar will be approximately 8 feet 8 inches below sidewalk level. The street front portion of the cellar will consist of a boiler room, gas meter room, electric meter room and a large open cellar area. The remaining portions of the cellar for each building will consist of two bedrooms, two bathrooms, and a laundry/Passover kitchen that are connected to the first floor residential unit of each building.

Each building will consist of three residential units. Unit #1 consists of the cellar level and first floor, Unit #2 is the second floor and Unit #3 is the third and fourth floors. Unit #1 has four bedrooms (two on cellar level, two on first floor), four bathrooms (two on cellar level, two on first floor), the laundry/Passover kitchen located in the cellar and a living room, kitchenette, and dinette on the first floor. Unit #2 has three bedrooms, two bathrooms, a living room, dinette, kitchenette and a laundry/Passover Kitchen. Unit #3 has a kitchen, half bath, living room, library, dinette and breakfast area on the third floor and four bedrooms, two bathrooms, a study, and laundry room.

Excavation for each new building will likely extend to a depth of approximately 10 feet below grade for construction of the buildings' cellar levels and foundations. In addition, each rear cellar level court yard will require excavation to approximately 10 feet below grade. Assuming an excavation volume of approximately 25 feet (wide) by 100 feet long (length) and 10 feet (deep), a total of approximately 925 cubic yards (1,250 tons) of soil will require excavation per building. The total excavated volume of soil for the entire Site will be approximately 4,625 cubic yards (6,250 cubic yards). The rear cellar level court yard will be capped with concrete.

## 2.3 Description of Remedial Action Plan

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and implementation of a Citizen Participation Plan.
2. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Track 1 Soil Cleanup Objectives (SCOs). Excavation and removal of soil/fill exceeding SCOs.
4. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
5. Installation of a vapor barrier system beneath the building slab.
6. Installation and operation of an active sub-slab depressurization system.

7. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
8. 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 onsite.
9. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
10. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
11. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
12. Submission of a 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.
13. 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.
14. Recording of a Declaration of Covenants and Restrictions that includes a listing of Engineering Controls and a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls including prohibition of the following: (1) use of groundwater without treatment rendering it safe for the intended use; (2) disturbance of residual contaminated material (if Track 1 is not achieved) unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval (unless Track 1 is achieved).

### **3.0 HAZARD ASSESSMENT**

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

#### **3.1 Physical Hazards**

##### *3.1.1 Tripping Hazards*

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

##### *3.1.2 Climbing Hazards*

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

##### *3.1.3 Cuts and Lacerations*

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

##### *3.1.4 Lifting Hazards*

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

##### *3.1.5 Utility Hazards*

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

##### *3.1.6 Traffic Hazards*

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

#### **3.2 Work in Extreme Temperatures**

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

### 3.2.1 Heat Stress

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

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

#### 1. Prevention

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

#### 2. Recognition and Treatment

##### a. Heat Rash (or prickly heat):

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

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

Treatment: Remove source 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.

### 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

Soil collected from the site as part of several subsurface investigations performed at the site have revealed elevated levels of SVOCs, metals and pesticides in historic fill at the Site.

Semi-Volatile organic compounds reported to be present at elevated concentrations in historic fill materials at the Site include the following:

Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(a)pyrene
Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene
Fluoranthene	Indeno(1,2,3-cd)pyrene	Naphthalene
Phenanthrene	Pyrene	

Metals reported to be present at elevated concentrations in historic fill materials at the Site include the following:

Barium	Copper	Mercury	Nickel	Lead	Zinc
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Pesticides reported to be present at elevated concentrations in historic fill materials at the Site include the following:

4,4,4-DDE	4,4,4-DDT	Chlordane	Dieldrin
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The primary routes of exposure to identified contaminants in soil to on-site construction workers are through inhalation, ingestion and absorption.

**Appendix C** includes information sheets for all detected 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/m<sup>3</sup> 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  $\mu\text{g}/\text{m}^3$  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.

### 3.3.3 *Organic Vapors*

Although no VOCs were detected within any of the soil samples collected at the Site, the site safety officer will periodically monitor organic vapors with a Photo-ionization Detector (PID) during excavation activities to determine whether organic vapor concentrations exceed action levels shown in Section 5 and/or the Community Air Monitoring Plan.

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

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

### 4.1 Level D

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

- standard work clothes, 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 sustained concentrations of measured total organic vapors in the breathing zone exceed background concentrations (using a portable OVA, or equivalent), by more 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.

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 excavations, active venting, etc.) will be implemented before requiring the use of respiratory protection.

## 5.0 AIR MONITORING AND ACTION LEVELS

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

### 5.1 Air Monitoring Requirements

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

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

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

### 5.2 Work Stoppage Responses

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

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

### 5.3 Action Levels During Excavation Activities

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

Organic Vapors (PID)	LEL %	Responses
0-1 ppm above background	0%	<ul style="list-style-type: none"> <li>• Continue excavating</li> <li>• Level D protection</li> <li>• Continue monitoring every 10 minutes</li> </ul>
1-5 ppm Above Background, Sustained Reading	1-10%	<ul style="list-style-type: none"> <li>• Continue excavating</li> <li>• Go to Level C protection or employ</li> </ul>

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

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

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

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

## 6.0 SITE CONTROL

### 6.1 Work Zones

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

**Due to the dimensions of the Site and the work area, it is expected that an exclusion zone will include the entire fenced area with the exception of the construction entrance area, which will serve as the decontamination zone. A support zone if needed will be located outside of the fenced area.** All onsite workers during excavation of historic fill 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. The exclusion zone is defined by the site safety officer but will typically be a 50-foot area around work activities. 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, if provided.

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

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

## 7.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

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

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

### 7.1 Emergency Equipment On-site

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

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

### 7.2 Emergency Telephone Numbers

General Emergencies	911
Suffolk County Police	911
NYC Fire Department	911
Woodhull Medical Center	(718) 963-7958
NYSDEC Spills Hotline	1-800-457-7362
NYSDEC Project Manager	(718) 482-4010
NYC Department of Health	(212) 676-2400
National Response Center	1-800-424-8802
Poison Control	1-800-222-1222
Project Manager	1-631-504-6000
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 Mr. Kevin Brussee (631) 504-6000
- Site Safety Officer Mr. Kevin Waters (631) 504-6000

#### **7.4 Medical Emergencies**

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

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

#### **7.5 Fire or Explosion**

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

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

#### **7.6 Evacuation Routes**

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

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

- Keep upwind of smoke, vapors, or spill location.
- Exit through the decontamination corridor if possible.
- If evacuation through the decontamination corridor is not possible, personnel should remove contaminated clothing once they are in a safe location and leave it near the exclusion zone or in a safe place.
- The site safety officer will conduct a head count to ensure that all personnel have been

evacuated safely. The head count will be correlated to the site and/or exclusion zone entry/exit log.

- If emergency site evacuation is necessary, all personnel are to escape the emergency situation and decontaminate to the maximum extent practical.

### **7.7 Spill Control Procedures**

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

### **7.8 Vapor Release Plan**

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

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

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

***APPENDIX A***  
***SITE SAFETY ACKNOWLEDGEMENT FORM***

## DAILY BRIEFING SIGN-IN SHEET

Date: \_\_\_\_\_ Person Conducting Briefing: \_\_\_\_\_

Project Name and Location: \_\_\_\_\_

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

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

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3. ATTENDEES (Print Name):

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

***APPENDIX B***  
***SITE SAFETY PLAN AMENDMENTS***

**SITE SAFETY PLAN AMENDMENT FORM**

**Site Safety Plan Amendment #:** \_\_\_\_\_

**Site Name:** \_\_\_\_\_

**Reason for Amendment:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Alternative Procedures:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Required Changes in PPE:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
**Project Superintendent (signature)**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Health and Safety Consultant (signature)**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Site Safety Officer (signature)**

\_\_\_\_\_  
**Date**

***APPENDIX C***  
***CHEMICAL HAZARDS***

**CHEMICAL HAZARDS**

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

# International Chemical Safety Cards

## BENZ(a)ANTHRACENE

ICSC: 0385



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

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



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.		Water spray, powder. In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>•INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>•SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>		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.
<b>•INGESTION</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

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

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0385

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

# International Chemical Safety Cards

ICSC: 0385

# BENZ(a)ANTHRACENE

I M P O R T A N T D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS TO YELLOW BROWN FLUORESCENT FLAKES OR POWDER.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
	<b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.
	<b>CHEMICAL DANGERS:</b>	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b>
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2 (as pyrolysis product of organic materials) (DFG 2005).	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is probably carcinogenic to humans.

<b>PHYSICAL PROPERTIES</b>	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
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<b>ENVIRONMENTAL DATA</b>	Bioaccumulation of this chemical may occur in seafood.	
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## NOTES

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

## ADDITIONAL INFORMATION

<b>ICSC: 0385</b>	<b>BENZ(a)ANTHRACENE</b>
(C) IPCS, CEC, 1994	

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

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

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0104**

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

# International Chemical Safety Cards

# BENZO(a)PYRENE

ICSC: 0104

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

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

## ADDITIONAL INFORMATION

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ICSC: 0104

BENZO(a)PYRENE

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**BENZO(b)FLUORANTHENE**

ICSC: 0720



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

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



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		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

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

**CHEMICAL DANGERS:**

Upon heating, toxic fumes are formed.

**OCCUPATIONAL EXPOSURE LIMITS:**

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

MAK:

Carcinogen category: 2;  
(DFG 2004).

of its aerosol and through the skin.

**INHALATION RISK:**

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

**EFFECTS OF SHORT-TERM EXPOSURE:**

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

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

**PHYSICAL PROPERTIES**

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

Octanol/water partition coefficient as log Pow: 6.12

**ENVIRONMENTAL DATA**

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



**NOTES**

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

**ADDITIONAL INFORMATION**

**ICSC: 0720**

**BENZO(b)FLUORANTHENE**

(C) IPCS, CEC, 1994

**IMPORTANT LEGAL NOTICE:**

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# International Chemical Safety Cards

**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
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		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	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
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**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.



**NOTES**

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

**ADDITIONAL INFORMATION**

**ICSC: 0721**

**BENZO(k)FLUORANTHENE**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**CHRYSENE**

ICSC: 1672



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

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



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

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

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

## CHRYSENE

ICSC: 1672

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

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

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

**ADDITIONAL INFORMATION**

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ICSC: 1672

CHRYSENE

(C) IPCS, CEC, 1994

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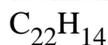
# International Chemical Safety Cards

## DIBENZO(a,h)ANTHRACENE

ICSC: 0431



1,25,6-Dibenzanthracene



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
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	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.
• <b>INGESTION</b>		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

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALLINE POWDER.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration
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<b>O</b>		

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**CHEMICAL DANGERS:**

of airborne particles can, however, be reached quickly.

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.

**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.



**NOTES**

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:**

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### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Fluoranthene

Product Number : 423947  
Brand : Aldrich

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

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Harmful by ingestion., Carcinogen

##### GHS Classification

Acute toxicity, Oral (Category 4)  
Acute toxicity, Dermal (Category 5)  
Acute aquatic toxicity (Category 1)  
Chronic aquatic toxicity (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)

H302 : Harmful if swallowed.  
H313 : May be harmful in contact with skin.  
H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P273 : Avoid release to the environment.  
P501 : Dispose of contents/ container to an approved waste disposal plant.

##### HMIS Classification

Health hazard: 1  
Chronic Health Hazard: \*  
Flammability: 1  
Physical hazards: 0

##### NFPA Rating

Health hazard: 1  
Fire: 1  
Reactivity Hazard: 0

## Potential Health Effects

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

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## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Benzo[j,k]fluorene

Formula : C<sub>16</sub>H<sub>10</sub>

Molecular Weight : 202.25 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Fluoranthene</b>			
206-44-0	205-912-4	-	-

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## 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

Flush eyes with water as a precaution.

### If swallowed

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

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## 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.

### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

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## 6. ACCIDENTAL RELEASE MEASURES

### Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Avoid breathing dust.

### 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. Sweep up and shovel. Keep in suitable, closed containers for disposal.

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## 7. HANDLING AND STORAGE

### Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

### Conditions for safe storage

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

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## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection

For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Eye protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin and body protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	solid
Colour	no data available

### Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 105 - 110 °C (221 - 230 °F) - lit.
Boiling point	384 °C (723 °F) - lit.
Flash point	198.0 °C (388.4 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available

Odour Threshold no data available

Evaporation rate no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

Other decomposition products - no data available

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## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 2,000 mg/kg

#### Inhalation LC50

no data available

#### Dermal LD50

LD50 Dermal - rabbit - 3,180 mg/kg

#### Other information on 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

Laboratory experiments have shown mutagenic effects.

### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Fluoranthene)

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: Reasonably anticipated to be human carcinogens. (Fluoranthene)

Reasonably anticipated to be a human carcinogen (Fluoranthene)

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

## Teratogenicity

no data available

## Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

## Specific target organ toxicity - repeated exposure (Globally Harmonized System)

no data available

## Aspiration hazard

no data available

## Potential health effects

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Harmful if swallowed.
<b>Skin</b>	Harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	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.

## Synergistic effects

no data available

## Additional Information

RTECS: LL4025000

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## 12. ECOLOGICAL INFORMATION

### Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.0077 mg/l - 96 h NOEC - Cyprinodon variegatus (sheepshead minnow) - 560 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	Immobilization EC50 - Daphnia magna (Water flea) - > 0.005 - < 0.01 mg/l - 3 d  Immobilization EC50 - Daphnia magna (Water flea) - 0.78 mg/l - 20 h NOEC - Daphnia magna (Water flea) - 0.085 mg/l - 48 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.

Very toxic to aquatic life with long lasting effects.

no data available

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### 13. DISPOSAL CONSIDERATIONS

#### Product

Offer surplus and non-recyclable solutions to a licensed disposal company. 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.

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### 14. TRANSPORT INFORMATION

#### DOT (US)

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

#### IMDG

Not dangerous goods

#### IATA

Not dangerous goods

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### 15. REGULATORY INFORMATION

#### OSHA Hazards

Harmful by ingestion., Carcinogen

#### 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

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
Fluoranthene	206-44-0	2007-03-01

#### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Fluoranthene	206-44-0	1990-01-01

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### 16. OTHER INFORMATION

#### Further information

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

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# 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
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		AVOID ALL CONTACT!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		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

<b>I</b>	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
<b>M</b>	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b>
<b>P</b>		

O  
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A

**CHEMICAL DANGERS:**  
Upon heating, toxic fumes are formed.

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

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

**EFFECTS OF SHORT-TERM EXPOSURE:**

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

**PHYSICAL PROPERTIES**

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

Octanol/water partition coefficient as log Pow: 6.58

**ENVIRONMENTAL DATA**

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



**NOTES**

Indeno(1,2,3-cd)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. ACGIH recommends environment containing Indeno(1,2,3-c,d)pyrene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m<sup>3</sup>. 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

**NAPHTHALENE**

ICSC: 0667



Naphthene  
C<sub>10</sub>H<sub>8</sub>

Molecular mass: 128.18

ICSC # 0667  
CAS # 91-20-3  
RTECS # QJ0525000  
UN # 1334 (solid); 2304 (molten)  
EC # 601-052-00-2  
April 21, 2005 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• <b>SKIN</b>	MAY BE ABSORBED! (Further see Inhalation).	Protective gloves.	Rinse skin with plenty of water or shower.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, food and feedstuffs. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol. N symbol. R: 22-40-50/53. S: 2-36/37-46-60-61. UN Hazard Class: 4.1. UN Packing Group: III.

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0667**

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

## NAPHTHALENE

ICSC: 0667

<b>I M P O R T A N T D A T A</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms irritating and toxic gases. Reacts with strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 10 ppm as TWA 15 ppm as STEL (skin) A4 (not classifiable as a human carcinogen); (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004). OSHA PEL: TWA 10 ppm (50 mg/m<sup>3</sup>) NIOSH REL: TWA 10 ppm (50 mg/m<sup>3</sup>) ST 15 ppm (75 mg/m<sup>3</sup>) NIOSH IDLH: 250 ppm See: <a href="#">91203</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the blood , resulting in lesions of blood cells (haemolysis) See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the blood , resulting in chronic haemolytic anaemia. The substance may have effects on the eyes , resulting in the development of cataract. This substance is possibly carcinogenic to humans.</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 218°C Sublimation slowly at room temperature Melting point: 80°C Density: 1.16 g/cm<sup>3</sup> Solubility in water, g/100 ml at 25°C: none</p>	<p>Vapour pressure, Pa at 25°C: 11 Relative vapour density (air = 1): 4.42 Flash point: 80°C c.c. Auto-ignition temperature: 540°C Explosive limits, vol% in air: 0.9-5.9 Octanol/water partition coefficient as log Pow: 3.3</p>
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p>	
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### NOTES

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF1-II+III (solid); 41S2304 (molten)  
NFPA Code: H2; F2; R0;

### ADDITIONAL INFORMATION

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ICSC: 0667

NAPHTHALENE

(C) IPCS, CEC, 1994

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

Product name : Phenanthrene

Product Number : 695114  
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

Harmful by ingestion., Irritant

##### Other hazards which do not result in classification

Photosensitizer.

##### GHS Label elements, including precautionary statements

Pictogram



Signal word

Warning

Hazard statement(s)

H302 Harmful if swallowed.  
H315 Causes skin irritation.  
H319 Causes serious eye irritation.  
H335 May cause respiratory irritation.  
H400 Very toxic to aquatic life.  
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
P273 Avoid release to the environment.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

#### HMIS Classification

Health hazard: 2  
Flammability: 0  
Physical hazards: 0

#### NFPA Rating

Health hazard: 2  
Fire: 0  
Reactivity Hazard: 0

#### Potential Health Effects

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.  
**Skin** May be harmful if absorbed through skin. Causes skin irritation.

**Eyes**  
**Ingestion**

Causes eye irritation.  
Harmful if swallowed.

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>14</sub>H<sub>10</sub>  
Molecular Weight : 178.23 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
<b>Phenanthrene</b>			
85-01-8	201-581-5	-	-

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### 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.

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### 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.

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### 7. HANDLING AND STORAGE

**Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols.

Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**

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

Handle and store under inert gas.

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### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

Components	CAS-No.	Value	Control	Update	Basis
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**Acute toxicity**

LD50 Oral - mouse - 700.0 mg/kg

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

Causes photosensitivity. Exposure to light can result in allergic reactions resulting in dermatologic lesions, which can vary from sunburnlike responses to edematous, vesiculated lesions, or bullae

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

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.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Phenanthrene)

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 (Globally Harmonized System)**

Inhalation - May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Ingestion</b>	Harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes 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**

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**12. ECOLOGICAL INFORMATION****Toxicity**

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 3.2 mg/l - 96.0 h LC100 - other fish - 1.5 mg/l - 1.0 h
Toxicity to daphnia	EC50 - Daphnia magna (Water flea) - 0.86 mg/l - 24 h

and other aquatic invertebrates.

EC50 - Daphnia magna (Water flea) - 0.38 mg/l - 48 h

Toxicity to algae EC50 - Chlorella vulgaris (Fresh water algae) - 1.20 mg/l - 3 h

#### **Persistence and degradability**

Biodegradability Result: 55 - 95 % - Partially biodegradable.

#### **Bioaccumulative potential**

Bioaccumulation Pimephales promelas (fathead minnow) - 28 d  
Bioconcentration factor (BCF): 5,100

#### **Mobility in soil**

no data available

#### **PBT and vPvB assessment**

no data available

#### **Other adverse effects**

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

Very toxic to aquatic organisms.

---

### **13. DISPOSAL CONSIDERATIONS**

#### **Product**

Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

#### **Contaminated packaging**

Dispose of as unused product.

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### **14. TRANSPORT INFORMATION**

#### **DOT (US)**

UN-Number: 3077 Class: 9 Packing group: III  
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Phenanthrene)  
Reportable Quantity (RQ): 5000 lbs  
Marine pollutant: No  
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. (Phenanthrene)  
Marine pollutant: No

#### **IATA**

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

#### **Further information**

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

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### **15. REGULATORY INFORMATION**

#### **OSHA Hazards**

Harmful by ingestion., Irritant

#### **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
Phenanthrene	85-01-8	2007-07-01

**SARA 311/312 Hazards**

Acute Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Phenanthrene	85-01-8	2007-07-01

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Phenanthrene	85-01-8	1990-01-01

---

**16. OTHER INFORMATION****Further information**

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# International Chemical Safety Cards

**PYRENE**

ICSC: 1474



Benzo (d,e,f) phenanthrene  
beta-Pyrene  
 $C_{16}H_{10}$   
Molecular mass: 202.26

ICSC # 1474  
CAS # 129-00-0  
RTECS # [UR2450000](#)  
November 27, 2003 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Water spray, carbon dioxide, dry powder, alcohol-resistant foam, foam.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>			
• <b>INHALATION</b>		Avoid inhalation of dust	Fresh air, rest.
• <b>SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		Do not eat, drink, or smoke during work.	Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles.)	Separated from strong oxidants. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. R: S:

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 1474

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

**PYRENE**

ICSC: 1474

I M	<b>PHYSICAL STATE; APPEARANCE:</b> YELLOW COLOURLESS SOLID IN VARIOUS FORMS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation through the skin and by ingestion
--------	--	---

P  
O  
R  
T  
A  
N  
T  
D  
A  
T  
A

**PHYSICAL DANGERS:**

**CHEMICAL DANGERS:**

The substance decomposes on heating producing irritating fumes

**OCCUPATIONAL EXPOSURE LIMITS:**

TLV not established.  
MAK not established.

**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:**

Exposure to sun may provoke an irritating effect of pyrene on skin and lead to chronic skin discoloration.

**EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**

**PHYSICAL PROPERTIES**

Boiling point: 404°C  
Melting point: 151°C  
Density: 1.27 g/cm<sup>3</sup>

Solubility in water: 0.135 mg/l at 25°C  
Vapour pressure, Pa at °C: 0.08  
Octanol/water partition coefficient as log Pow: 4.88

**ENVIRONMENTAL DATA**

Bioaccumulation of this chemical may occur in crustacea, in fish, in milk, in algae and in molluscs. It is strongly advised that this substance does not enter the environment.



**NOTES**

Pyrene is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, pyrene may be encountered as a laboratory chemical in its pure form. Health effects of exposure to the substance have not been investigated adequately. See ICSC 1415 Coal-tar pitch.

**ADDITIONAL INFORMATION**

**ICSC: 1474**

**PYRENE**

(C) IPCS, CEC, 1994

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# International Chemical Safety Cards

**BARIUM SULFATE**

ICSC: 0827



Barium sulphate  
Blanc fixe  
Artificial barite  
BaSO<sub>4</sub>

Molecular mass: 233.43

ICSC # 0827

CAS # 7727-43-7

RTECS # [CR0600000](#)

October 20, 1999 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>		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: P1 filter respirator for inert particles.		R: S:

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0827**

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

## BARIUM SULFATE

ICSC: 0827

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS TASTELESS, WHITE OR YELLOWISH CRYSTALS OR POWDER.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with aluminium powder.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 10 mg/m<sup>3</sup> as TWA; (ACGIH 2004). MAK: (Inhalable fraction) 4 mg/m<sup>3</sup>; (Respirable fraction) 1.5 mg/m<sup>3</sup>; (DFG 2004). OSHA PEL<sup>†</sup>: TWA 15 mg/m<sup>3</sup> (total) TWA 5 mg/m<sup>3</sup> (resp) NIOSH REL: TWA 10 mg/m<sup>3</sup> (total) TWA 5 mg/m<sup>3</sup> (resp) NIOSH IDLH: N.D. See: <a href="#">IDLH INDEX</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b></p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Lungs may be affected by repeated or prolonged exposure to dust particles, resulting in baritosis (a form of benign pneumoconiosis).</p>
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<b>PHYSICAL PROPERTIES</b>	<p>Melting point (decomposes): 1600°C Density: 4.5 g/cm<sup>3</sup></p>	Solubility in water: none
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<b>ENVIRONMENTAL DATA</b>	
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**NOTES**

Occurs in nature as the mineral barite; also as barytes, heavy spar. Card has been partly updated in October 2005. See section Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

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<b>ICSC: 0827</b>	<b>BARIUM SULFATE</b>
(C) IPCS, CEC, 1994	

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

**COPPER**

ICSC: 0240



Cu  
(powder)

ICSC # 0240

CAS # 7440-50-8

RTECS # [GL5325000](#)

September 24, 1993 Validated

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

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0240**

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

# International Chemical Safety Cards

**COPPER**

ICSC: 0240

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

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

**OCCUPATIONAL EXPOSURE LIMITS:**  
TLV: 0.2 mg/m<sup>3</sup> fume (ACGIH 1992-1993).  
TLV (as Cu, dusts & mists): 1 mg/m<sup>3</sup> (ACGIH 1992-1993).  
Intended change 0.1 mg/m<sup>3</sup>  
Inhal.,  
A4 (not classifiable as a human carcinogen);  
MAK: 0.1 mg/m<sup>3</sup> (Inhalable fraction)  
Peak limitation category: II(2) Pregnancy risk group: D (DFG 2005).  
OSHA PEL\*: TWA 1 mg/m<sup>3</sup> \*Note: The PEL also applies to other copper compounds (as Cu) except copper fume.  
NIOSH REL\*: TWA 1 mg/m<sup>3</sup> \*Note: The REL also applies to other copper compounds (as Cu) except Copper fume.  
NIOSH IDLH: 100 mg/m<sup>3</sup> (as Cu) See: [7440508](https://www.cdc.gov/niosh/ttl-tables/)

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

**PHYSICAL PROPERTIES**

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

Solubility in water:  
none

**ENVIRONMENTAL DATA**

**NOTES**

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

**ADDITIONAL INFORMATION**

**ICSC: 0240**

(C) IPCS, CEC, 1994

**COPPER**

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# International Chemical Safety Cards

**MERCURY**

ICSC: 0056



Quicksilver  
Liquid silver  
Hg  
Atomic mass: 200.6

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



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

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0056**

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

# International Chemical Safety Cards

## MERCURY

ICSC: 0056

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

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

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

### ADDITIONAL INFORMATION

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<b>ICSC: 0056</b>	(C) IPCS, CEC, 1994	<b>MERCURY</b>
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# 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
<b>FIRE</b>	Flammable as dust. Toxic fumes may be released in a fire.		Dry sand. NO carbon dioxide. NO water.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	
• <b>INHALATION</b>	Cough. Shortness of breath.	Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		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.
• <b>INGESTION</b>		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	<p><b>PHYSICAL STATE; APPEARANCE:</b> SILVERY METALLIC SOLID IN VARIOUS FORMS.</p> <p><b>PHYSICAL DANGERS:</b></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of the dust.</p>
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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/m<sup>3</sup> 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<sup>3</sup> \*Note: The PEL does not apply to Nickel carbonyl. NIOSH REL\*: Ca TWA 0.015 mg/m<sup>3</sup> [See Appendix A](#) \*Note: The REL does not apply to Nickel carbonyl. NIOSH IDLH: Ca 10 mg/m<sup>3</sup> (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/cm<sup>3</sup>

Solubility in water: none

**ENVIRONMENTAL DATA**

**NOTES**

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**

**ICSC: 0062**

**NICKEL**

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# International Chemical Safety Cards

**LEAD**

ICSC: 0052



Lead metal  
Plumbum  
Pb  
Atomic mass: 207.2  
(powder)

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
• <b>INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
• <b>SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• <b>EYES</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• <b>INGESTION</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>	<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>	
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. Personal protection: P3 filter respirator for toxic particles.	Separated from food and feedstuffs incompatible materials See Chemical Dangers.	R: S:	
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 0052</b>	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.		

# International Chemical Safety Cards

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

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

**ADDITIONAL INFORMATION**

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<b>ICSC: 0052</b>	<b>LEAD</b>
(C) IPCS, CEC, 1994	

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# International Chemical Safety Cards

ZINC POWDER

ICSC: 1205



Blue powder  
Merrillite  
Zn  
Atomic mass: 65.4  
(powder)

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



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

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

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 1205

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

# International Chemical Safety Cards

## ZINC POWDER

ICSC: 1205

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

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

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

### ADDITIONAL INFORMATION

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ICSC: 1205

ZINC POWDER

(C) IPCS, CEC, 1994

<p><b>IMPORTANT LEGAL NOTICE:</b></p>	<p>Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.</p>
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72-55-9 msds



MSDS 250,000+

MSDS : 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99%

CAS : 72-55-9

SYNONYMS : p,p'-DDE ; ethylene,1,1-dichloro-2,2-bis-(p-chlorophenyl)- ; DDT dehydrochloride ; DDE; 1-1'-(Dichloroethenylidene)bis(4-chlorobenzene)

[MSDS Safety Sheet](#)

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[ 2,2-Bis-(4-chlorophenyl)-1,1-dichloroethylene, 99% 72-55-9 ]

Suppliers:

Not Available

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

```

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

```

Hazard Symbols: XN

Risk Phrases: 22 33

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

## EMERGENCY OVERVIEW

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

## Potential Health Effects

## Eye:

May cause eye irritation.

## Skin:

May cause skin irritation.

## Ingestion:

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

## Inhalation:

May cause respiratory tract irritation.

## Chronic:

May cause cancer according to animal studies. Adverse reproductive  
effects have been reported in animals. Laboratory experiments have  
resulted in mutagenic effects.

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

## Eyes:

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

## Skin:

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

## Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water.

Never give anything by mouth to an unconscious person. Get medical  
aid immediately.

## Inhalation:

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

## Notes to Physician:

Treat symptomatically and supportively.

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

General Information:

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

**Extinguishing Media:**

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

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

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

**Spills/Leaks:**

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

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

**Handling:**

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

**Storage:**

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

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

**Engineering Controls:**

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

**Exposure Limits**

CAS# 72-55-9:

**Personal Protective Equipment**

**Eyes:**

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

**Skin:**

Wear appropriate protective gloves to prevent skin exposure.

**Clothing:**

Wear appropriate protective clothing to prevent skin exposure.

**Respirators:**

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

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

**Physical State:** Crystals

**Color:** white

**Odor:** None reported.

**pH:** Not available.

**Vapor Pressure:** 6.5106 mm Hg @ 20 C

**Viscosity:** Not available.

**Boiling Point:** 336 deg C

**Freezing/Melting Point:** 88.00 - 90.00 deg C

**Autoignition Temperature:** Not available.

**Flash Point:** Not available.

**Explosion Limits, lower:** Not available.

**Explosion Limits, upper:** Not available.

**Decomposition Temperature:**

**Solubility in water:** 0.010 ppm

**Specific Gravity/Density:**

**Molecular Formula:** C14H8Cl4

**Molecular Weight:** 318.02

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

**Chemical Stability:**

Stable under normal temperatures and pressures.

**Conditions to Avoid:**

Incompatible materials, dust generation, strong oxidants.

**Incompatibilities with Other Materials:**

Strong oxidizing agents - strong bases.

**Hazardous Decomposition Products:**

Hydrogen chloride, carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Has not been reported.

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

**RTECS#:**

CAS# 72-55-9: KV9450000

**LD50/LC50:**

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

**Carcinogenicity:**

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

California: carcinogen, initial date 1/1/89

## Other:

See actual entry in RTECS for complete information.

## \*\*\*\* SECTION 12 - ECOLOGICAL INFORMATION \*\*\*\*

## Ecotoxicity:

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

## \*\*\*\* SECTION 13 - DISPOSAL CONSIDERATIONS \*\*\*\*

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

## \*\*\*\* SECTION 14 - TRANSPORT INFORMATION \*\*\*\*

## IATA

Not regulated as a hazardous material.

## IMO

Not regulated as a hazardous material.

## RID/ADR

Not regulated as a hazardous material.

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

## \*\*\*\* SECTION 15 - REGULATORY INFORMATION \*\*\*\*

## European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN

## Risk Phrases:

R 22 Harmful if swallowed.

R 33 Danger of cumulative effects.

## Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 72-55-9: 3

## Canada

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

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

## US FEDERAL

## TSCA

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

It is for research and development use only.

## \*\*\*\* SECTION 16 - ADDITIONAL INFORMATION \*\*\*\*

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

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

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## ALL MSDS PAGES IN THIS GROUP

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

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

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# International Chemical Safety Cards

DDT

ICSC: 0034



Dichlorodiphenyltrichloroethane  
 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane  
 2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane  
 1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)  
 p,p'-DDT  
 $C_{14}H_9Cl_5$   
 Molecular mass: 354.5



ICSC # 0034  
 CAS # 50-29-3  
 RTECS # [KJ3325000](#)  
 UN # 2761  
 EC # 602-045-00-7  
 April 20, 2004 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
<b>•SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness.	Safety goggles, 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.
<b>•INGESTION</b>	Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0034

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: 0034

DDT

<p><b>I M P O R T A N T D A T A</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS WHITE POWDER. TECHNICAL PRODUCT IS WAXY SOLID.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> On combustion, forms toxic and corrosive fumes including hydrogen chloride. Reacts with aluminium and iron.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 1 mg/m<sup>3</sup> as TWA A3 (ACGIH 2004). MAK: 1 mg/m<sup>3</sup> H Peak limitation category: II(8) (DFG 2003). OSHA PEL: TWA 1 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> <a href="#">See Appendix A</a> NIOSH IDLH: Ca 500 mg/m<sup>3</sup> See: <a href="#">50293</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> May cause mechanical irritation. The substance may cause effects on the central nervous system, resulting in convulsions and respiratory depression. Exposure at high levels may result in death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 260°C Melting point: 109°C Density: 1.6 g/cm<sup>3</sup></p>	<p>Solubility in water: poor Octanol/water partition coefficient as log Pow: 6.36</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal.</p>	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

Transport Emergency Card: TEC (R)-61GT7-III

## ADDITIONAL INFORMATION

<p><b>ICSC: 0034</b></p>	<p><b>DDT</b></p>
<p>(C) IPCS, CEC, 1994</p>	

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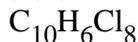
# International Chemical Safety Cards

## CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740



1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene  
1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene



Molecular mass: 409.8

ICSC # 0740

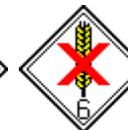
CAS # 57-74-9

RTECS #

UN # 2996

EC # 602-047-00-8

March 26, 1998 Peer reviewed



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	(See Ingestion).	Breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	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.
<b>•INGESTION</b>	Confusion. Convulsions. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: chemical protection suit including self-contained breathing apparatus.	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs bases and incompatible materials See Chemical Dangers. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. Xn symbol N symbol R: 21/22-40-50/53 S: 2-36/37-60-61 UN Hazard Class: 6.1 UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0740**

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

## CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740

<p><b>I M P O R T A N T A D V I S O R Y</b></p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene hydrogen chloride Attacks iron, zinc, plastic, rubber and coatings.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004). MAK: (Inhalable fraction) 0.5 mg/m<sup>3</sup> Peak limitation category: II(8); skin absorption (H); Carcinogen category: 3B; (DFG 2004). OSHA PEL: TWA 0.5 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.5 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 100 mg/m<sup>3</sup> See: <a href="#">57749</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may have effects on the liver immune system, resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.</p>
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<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point at 0.27kPa: 175°C Relative density (water = 1): 1.59-1.63 Solubility in water: none</p>	<p>Vapour pressure, Pa at 25°C: 0.0013 Octanol/water partition coefficient as log Pow: 2.78</p>
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<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to soil organisms, honey bees. It is strongly advised that this substance does not enter the environment. The substance may cause long-term effects in the aquatic environment.</p>	
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### NOTES

If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. Belt, Chlor Kil, Chlortox, Corodan, Gold Crest, Intox, Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclör, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

### ADDITIONAL INFORMATION

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ICSC: 0740

CHLORDANE (TECHNICAL PRODUCT)

(C) IPCS, CEC, 1994

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

**DIELDRIN**

ICSC: 0787



1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-1,4-exo- 5,8-dimethanonaphthalene  
3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2β,2aalpha,3β,6β,6aalpha,7β,7aalpha)-2,7,3,6-  
dimethanonaphth(2,3-b)oxirene

HEOD



Molecular mass: 380.9

ICSC # 0787

CAS # 60-57-1

RTECS # [IO1750000](#)

UN # 2761

EC # 602-049-00-9

March 26, 1998 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
<b>•INHALATION</b>	(See Ingestion).	Ventilation (not if powder).	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! See Ingestion.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>•EYES</b>		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 25-27-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

# International Chemical Safety Cards

DIELDRIN

ICSC: 0787

I M P O R T A N T D A T A	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating producing toxic fumes including hydrogen chloride. Reacts with oxidants and acids. Attacks metal due to the slow formation of hydrogen chloride in storage.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (as TWA): 0.25 mg/m<sup>3</sup>, A4 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m<sup>3</sup> : Peak limitation category: II(8) skin absorption (H); (DFG 2007). OSHA PEL: TWA 0.25 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.25 mg/m<sup>3</sup> skin <a href="#">See Appendix A</a> NIOSH IDLH: Ca 50 mg/m<sup>3</sup> See: <a href="#">60571</a></p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body through the skin and by ingestion.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system, resulting in convulsions. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.</p>
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<b>PHYSICAL PROPERTIES</b>	Melting point: 175-176°C Density: 1.7 g/cm <sup>3</sup> Solubility in water: none	Vapour pressure, Pa at 20°C: 0.0004 Octanol/water partition coefficient as log Pow: 6.2
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<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees, birds. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.</p>	
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## NOTES

Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Alvit, Dieldrex, Dieldrite, Illoxol, Octalox, Panoram, and Quintox are trade names. Also consult ICSC #0774, Aldrin.

Transport Emergency Card: TEC (R)-61G41b.

Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

## ADDITIONAL INFORMATION

ICSC: 0787

DIELDRIN

(C) IPCS, CEC, 1994

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

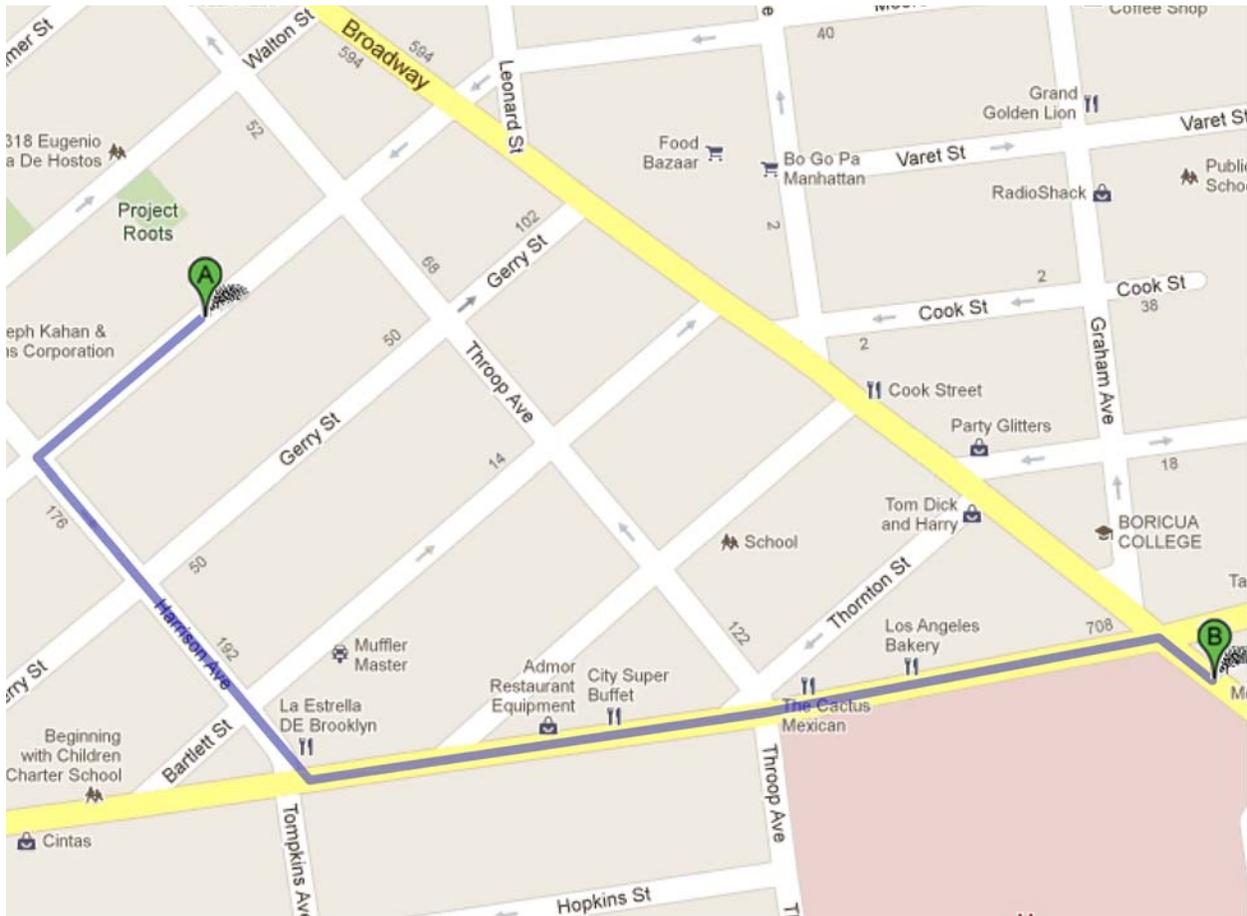
### WOODHULL MEDICAL CENTER

760 Broadway # 3C150, Brooklyn, NY 11206-5317

(718) 963-8000

0.5 Miles – About 2 Minutes

1. Head Southwest on Wallabout Street toward Harrison Avenue
2. Make the first Left onto Harrison Avenue
3. Make the third left onto Flushing Avenue
4. Right the second RIGHT onto Broadway, Woodhull Medical Center will be on the right.



**Appendix F**  
**Community Air Monitoring Plan**



**COMMUNITY AIR MONITORING PLAN**

**RESIDENTIAL DEVELOPMENT PROJECT  
390 to 398 WALLABOUT STREET  
BROOKLYN, NY**

**MARCH - 2012**

**COMMUNITY AIR MONITORING PLAN  
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***APPENDICES***

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Appendix A    Action Limit Report

## 1.0 INTRODUCTION

This Community Air Monitoring Plan (CAMP) has been prepared for soil disturbance activities associated with construction and remedial activities to be performed under a Hazmat Remedial Action Plan (RAP) at 390 to 398 Wallabout Street in Brooklyn, NY. The CAMP provides measures for protection for the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at the site.

Compliance with this CAMP is required during all activities associated with soil excavation that have the potential to generate airborne particulate matter and volatile organic compounds (VOCs). These activities include excavation of soils, stockpiling, loading, and backfilling. This CAMP has been prepared to ensure that remediation activities do not adversely affect passersby, residents, or workers in the area immediately surrounding the Site and to preclude or minimize airborne migration of construction-related contaminants to offsite areas.

### 1.1 Regulatory Requirements

This CAMP was established in accordance with the following requirements:

- New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan as presented in DER-10 Technical Guidance for Site Investigation and Remediation (NYSDEC May 3, 2010). This guidance specifies that a community air-monitoring program shall be implemented to protect the surrounding community and to confirm that the work does not spread contamination off-site through the air;
- New York State Department of Environmental Conservation (NYSDEC) Technical and Guidance Memorandum (TAGM) #4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites: This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

## **2.0 AIR MONITORING**

SVOCs, pesticides and metals are the constituents of concern at the Site. The appropriate method to monitor air for these constituents during remediation activities is through real-time VOC and air particulate (dust) monitoring.

### **2.1 Meteorological Data**

At a minimum, wind direction will be evaluated at the start of each workday, noon of each workday, and the end of each workday. These readings will be utilized to position the monitoring equipment in appropriate upwind and downwind locations.

### **2.2 Community Air Monitoring Requirements**

To establish ambient air background concentrations, air will be monitored at several locations around the site perimeter before construction activities begin. These points will be monitored periodically in series during the site work. When the excavation area is within 20 feet of potentially exposed populations or occupied structures, the perimeter monitoring points will be located to represent the nearest potentially exposed individuals at the downwind location.

Fugitive respirable dust will be monitored using a MiniRam Model PDM-3 aerosol monitor (or equivalent). Air will be monitored for VOCs with a portable Ionscience 3000 photoionization detector (PID), or equivalent. All air monitoring data will be documented in a site log book by the designated site safety officer. The site safety officer or delegate must ensure that air monitoring instruments are calibrated and maintained in accordance with manufacturer's specifications. All instruments will be zeroed daily and checked for accuracy. A daily log will be kept. If additional monitoring is required, the protocols will be developed and appended to this plan

### 3.0 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 or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present.

The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should 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 must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can 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 must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can 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 must be shutdown. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

All readings will be recorded and made available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report, as shown in Appendix A, will be completed.

#### 3.1 Potential Corrective Measures and VOC Suppression Techniques

If the 15-minute integrated VOC level at the downwind location persists at a concentration that exceeds the upwind level by more than 5 ppm but less than 25 ppm during remediation activities, then vapor suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive organic vapors:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 6-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- applying vapor suppressant foam.

## 4.0 PARTICULATE MONITORING

Air monitoring for particulates (i.e., dust) will be performed continuously during remediation activities using both air monitoring equipment and visual observation at upwind and downwind locations. Monitoring equipment capable of measuring particulate matter smaller than 10 microns (PM<sub>10</sub>) and capable of integrating (averaging) over periods of 15 minutes or less will be set up at upwind (i.e., background) and downwind locations, at heights approximately four to five feet above land surface (i.e., the breathing zone). Monitoring equipment will be MIE Data Ram monitors, or equivalent. The audible alarm on the particulate monitoring device will be set at 90 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). This setting will allow proactive evaluation of worksite conditions prior to reaching the action level of  $100 \mu\text{g}/\text{m}^3$  above background. The monitors will be calibrated at least once per day prior to work activities and recalibrated as needed thereafter. In addition, fugitive dust migration will be visually assessed during all intrusive work activities.

The following summarizes particulate action levels and the appropriate responses:

- If the downwind PM-10 particulate level is  $100 \mu\text{g}/\text{m}^3$  greater than background (upwind perimeter) for the 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed  $150 \mu\text{g}/\text{m}^3$  above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than  $150 \mu\text{g}/\text{m}^3$  above the upwind level, work must be stopped and an evaluation of activities initiated. Work can resume provided that dust suppression measures (as described in Section 2.3.1 below) and other controls are successful in reducing the downwind PM-10 particulate concentration to within  $150 \mu\text{g}/\text{m}^3$  of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for NYSDEC and NYSDOH personnel to review. If an exceedance of the Action Limits occurs, an Action Limit Report as shown in **Appendix A** will be completed.

### 4.1 Potential Particulate Suppression Techniques

If the integrated particulate level at the downwind location exceeds the upwind level by more than  $100 \mu\text{g}/\text{m}^3$  at any time during remediation activities, then dust suppression techniques will be employed. The following techniques, or others, may be employed to mitigate the generation and migration of fugitive dusts:

- limiting the excavation size;
- backfilling the excavation;
- spraying water onto the excavation faces and equipment;
- covering soil stockpiles with 8-mil plastic sheeting;
- hauling waste materials in properly tarped containers; and/or
- limiting vehicle speeds onsite.

Work may continue with dust suppression techniques provided that downwind PM<sub>10</sub> levels are not more than 150 µg/m<sup>3</sup> greater than the upwind levels.

There may also be situations where the dust is generated by remediation activities and migrates to downwind locations, but is not detected by the monitoring equipment at or above the action level. Therefore, if dust is observed leaving the working area, dust suppression techniques such as those listed above will be employed.

If dust suppression techniques do not lower particulates to below 150 µg/m<sup>3</sup>, or visible dust persists, work will be suspended until appropriate corrective measures are identified and implemented to remedy the situation.

All air monitoring readings will be recorded in the field logbook and will be available for the NYSDEC and NYSDOH personnel to review.

## **5.0 DATA QUALITY ASSURANCE**

### **5.1 Calibration**

Instrument calibration shall be documented on instrument calibration and maintenance sheets or in the designated field logbook. All instruments shall be calibrated as required by the manufacturer. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

### **5.2 Operations**

All instruments shall be operated in accordance with the manufacturer's specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on-site by the SSO for reference.

### **5.3 Data Review**

The SSO will interpret all monitoring data based the established criteria and his/her professional judgment. The SSO shall review the data with the PM to evaluate the potential for worker exposure, upgrades/downgrades in level of protection, comparison to direct reading instrumentation and changes in the integrated monitoring strategy.

Monitoring and sampling data, along with all sample documentation will be periodically reviewed by the PM.

## **6.0 RECORDS AND REPORTING**

All air readings must be recorded on daily air monitoring log sheets and made available for review by personnel from NYSDEC and NYSDOH.

**APPENDIX A**  
**ACTION LIMIT REPORT**

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**Appendix G**  
**Vapor Barrier Specifications**



### *Vapor Barrier Design and Installation*

A vapor barrier is being recommended for this project as a preventative measure. This section includes the specifications and guidelines for installing a below concrete slab sheet vapor barrier. The vapor barrier will extend throughout the area to be occupied by the new multi-use building to be constructed on the site. Vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

A vapor retarder or barrier, by definition, is a material or assembly of materials that resists vapor diffusion through it. For this project the sheet material will consist of a black high-density polyethylene (HDPE) film, 20 mil thick.

ASTM references for vapor barriers include the following:

1. ASTM E 1745-97 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs."
2. ASTM E 1643-98 "Standard Practice for Vapor Barriers."

### *Materials*

The minimum values for the HDPE film will meet the following:

Property	Test Method	Minimum Values
Thickness, mil (mm)	ASTM D 5199	20
Density, g/cm <sup>3</sup>	ASTM D 1505	0.94
Carbon Black Content, %	ASTM D 1603, mod.	2.0
Tensile Properties (each direction)	ASTM D 6693	
Strength at Yield, lb/in. (kN/m)		22
Strength at Break, lb/in. (kN/m)		44
Elongation at Yield, %	(1.3" gauge length)	10
Elongation at Break, %	(2.0" gauge length)	500
Tear Resistance, lb (N)	ASTM D 1004	5
Puncture Resistance, lb (N)	ASTM D 4833	26
Notched Constant Tensile Load, hours	ASTM D 5397, app.	400
Oxidative Induction Time, min.	ASTM D 3895	100

The manufacturer of the specified liner is: GSE LINING TECHNOLOGY, INC.

1. All joints in the HDPE sheeting will be sealed with either a tape seal or a weld seal. The tape seal consists of a butyl mastic self-adhering tape, 2 inch (50 mm) wide, compatible with the sheet material.
2. The weld seal consists of an extrudate rod or bead, compatible with sheet material.

Preparation for the installation of the vapor barrier membrane is as follows:

3. Do not install vapor retarder/barrier until items penetrating it are in place.
4. Rake, trim, and tamp surfaces over which membrane is to be installed.
5. Substrates must be regular and smooth with no gaps or voids greater than 0.5 inches (12 mm).
6. The substrate must be free of loose aggregate and sharp protrusions.
7. The substrate does not need to be dry, but standing water must be removed.

#### *Membrane Installation*

Place the membrane HDPE film side to the substrate with printed coating side up facing towards the concrete pour. Lay membrane with seams perpendicular to and lapped in direction of concrete pour.

End laps should be staggered to avoid a build-up of layers. Accurately position succeeding sheets to overlap the previous sheet 3 inches (75 mm). Ensure that the underside of the succeeding sheet is clean, dry, and free from contamination before attempting to overlap.

If manufacturer recommends sealing overlaps with tape, proceed with the following steps:

8. Secure overlaps to the bottom sheet with tape.
9. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. During cold or damp conditions, the tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.
10. If manufacturer recommends sealing overlaps by welding, weld overlap seams according to manufacturer's instructions.
11. Penetrations through the membrane such as utility conduits, can be sealed either using the tape and liquid membrane method or the extrusion weld method.

Procedures for sealing penetrations using the tape and seal method include the following:

12. Scribe membrane tight to the penetration.
13. If the membrane is not within 0.5 inches (12 mm) of the penetration, apply tape to cover the gap.
14. Wrap the penetration with tape by positioning the tape 0.5 inches (12 mm) above the membrane.
15. Mix and apply Liquid Membrane around the penetrations using a fillet to provide a watertight seal between the membrane and tape.

Procedures for sealing penetrations using the extrusion weld method include the following:

Scribe membrane tight to the penetration.

16. Perform extrusion weld techniques according to manufacturer's instructions.

#### *Protection*

Protect membrane from damage until permanent covering is in place.

#### *Membrane Repair*

The membrane can be repaired using either the tape method or the weld method.

The procedure to repair the membrane using the tape method is as follows:

- Repair punctures and tears in membrane using patches of the material and overlapping the puncture or tear a minimum of 12 inches.
- Seal with tape.

The procedure to repair the membrane using the weld method is as follows:

- Repair punctures and tears in membrane using patches of the material and overlapping the puncture or tear a minimum of 6 inches. Seal with extrusion weld.

#### *Inspection*

Upon completion of the installation of the membrane, the Contractor shall coordinate an inspection with the Engineer or its designated representative. The membrane shall not be covered until the Contractor receives written approval from the Engineer.

#### *Pouring of Concrete*

It is recommended that concrete be poured within 56 days of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.



### Permeability For GSE Geomembranes

Due to its chemical structure, polyethylene is an (essentially) impermeable substance. The material is made up of very long molecules. There does exist, however, molecular voids (sometimes referred to as "free space") among the individual polyethylene chains. The existence of these spaces is recognized when we say polyethylene is essentially impermeable. Permeation may exist when, for instance, the pressure behind the permeant is very high or the permeant's molecular size is very small. However, the degree of permeation exhibited is difficult to determine using currently available test procedures. As a result, test results frequently reflect the inaccuracy of the procedure rather than the permeation of the material. Testing of GSE HDPE performed by an independent laboratory produced the following results.

A sometimes overlooked factor when reviewing permeation data is that most permeameters apply pressure to encourage permeation. In geotechnical and environmental applications, geomembranes are not subjected to the high pressures of potential permeants as they are in a permeation laboratory test. The lack of a driving force greatly diminishes actual permeation since the gaseous molecules find an easier path to follow than through the polyethylene liner. Also, because of the high pressures required to force permeants through polyethylene, failure of the permeameter is common. This is commonly in the form of a test apparatus leak. Such leaks can result in erroneous results.

Test	ASTM Method	Results
Methane Permeability	D 1434	2.0 x 10 <sup>-6</sup> mL/cm <sup>2</sup> ·s
Water Vapor Permeability	E 96	1.7 x 10 <sup>-9</sup> mL/cm <sup>2</sup> ·s

It must be emphasized that different chemicals will permeate at different rates due to differences in molecular shape, polarity and phase (gas or liquid). For example, the relatively small water molecule (atomic weight 18) will more easily permeate the polyethylene matrix as compared to a large molecule such as cyclohexanol (atomic weight 94).

The molecules' polarity must also be considered (recall the adage "like dissolves like"). Polyethylene is a non-polar molecule, therefore other non-polar molecules will permeate the matrix better. Examples of these molecules are hydrocarbons - especially those such as octane, pentane and hexene. The permeation of these are therefore greater than for polar molecules such as water.

TN006 PermeabilityGeomem R03/17/06

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## Chemical Resistance For GSE Geomembranes

GSE geomembranes are made of high quality, virgin polyethylene which demonstrates excellent chemical resistance. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. It is this property of (HDPE) high density polyethylene geomembranes that makes it the lining material of choice.

In order to gauge the durability of a material in contact with a chemical mixture, testing is required in which the material is exposed to the chemical environment in question. Chemical resistance testing is a very large and complex topic because of two factors. First, the number of specific media is virtually endless and second, there are many criteria such as tensile strength, hardness, etc. that may be used to assess a material's resistance to degradation.

The chemical resistance of polyethylene has been investigated by many people over the past few decades. We are able to draw from that work when making statements about the chemical resistance of today's polyethylene geomembranes. In addition to that, many tests have been performed that specifically use geomembranes and certain chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for. As a result of these factors, GSE published a chemical resistance chart, demonstrating general guidelines.

Polyethylene is, for practical purposes, considered impermeable. Be aware, however, that all materials are permeable to some extent. Permeability varies with concentration, temperature, pressure and type of permeant. The rates of permeation are usually so low, however, that they are insignificant. As a point of reference, polyethylene is commonly used for packaging of several types of materials. These include gasoline, motor oil, household cleaners (i.e. bleach), muratic acid, pesticides, insecticides, fungi-

cides, and other highly concentrated chemicals. Also, you should be aware that there are some chemicals which may be absorbed by the material but only when present at very high concentrations. These include halogenated and/or aromatic hydrocarbons at greater than 50%; their absorption results in swelling and slight changes in physical properties such as increased tensile elongations. This includes many types of fuels and oils. Recognize that this action, however, does not affect the liner's ability to act as a barrier for the material it is containing.

Since polyethylene is a petroleum product, it can absorb other petroleum products. Like a sponge, the material becomes slightly thicker and more flexible but does not produce a hole or void. However, unlike a sponge, this absorption is not immediate. It takes a much longer time for a polyethylene liner to swell than it does for a sponge. The exact time it takes for swelling to occur depends on the particular constituents and concentrations of the contained media. However, a hole would not be produced. Also, this absorption is reversible and the material will essentially return to it's original state when the chemical is no longer in contact with the liner.

With regard to typical municipal landfills in the United States, legally allowable levels of chemicals have been demonstrated to have no adverse affect on polyethylene geomembrane performance. The very low levels of salts, metals and organic compounds do not damage polyethylene. A double-lined containment with a leachate (leak detection) removal system effectively prevents any significant, continuous exposure of the secondary membrane to these materials and for practical purposes makes the total liner system even more impermeable.

TN005 ChemicalResistance R03/17/06

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Chemical Resistance Chart

GSE is the world's leading supplier of high quality, polyethylene geomembranes. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. Note that the effect of chemicals on any material is influenced by a number of variable factors such as temperature, concentration, exposed area and duration. Many tests have been performed that use geomembranes and certain specific chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for, and various criteria may be used to judge performance. Reported performance ratings may not apply to all applications of a given material in the same chemical. Therefore, these ratings are offered as a guide only. This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information.

Medium	Concentration	Resistance at:	
		20 °C (68 °F)	60 °C (140 °F)
<b>A</b>			
Acetic acid	100%	S	L
Acetic acid	10%	S	S
Acetic acid anhydride	100%	S	L
Acetone	100%	L	L
Adipic acid	sat. sol.	S	S
Allyl alcohol	96%	S	S
Aluminum chloride	sat. sol.	S	S
Aluminum fluoride	sat. sol.	S	S
Aluminum sulfate	sat. sol.	S	S
Alum	sol.	S	S
Ammonia, aqueous	dil. sol.	S	S
Ammonia, gaseous dry	100%	S	S
Ammonia, liquid	100%	S	S
Ammonium chloride	sat. sol.	S	S
Ammonium fluoride	sol.	S	S
Ammonium nitrate	sat. sol.	S	S
Ammonium sulfate	sat. sol.	S	S
Ammonium sulfide	sol.	S	S
Amyl acetate	100%	S	L
Amyl alcohol	100%	S	L
Aniline	100%	S	L
Antimony trichloride	90%	S	S
Arsenic acid	sat. sol.	S	S
Aqua regia	HCl-HNO <sub>3</sub>	U	U
<b>B</b>			
Barium carbonate	sat. sol.	S	S
Barium chloride	sat. sol.	S	S
Barium hydroxide	sat. sol.	S	S
Barium sulfate	sat. sol.	S	S
Barium sulfide	sol.	S	S
Benzaldehyde	100%	S	L
Benzene	—	L	L
Benzoic acid	sat. sol.	S	S
Beer	—	S	S
Borax (sodium tetraborate)	sat. sol.	S	S
Boric acid	sat. sol.	S	S
Bromine, gaseous dry	100%	U	U
Bromine, liquid	100%	U	U
Butane, gaseous	100%	S	S
1-Butanol	100%	S	S
Butyric acid	100%	S	L
<b>C</b>			
Calcium carbonate	sat. sol.	S	S
Calcium chlorate	sat. sol.	S	S
Calcium chloride	sat. sol.	S	S
Calcium nitrate	sat. sol.	S	S
Calcium sulfate	sat. sol.	S	S
Calcium sulfide	dil. sol.	L	L
Carbon dioxide, gaseous dry	100%	S	S
Carbon disulfide	100%	L	U
Carbon monoxide	100%	S	S
Chloroacetic acid	sol.	S	S
Carbon tetrachloride	100%	L	U
Chlorine, aqueous solution	sat. sol.	L	U
Chlorine, gaseous dry	100%	L	U
Chloroform	100%	U	U
Chromic acid	20%	S	L
Chromic acid	50%	S	L
Citric acid	sat. sol.	S	S

Medium	Concentration	Resistance at:	
		20 °C (68 °F)	60 °C (140 °F)
Copper chloride	sat. sol.	S	S
Copper nitrate	sat. sol.	S	S
Copper sulfate	sat. sol.	S	S
Cresylic acid	sat. sol.	L	—
Cyclohexanol	100%	S	S
Cyclohexanone	100%	S	L
<b>D</b>			
Decahydronaphthalene	100%	S	L
Dextrine	sol.	S	S
Diethyl ether	100%	L	—
Dioctylphthalate	100%	S	L
Dioxane	100%	S	S
<b>E</b>			
Ethandiol	100%	S	S
Ethanol	40%	S	L
Ethyl acetate	100%	S	U
Ethylene trichloride	100%	U	U
<b>F</b>			
Ferric chloride	sat. sol.	S	S
Ferric nitrate	sol.	S	S
Ferric sulfate	sat. sol.	S	S
Ferrous chloride	sat. sol.	S	S
Ferrous sulfate	sat. sol.	S	S
Fluorine, gaseous	100%	U	U
Fluorosilicic acid	40%	S	S
Formaldehyde	40%	S	S
Formic acid	50%	S	S
Formic acid	98-100%	S	S
Furfuryl alcohol	100%	S	L
<b>G</b>			
Gasoline	—	S	L
Glacial acetic acid	96%	S	L
Glucose	sat. sol.	S	S
Glycerine	100%	S	S
Glycol	sol.	S	S
<b>H</b>			
Heptane	100%	S	U
Hydrobromic acid	50%	S	S
Hydrobromic acid	100%	S	S
Hydrochloric acid	10%	S	S
Hydrochloric acid	35%	S	S
Hydrocyanic acid	10%	S	S
Hydrofluoric acid	4%	S	S
Hydrofluoric acid	60%	S	L
Hydrogen	100%	S	S
Hydrogen peroxide	30%	S	L
Hydrogen peroxide	90%	S	U
Hydrogen sulfide, gaseous	100%	S	S
<b>L</b>			
Lactic acid	100%	S	S
Lead acetate	sat. sol.	S	—
<b>M</b>			
Magnesium carbonate	sat. sol.	S	S
Magnesium chloride	sat. sol.	S	S
Magnesium hydroxide	sat. sol.	S	S
Magnesium nitrate	sat. sol.	S	S
Maleic acid	sat. sol.	S	S
Mercuric chloride	sat. sol.	S	S

Medium	Concentration	Resistance at:	
		20 °C (68 °F)	60 °C (140 °F)
Mercuric cyanide	sat. sol.	S	S
Mercuric nitrate	sol.	S	S
Mercury	100%	S	S
Methanol	100%	S	S
Methylene chloride	100%	L	—
Milk	—	S	S
Molasses	—	S	S
<b>N</b>			
Nickel chloride	sat. sol.	S	S
Nickel nitrate	sat. sol.	S	S
Nickel sulfate	sat. sol.	S	S
Nicotinic acid	dil. sol.	S	—
Nitric acid	25%	S	S
Nitric acid	50%	S	U
Nitric acid	75%	U	U
Nitric acid	100%	U	U
<b>O</b>			
Oils and Grease	—	S	L
Oleic acid	100%	S	L
Orthophosphoric acid	50%	S	S
Orthophosphoric acid	95%	S	L
Oxalic acid	sat. sol.	S	S
Oxygen	100%	S	L
Ozone	100%	L	U
<b>P</b>			
Petroleum (kerosene)	—	S	L
Phenol	sol.	S	S
Phosphorus trichloride	100%	S	L
Photographic developer	cust. conc.	S	S
Picric acid	sat. sol.	S	—
Potassium bicarbonate	sat. sol.	S	S
Potassium bisulfide	sol.	S	S
Potassium bromate	sat. sol.	S	S
Potassium bromide	sat. sol.	S	S
Potassium carbonate	sat. sol.	S	S
Potassium chlorate	sat. sol.	S	S
Potassium chloride	sat. sol.	S	S
Potassium chromate	sat. sol.	S	S
Potassium cyanide	sol.	S	S
Potassium dichromate	sat. sol.	S	S
Potassium ferricyanide	sat. sol.	S	S
Potassium ferrocyanide	sat. sol.	S	S
Potassium fluoride	sat. sol.	S	S
Potassium hydroxide	10%	S	S
Potassium hydroxide	sol.	S	S
Potassium hypochlorite	sol.	S	L
Potassium nitrate	sat. sol.	S	S
Potassium orthophosphate	sat. sol.	S	S
Potassium perchlorate	sat. sol.	S	S
Potassium permanganate	20%	S	S
Potassium persulfate	sat. sol.	S	S
Potassium sulfate	sat. sol.	S	S
Potassium sulfite	sol.	S	S
Propionic acid	50%	S	S
Propionic acid	100%	S	L
Pyridine	100%	S	L
<b>Q</b>			
Quinol (Hydroquinone)	sat. sol.	S	S
<b>S</b>			
Salicylic acid	sat. sol.	S	S

Medium	Concentration	Resistance at:	
		20 °C (68 °F)	60 °C (140 °F)
Silver acetate	sat. sol.	S	S
Silver cyanide	sat. sol.	S	S
Silver nitrate	sat. sol.	S	S
Sodium benzoate	sat. sol.	S	S
Sodium bicarbonate	sat. sol.	S	S
Sodium biphosphate	sat. sol.	S	S
Sodium bisulfite	sol.	S	S
Sodium bromide	sat. sol.	S	S
Sodium carbonate	sat. sol.	S	S
Sodium chlorate	sat. sol.	S	S
Sodium chloride	sat. sol.	S	S
Sodium cyanide	sat. sol.	S	S
Sodium ferricyanide	sat. sol.	S	S
Sodium ferrocyanide	sat. sol.	S	S
Sodium fluoride	sat. sol.	S	S
Sodium hydroxide	40%	S	S
Sodium hydroxide	sat. sol.	S	S
Sodium hypochlorite	15% active chlorine	S	S
Sodium nitrate	sat. sol.	S	S
Sodium nitrite	sat. sol.	S	S
Sodium orthophosphate	sat. sol.	S	S
Sodium sulfate	sat. sol.	S	S
Sodium sulfide	sat. sol.	S	S
Sulfur dioxide, dry	100%	S	S
Sulfur trioxide	100%	U	U
Sulfuric acid	10%	S	S
Sulfuric acid	50%	S	S
Sulfuric acid	98%	S	U
Sulfuric acid	fuming	U	U
Sulfurous acid	30%	S	S
<b>T</b>			
Tannic acid	sol.	S	S
Tartaric acid	sol.	S	S
Thionyl chloride	100%	L	U
Toluene	100%	L	U
Triethylamine	sol.	S	L
<b>U</b>			
Urea	sol.	S	S
Urine	—	S	S
<b>W</b>			
Water	—	S	S
Wine vinegar	—	S	S
Wines and liquors	—	S	S
<b>X</b>			
Xylenes	100%	L	U
<b>Y</b>			
Yeast	sol.	S	S
<b>Z</b>			
Zinc carbonate	sat. sol.	S	S
Zinc chloride	sat. sol.	S	S
Zinc (II) chloride	sat. sol.	S	S
Zinc (IV) chloride	sat. sol.	S	S
Zinc oxide	sat. sol.	S	S
Zinc sulfate	sat. sol.	S	S

Specific immersion testing should be undertaken to ascertain the suitability of chemicals not listed above with reference to special requirements.

**NOTES:**

(S) **Satisfactory:** Liner material is resistant to the given reagent at the given concentration and temperature. No mechanical or chemical degradation is observed.

(L) **Limited Application Possible:** Liner material may reflect some attack. Factors such as concentration, pressure and temperature directly affect liner performance against the given media. Application, however, is possible under less severe conditions, e.g. lower concentration, secondary containment, additional liner protections, etc.

(U) **Unsatisfactory:** Liner material is not resistant to the given reagent at the given concentration and temperature. Mechanical and/or chemical degradation is observed.

(-) **Not tested**

sat. sol. = Saturated aqueous solution, prepared at 20°C (68°F)

sol. = aqueous solution with concentration above 10% but below saturation level

dil. sol. = diluted aqueous solution with concentration below 10%

cust. conc. = customary service concentration

TN032 ResistChart R03/17/06

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