

**109-09 15<sup>TH</sup> AVENUE**  
**COLLEGE POINT, NEW YORK**

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# **Remedial Action Work Plan**

**NYC OER Site Number: 13RHAZ374Q**

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**JANUARY 2015**

# REMEDIAL ACTION WORK PLAN

## TABLE OF CONTENTS

TABLE OF CONTENTS .....	ii
LIST OF ACRONYMS.....	iv
CERTIFICATION.....	<b>Error! Bookmark not defined.</b>
EXECUTIVE SUMMARY.....	1
REMEDIAL ACTION WORK PLAN .....	1
1.0 SITE BACKGROUND.....	12
1.1 Site Location and Current Usage .....	12
1.2 Proposed Redevelopment Plan.....	12
1.3 Description of Surrounding Property .....	13
1.4 Remedial Investigation.....	14
2.0 REMEDIAL ACTION OBJECTIVES .....	18
3.0 REMEDIAL ALTERNATIVES ANALYSIS .....	19
3.1 Threshold Criteria .....	<b>Error! Bookmark not defined.</b>
3.2 Balancing Criteria .....	<b>Error! Bookmark not defined.</b>
4.0 REMEDIAL ACTION.....	29
4.1 Summary of Preferred Remedial Action.....	29
4.2 Soil Cleanup Objectives and Soil/Fill Management .....	32
4.3 Engineering Controls .....	32
4.4 Institutional Controls.....	32
4.5 Site Management Plan.....	32
4.6 Qualitative Human Health Exposure Assessment.....	32
5.0 REMEDIAL ACTION MANAGEMENT .....	44
5.1 Project Organization and Oversight .....	44
5.2 Site Security .....	44
5.3 Work Hours.....	44
5.4 Construction Health and Safety Plan (HASP) .....	44
5.5 Community Air Monitoring Plan.....	45
5.6 Agency Approvals.....	47

5.7	Site Preparation .....	47
5.8	Traffic Control .....	51
5.9	Demobilization.....	51
5.10	Reporting and Record Keeping.....	52
5.11	Complaint Management .....	53
5.12	Deviations from the Remedial Action Work Plan .....	53
5.13	DUSR .....	53
6.0	REMEDIAL ACTION REPORT .....	54
7.0	SCHEDULE.....	57

# FIGURES

- Figure 1: Site Location
- Figure 2: Site Diagram
- Figure 3: Redevelopment Plans
- Figure 4: Surrounding Land Usage
- Figure 5: Sampling Diagram
- Figure 6: Sampling Point Exceedance Diagrams
- Figure 7: Vapor Barrier Specifications
- Figure 8: Active Sub-slab Depressurization System Specifications
- Figure 9: Endpoint Sampling Location Diagram
- Figure 10: Composite Cover Diagram
- Figure 11: Truck Route

# **TABLES**

- Table 1: Volatile Organic Compounds in Soil
- Table 2: Semi Volatile Organic Compounds in Soil
- Table 3: PCBs and Pesticides in Soil
- Table 4: Metals in Soil
- Table 5: Volatile Organic Compounds in Groundwater
- Table 6: Semi Volatile Organic Compounds in Groundwater
- Table 7: PCBs and Pesticides in Groundwater
- Table 8: Total and Dissolved Metals in Groundwater
- Table 9: Volatile Organic Compounds in Soil Vapor
- Table 10: Depth to Groundwater

# **APPENDICES**

- Appendix 1: Citizen Participation Plan
- Appendix 2: Sustainability Statement
- Appendix 3: Soil/Materials Management Plan
- Appendix 4: Construction Health and Safety Plan

## 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
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC BCP	New York City Brownfield 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

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, Andrew R. Levenbaum, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 109-09 15<sup>th</sup> Avenue, College Point Site 13RHAZ374Q.

I, Paul P. Stewart, am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 109-09 15<sup>th</sup> Avenue, College Point Site 13RHAZ374Q.

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



\_\_\_\_\_  
QEP Name

\_\_\_\_\_  
QEP Signature

\_\_\_\_\_  
Date

# **EXECUTIVE SUMMARY**

King's USA Group Inc. has enrolled in the New York City Voluntary Brownfield Cleanup Program (NYC VCP) to investigate and remediate a 39,950-square foot site located at 109-09 15<sup>th</sup> Avenue in Queens, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

## **Site Location and Current Usage**

The Site is located at 109-09 15<sup>th</sup> Avenue in the College Point section of Queens, New York and is identified as Block 4044 and Lot 60 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 39,950-square feet and is bounded by a six story residential apartment building to the north, 15<sup>th</sup> Avenue followed by a one story commercial building to the south, 110<sup>th</sup> Street followed by a two story mixed use building to the east, and Flushing Bay to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is vacant and contains an existing three-story brick building.

## **Summary of Proposed Redevelopment Plan**

The proposed future use of the Site will consist of a six story residential building with a cellar at grade for parking. Layout of the proposed site development is presented in Figure 3. The current zoning designation is M2-1 for manufacturing.

The proposed redevelopment plan for the property will be a modification of the existing building. The project includes the installation of a 30,214 square foot cellar in the footprint of the existing building. The cellar is projected to be constructed at grade with an elevation of 9.17'. The current elevation at grade in the building ranges from 11.31' on the north side of the property to 8.54' on the south side of the property. The cellar of the building will consist of 138 parking spaces as well as storage areas and compactor rooms. Due to the location of the property

and the possible risk of flooding, the first floor elevation is projected to be constructed at an elevation of 17.83' as per FEMA requirements. The first floor will consist of an additional 24 parking spaces, a lobby, mechanical and meter rooms and residential apartments. The remainder of the building will be redeveloped to include an additional three floors and two 6-story extensions added to the west side of the existing building. The two 6-story extensions will be constructed to align with the 17.83' elevation of the proposed first floor and will only consist of residential living space. There will be a total 129,497.90 square feet of residential living space and a gross of 186,278.08 square feet. The western side of the property will consist of a courtyard, landscaped area and a public shore walkway. The building height proposed is at a final elevation of 89.50'.

Approximately 2' of a gravel blend was used to cover the western side of the property from the building to the shore. To restore the property to the proposed elevation the gravel blend will need to be excavated. An additional 2' of soil will be excavated in any areas of landscaping. An estimated 702 tons (400 cubic yards) of soil will be excavated throughout the development of the property. No excavation is planned to extend beneath grade level or the water table.

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 performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan (CPP).

2. Performance of a Community Air Monitoring Program (CAMP) for particulates and volatile organic carbon compounds.
3. Establishment of Site Specific Track 4 Soil Cleanup Objectives (SCOs).
4. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency required by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to the start of the remedial action;
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
6. Excavation and removal of soil/fill exceeding Site Specific Track 4 SCOs. Planned development-based excavation will be to a depth of approximately 2' in any landscaped areas. There is no proposed excavation in the existing building perimeter, which will be utilized for parking at grade. Approximately 702 tons of soil will be excavated and removed from this site;
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media onsite;
8. Removal of USTs (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State, and Federal laws and regulations;
9. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials as described in Appendix 3;
10. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;

11. Collection and analysis of five end-point samples beneath the building footprint to determine the performance of the remedy with respect to attainment of SCOs;
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
15. Submission of a Remedial action report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP;
16. Construction and maintenance of an engineered composite cover consisting of the concrete building foundation and concrete parking lot across the entire property to prevent human exposure to residual soil/fill remaining under the Site;
17. Installation of a vapor barrier system beneath the building slab. The vapor barrier will consist of a 20 mil Stego Wrap Vapor Barrier.
18. Installation and operation of an active sub-slab depressurization system underneath the footprint of new building. The SSDS will consist of a network of horizontal perforated pipes installed within a minimum of 18-inch layers of crushed stone beneath the building's 10-inch foundation floor. The perforated piping will consist of 4-inch diameter scheduled 40 PVC perforated pipe. A minimum of 4 inches of crushed stone will be placed above and below the pipes.
19. Demarcation of residual soil/fill in landscaped areas.
20. 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.

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

## COMMUNITY PROTECTION STATEMENT

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

This cleanup plan provides a very high level of protection for neighboring communities. 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 BCP, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

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

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

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

**Site Safety Coordinator.** This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is Yisong Yang and can be reached at 1-718-508-2970.

**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 onsite Project Manager Theresa Burkard (516-441-5800 ext.105) or NYC Office of Environmental Remediation Project Manager Rebecca Bub (212-341-2073).

**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 7am – 6pm, Monday through Friday.

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

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager Silvio Spallone at 917-335-2086, the NYC Office of Environmental Remediation Project Manager Rebecca Bub at 212-341-2073, 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 Poppehusen Public Library, 121-23 14<sup>th</sup> Avenue, College Point.

**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 or established through a city environmental designation. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

# **REMEDIAL ACTION WORK PLAN**

## **1.0 SITE BACKGROUND**

King's USA Group Inc. has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 109-09 15<sup>th</sup> Avenue in the College Point section of Queens, 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 109-09 15<sup>th</sup> Avenue in the College Point section of Queens, New York and is identified as Block 4044 and Lot 60 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 39,950-square feet and is bounded by a six story residential apartment building to the north, 15<sup>th</sup> Avenue followed by a one story commercial building to the south, 110<sup>th</sup> Street followed by a two story mixed use building to the east, and Flushing Bay to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is vacant and contains an existing three-story brick building.

### **1.2 PROPOSED REDEVELOPMENT PLAN**

The proposed future use of the Site will consist of a six story residential building with a cellar at grade for parking. Layout of the proposed site development is presented in Figure 3. The current zoning designation is M2-1 for manufacturing.

The proposed redevelopment plan for the property will be a modification of the existing building. The project includes the installation of a 30,214 square foot cellar in the footprint of the

existing building. The cellar is projected to be constructed at grade with an elevation of 9.17'. The current elevation at grade in the building ranges from 11.31' on the north side of the property to 8.54' on the south side of the property. The cellar of the building will consist of 138 parking spaces as well as storage areas and compactor rooms. Due to the location of the property and the possible risk of flooding, the first floor elevation is projected to be constructed at an elevation of 17.83' as per FEMA requirements. The first floor will consist of an additional 24 parking spaces, a lobby, mechanical and meter rooms and residential apartments. Floors 2 through 6 will only be utilized for residential purposes. The remainder of the building will be redeveloped to include an additional three floors and two 6-story extensions added to the west side of the existing building. The two 6-story extensions will be constructed to align with the 17.83' elevation of the proposed first floor and will only consist of residential living space. There will be a total 129,497.90 square feet of residential living space and a gross of 186,278.08 square feet. The western side of the property will consist of a courtyard, landscaped area and a public shore walkway. The building height proposed is at a final elevation of 89.50'.

Approximately 2' of a gravel blend was used to cover the western side of the property from the building to the shore. To restore the property to the proposed elevation the gravel blend will need to be excavated. An additional 2' of soil will be excavated in any areas of landscaping. An estimated 702 tons (400 cubic yards) will be excavated throughout the development of the property. No excavation is planned to extend beneath grade level or the water table.

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

### **1.3 DESCRIPTION OF SURROUNDING PROPERTY**

There are no nearby sensitive receptors such as schools, hospitals, and day care facilities within a 250 to 500-foot radius.

Figure 4 shows the surrounding land usage.

## **1.4 REMEDIAL INVESTIGATION**

A remedial investigation was performed and the results are documented in a companion document called “*Remedial Investigation Report, 109-09 15<sup>th</sup> Avenue, College Point*”, dated December, 2014 (RIR).

A Phase I Environmental Site Assessment (Phase I) was completed by ACT on October 3, 2014. The Phase I indicated that the property contained a predominantly vacant three-story commercial warehouse with a seafood distributor as a current tenant in the northern portion of the first floor. The Phase I identified the following Recognized Environmental Conditions at the property (RECs):

- The historical industrial use of the subject property.
- An open petroleum spill at the subject property (Spill 05-10659).
- A hazardous material e-designation at the subject property.
- A potential vapor encroachment condition at the subject property.

The site was identified as a Hazardous Waste Generator/Transporter under the Giles Varnish Company from approximately 1984 through 1986. According to historical fire insurance maps in 1886 a two-story manufacturing building and three one-story storage buildings were located at the subject property and occupied by Chilton Manufacturing Company. By 1892 a three-story building replaces the previous buildings at the property for Chilton Paint Manufacturing. In 1943 a varnish plant was identified on the western portion of the property. By 1981, the coastline had been expanded and a varnish plant was no longer identified.

The AOCs identified for this site include:

1. Open petroleum Spill 05-10659
2. Historic use of the property as a Hazardous Waste Generator/Transporter
3. Historic fill utilized to extend the shoreline an estimated 125 feet westward.

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

King’s USA Group Inc. performed the following scope of work in November 2014:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Performed a Ground-Penetrating Radar survey over exterior portions of the Site.
3. Installed four test pits across the western portion of the Site, and collected eight soil samples for chemical analysis from the test pits to evaluate soil quality;
4. Sampled two existing groundwater monitoring wells across the Site and collected two groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed two soil vapor probes in the area of proposed two 6-story expansions and collected two samples for chemical analysis.

King's USA Group Inc. performed the following scope of work in May 2013:

6. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
7. Installed six soil borings across the exterior parking lot and interior of the existing building, and collected six soil samples for chemical analysis from the soil borings to evaluate soil quality;
8. Installed and sampled three temporary groundwater monitoring wells across the Site and collected three groundwater samples for chemical analysis to evaluate groundwater quality;
9. Installed three sub-slab vapor probes and collected three samples for chemical analysis.

### **Summary of Environmental Findings**

1. The Site is approximately 11 feet above sea level.
2. The Site is adjacent to Flushing Bay and depth to groundwater changes with the tide.
3. Groundwater flow is believed to be from east to west beneath the Site.
4. Bedrock was not encountered during this investigation.

5. The stratigraphy of the site, from the surface down, consists of approximately 2 feet of gravel blend to reddish-brown, silty sands mixed with fill materials and frequent cobbles.
6. Soil/fill samples collected during the November 2014 RI were compared to NYSDEC Part 375-6.8 Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs). Soil sampling results show that no PCBs were detected above Track 1 SCOs. Soil sampling results showed no VOCs except for acetone (max 200 µg/kg) above Track 1 SCOs. Trichloroethene (TCE) was detected in one sample at 120 µg/kg, below its Unrestricted Use SCOs. No SVOCs except for Chrysene (max of 1,850 µg/kg) was detected above Track 1 SCOs. Two pesticides including 4,4'-DDT (max of 14.3 µg/kg), and dieldrin (max of 9.58 µg/kg) were detected above their respective Track 1 SCOs. A total of 9 metals were detected in the soil above soil cleanup objectives. Arsenic (37.4 mg/kg), barium (2,480 mg /kg), chromium (232 mg /kg), copper (max of 307 mg /kg), lead (max of 2,730 mg /kg), mercury (max of 1.36 mg /kg), nickel (36.4 mg /kg), selenium (max of 12.6 mg /kg) and zinc (max of 890 mg /kg) were detected exceeding their respective Unrestricted Use SCOs. Of these metals, arsenic, barium, chromium, copper, lead and mercury were detected at levels exceeding their respective Restricted Residential Use SCOs. There is a hotspot in the vicinity of the TP-2 (3-5) location. Overall, the soil chemistry is indicative of historic fill materials.
7. Soil/fill samples collected during the May 2013 RI were compared to NYSDEC Part 375-6.8 Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs). Soil sampling results showed acetone (max 120 µg/kg) in three deeper samples. Elevated levels of isopropylbenzene (at 9500 µg/kg) were detected in one sample. Several SVOCs were identified in one soil boring at concentrations below Unrestricted Use SCOs. Metals including chromium (max. of 199 mg /kg), lead (max. of 71 mg /kg) and zinc (max. of 233 mg /kg) exceeded Unrestricted Use SCOs. Pesticides and PCBs were not detected.
8. Groundwater samples collected in the November 2014 RI were compared to NYSDEC 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Groundwater results showed no no PCB's or Pesticides detected above laboratory method detection limits. No VOCs were detected at concentrations exceeding GQS. Trace levels of TCE was detected

in in one groundwater sample at a concentration of 1.4 µg/L. Five SVOC's were detected above their corresponding groundwater standards, including benzo(b)fluoranthene (0.220 µg/L), benzo (k)fluoranthene (0.130 µg/L), chrysene (0.150 µg/L), and indeno (1,2,3-c,d)pyrene (0.0800 µg/L), and bis(2-ethylhexyl)phthalate (5.26 µg/L). ]Several metals were identified and of those, iron (6,460 µg/L) and manganese (777 µg/L), magnesium (max of 121,000 µg/L), selenium (max of 58 µg/L) and sodium (max of 756,000 µg/L) were detected above groundwater standards.

9. Groundwater samples collected in the May 2013 RI were compared to NYSDEC 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Groundwater results indicated that acetone (at 110 µg/L) and isopropylbenzene (max of 140 µg/L) exceeded their respective GQSs. SVOCs, PCBs and pesticides were not detected in groundwater.
10. Soil vapor samples collected during the November 2014 RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. All of the detected compounds were below their respective guidance values. The most prevalent VOC detected in soil vapor was 2-Butanone with a maximum concentration of 360 µg/m<sup>3</sup> in SV-1. Chlorinated VOC, tetrachloroethene (PCE), was detected at a maximum concentration of 7.5 µg/m<sup>3</sup>. Carbon tetrachloride, trichloroethene and 1,1,1-trichloroethane were not detected in any soil vapor samples. Detected concentrations of PCE were below the monitoring level range established by NYSDOH.
11. Soil vapor samples collected during the May 2013 RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Most VOCs were detected at trace concentrations. Chlorinated, trichloroethene was detected in two of three samples at concentration of 36 µg/m<sup>3</sup>. Carbon tetrachloride was detected at 12.3 µg/m<sup>3</sup>.

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 off-Site migration of contaminated groundwater above applicable groundwater standards.

### **Soil**

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

### **Soil Vapor**

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

### **3.0 REMEDIAL ALTERNATIVES ANALYSIS**

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

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and permanence;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance;
- Land use; and
- Sustainability.

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

#### **Alternative 1 involves:**

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track1) Soil Cleanup Objectives (SCOs);

- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs and confirmation that Track 1 has been achieved with post-excavation endpoint sampling. If soil/fill containing chemical constituents at concentrations above Track 1 Unrestricted Use SCOs are still present at the base of the excavation after the removal of all soil required for new construction, 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 are required for a Track 1 cleanup, but a vapor barrier would be installed beneath the basement foundation and behind foundation sidewalls of the new building as part of new development to prevent any potential future exposures from off-Site soil vapor; and

**Alternative 2 involves:**

- Establishment of Site-Specific (Track 4) SCOs;
- Excavation and removal of all soil/fill exceeding Site-specific SCOs and confirmation that Track 4 has been achieved with post-excavation end-point sampling. Excavation for construction of the new building's cellar is not necessary. Therefore, if soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for the installation of new foundation and elevation requirements are complete, additional excavation will be performed to achieve Site Specific SCOs.
- Installation of a vapor barrier system beneath the entire new building slab to prevent exposure to soil vapor contaminants;
- Installation of an active sub-slab depressurization system (SSDS) beneath the entire new building slab;
- 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 the above Engineering and Institutional Controls including the performance of periodic inspections and certification that the Controls are performing as they were intended; and
- Continued registration as an E-designated property to memorialize the remedial action and the Engineering and Institutional Controls required by this RAWP.

### **3.1 THRESHOLD CRITERIA**

#### **Protection of Public Health and the Environment**

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

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

Alternative 2 would achieve comparable protections of human health and the environment by excavating hazardous material at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site Specific SCOs as well as by future placement of Institutional and Engineering Controls, including installation of a vapor barrier system beneath the entire new building slab as part of construction would prevent exposures from potential soil vapor intrusion. Implementing Institutional Controls, a Site Management Plan would ensure that the vapor barrier remains intact and protective and that the SSDS system remains active.

For both remedial Alternatives, potential exposure to contaminated soils during construction would be minimized by implementing a Construction Health and Safety Plan (CHASP), an approved Soils/Materials Management Plan, and a Community Air Monitoring Plan (CAMP). Potential contact with groundwater would be prevented as its use is prohibited by city laws and

regulations. Potential future mitigation of off-Site soil vapors into the new building would be prevented by installing a vapor barrier below the new building's foundation slab.

### **3.2. BALANCING CRITERIA**

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

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

Alternative 1 would achieve compliance with remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to meet Track 1 Unrestricted Use SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system below the new building's cellar floor.

Alternative 2 would achieve compliance with remedial goals, chemical-specific SCGs and RAOs for soil through the removal of soil to meet Track 4 Site-Specific SCOs. Compliance with SCGs for soil vapor would also be achieved by installation of a vapor barrier system beneath the entire floor slab as part of construction as well as an active sub-slab depressurization system (SSDS). A Site Management Plan would ensure that these controls remain protective for the long term.

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

#### **Short-term effectiveness and impacts**

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

impacts, time until remedial response objectives are achieved, and protection of workers during remedial actions.

Both remedial alternatives have similar short-term effectiveness during their respective implementations, as each requires excavation of soil/fill material. Alternative 1 would eliminate and Alternative 2 would reduce exposure to contaminant sources. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short term impacts could potentially be higher for Alternative 1 if excavation of greater amounts of historic fill material is encountered below the excavation depth of the proposed building. However, focused attention to means and methods during the remedial action during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize or negate the overall impact of these activities.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

Both Alternatives would employ appropriate measures to prevent short-term impacts, including a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-site soil disturbance activities and would effectively mitigate the release of significant contaminants into the environment. Construction workers operating under appropriate management procedures and a Health and Safety Plan (HASP) will be protected from on-site contaminants (personal protective equipment would be work consistent with the documented risks within the respective work zones).

### **Long-term effectiveness and permanence**

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

containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

Alternative 1 would achieve higher long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill and enabling unrestricted usage of the property. Potential sources of soil vapor contamination would also be eliminated as part of the Track 1 remedy.

Alternative 2 would be effective over the long-term by attaining Track 4 SCOs for soil, establishing use restrictions, establishing a Site Management Plan to ensure long-term management of Institutional and Engineering Controls, and placing a deed restriction to memorialize these controls for the long term. Groundwater use restrictions will eliminate potential exposure to groundwater and establishment of an SMP would ensure that this protection remains effective for the long-term. The SMP would ensure long-term effectiveness of all Engineering and Institutional Controls by requiring periodic inspection and certification that these controls and use restrictions continue to be in place and functioning as they were intended assuring that protections designed into the remedy will provide continued high level of protection in perpetuity.

Both Alternatives would result in removal of soil contamination exceeding the SCOs providing the highest level, most effective and permanent remedy over the long-term with respect to a remedy for contaminated soil, which will eliminate any migration to groundwater. A vapor barrier as part of the remedy would also eliminate potential sources of soil vapor and groundwater contamination. If on-site sources are removed, soil vapor impacts would be expected to dissipate.

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

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

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

Alternative 1 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 – Unrestricted Use SCOs.

Alternative 2 would greatly reduce the toxicity, mobility, and volume of contaminants from on-Site soil because it would include removal of contaminants that exceed Track 4 – Restricted Residential 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. They use standard materials and services that are well-established technology. The reliability of each remedy is also high. There are no special difficulties associated with any of the activities proposed.

For implementation of both Alternatives, standard construction equipment utilized for the overall earthwork would be used. OSHA trained personnel will complete all activities that include excavation and handling of impacted soils. No special permits other than earthwork permits required for completion of the required site redevelopment scope are required for implementation of the remedy.

### **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.

The capital costs associated with the Track 1 Alternative are marginally higher than the Track 4 Alternative in that a higher volume of soil/fill might have to be excavated for off-site disposal to achieve a Track 1 status over the entire site. In both cases, appropriate public health and environmental protections are achieved. Track 4 would require long term monitoring and higher associated costs.

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

### **Community Acceptance**

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

Based on the overall goals of the remedial program and initial permitting associated with the proposed site development, no adverse community opinion is anticipated for either alternative. This RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedial action. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 1. Observations here will be supplemented by public comment received on the RAWP.

### **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.

Because of the complete soil removal, the Track 1 alternative provides protection of public health and the environment for both the proposed use of the Site and any future use. The Track 1 alternative provides a remedial action that is beneficial to the surrounding community and is consistent with the goals of the City for remediating and redeveloping brownfield sites. The Track 4 alternative also provides protection for the intended use.

Both alternatives for remedial action at the site are comparable with respect to the proposed use and to land uses in the vicinity of the Site. The proposed use is consistent with the existing zoning designation for the property and is consistent with recent development patterns. The Site is surrounded by residential properties, and both alternatives provide comprehensive protection of public health and the environment for these uses. Improvements in the current environmental condition of the property achieved by both alternatives are also consistent with the City's goals for cleanup of contaminated land and bringing such properties into productive reuse. Both alternatives are equally protective of natural resources and cultural resources. This RAWP will undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the land use factors described in this section. This public comment will be considered by OER prior to approval of this plan.

### **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.

Both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix 2.

## **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:

1. Preparation of a Community Protection Statement performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan (CPP).
2. Performance of a Community Air Monitoring Program (CAMP) for particulates and volatile organic carbon compounds.
3. Establishment of Site Specific Track 4 Soil Cleanup Objectives (SCOs).
4. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency required by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to the start of the remedial action;
5. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
6. Excavation and removal of soil/fill exceeding Site Specific Track 4 SCOs. Planned development-based excavation will be to a depth of approximately 2' in any landscaped areas. There is no proposed excavation in the existing building perimeter, which will be

utilized for parking at grade. Approximately 702 tons of soil will be excavated and removed from this site;

7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media onsite;
8. Removal of USTs (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State, and Federal laws and regulations;
9. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials as described in Appendix 3;
10. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite;
11. Collection and analysis of five end-point samples beneath the building footprint to determine the performance of the remedy with respect to attainment of SCOs;
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;
14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;
15. Submission of a Remedial action report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP;

16. Construction and maintenance of an engineered composite cover consisting of the concrete building foundation and concrete parking lot across the entire property to prevent human exposure to residual soil/fill remaining under the Site;
17. Installation of a vapor barrier system beneath the building slab. The vapor barrier will consist of a 20 mil Stego Wrap Vapor Barrier.
18. Installation and operation of an active sub-slab depressurization system underneath the footprint of new building. The SSDS will consist of a network of horizontal perforated pipes installed within a minimum of 18-inch layers of crushed stone beneath the building's 10-inch foundation floor. The perforated piping will consist of 4-inch diameter scheduled 40 PVC perforated pipe. A minimum of 4 inches of crushed stone will be placed above and below the pipes.
19. Demarcation of residual soil/fill in landscaped areas.
20. 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.
21. The property will continue to be registered with an E-Designation by the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

## **4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT**

The 6NYCRR Part 703.5, Table 6.8(b) Track 2 Restricted Residential Use SCOs will be used as amended by the following Site-Specific Track 4 SCOs.

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	4,500 ppm
Lead	1,000 ppm
Mercury	2.5 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 3. The location of planned excavations and endpoint sampling is shown in Figure 9.

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 soil/fill expected to be excavated and disposed off-Site is 709 tons.

The proposed disposal locations for Site-derived impacted materials are listed below. Additional disposal locations established at a later date will be reported promptly to the OER Project Manager.

### **End-Point Sampling**

Removal actions for development purposes under this plan will be performed in conjunction with confirmation soil sampling. 4 confirmation samples will be collected from the base of the excavation at locations to be determined by OER. For comparison to Track 1 SCOs, analytes will include VOCs, SVOC, pesticides, PCBs and metals according to analytical methods described below. For comparison to Track 4 SCOs, analytes will only include trigger compounds and elements established on the Track 4 SCO list.

Hot-spot removal actions, whether established under this RAWP or identified during the remedial program, will be performed in conjunction with post remedial end-point samples to ensure that hot-spots are fully removed. Analytes for end-point sampling will be those parameters that are driving the hot-spot removal action and will be approved by OER. Frequency for hot-spot end-point sample collection is as follows:

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

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

New York State ELAP certified labs will be used for all confirmation and end-point sample analyses. Labs performing confirmation and end-point sample analyses will be reported in the

RAR. The RAR will provide a tabular and map summary of all confirmation and end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be Confirmation samples will be analyzed for compounds and elements as described above utilizing the following methodology:

Soil analytical methods will include:

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

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

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

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

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

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

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

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

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

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

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 0 tons. There will be no reuse of contaminated soils on-site.

### **4.3 ENGINEERING CONTROLS**

The excavation required for the proposed Site development will achieve Track 4 Site Specific SCOs. Engineering Controls are required to address residual contamination remaining at the site. The Site has three primary Engineering Control Systems as:

- composite cover system consisting of a concrete building slab, concrete walkways and the removal of 2' of soils and backfilling of clean fill in areas of landscaping;
- an active sub-slab depressurization system beneath the newly installed foundation slab;

- soil vapor barrier/waterproof membrane.

### **Composite Cover System**

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

- Walkways will be composed of 4” thick pervious pavers;
- All areas containing landscaping will be excavated 2’ and backfilled with clean fill.
- Concrete building slabs will be composed of 5” thick reinforced concrete slab on grade.

Figure 10 shows the location of each cover type built at the Site.

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 potential soil vapor from onsite or offsite sources in the future will be mitigated with a combination of building slab and vapor barrier. A 20 mil Stego® Wrap Vapor Barrier consisting of a multi-layer extruded polyolefin membrane will be installed as an impermeable vapor barrier underneath the entire foundation of the proposed building and the of the cellar level (at grade). The Stego® Wrap Vapor Barrier will be laid down in sheets that will be overlapped and joined by tape supplied by the manufacturer. Photo documentation of the vapor barrier installation will be submitted as part of the Remedial Action Report. Vapor barrier specifications are provided in Figure 7.

The project’s Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The Remedial Action Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for

installation oversight and field inspections, and a copy of the manufacturers certificate of warranty.

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

Migration of soil vapor will be mitigated with the construction of an active sub-slab depressurization system.

Contaminated sub-slab vapor is likely to be present mainly beneath the Site as demonstrated in the soil vapor samples. An active sub-slab depressurization system will be installed beneath the future building slab. The SSDS will be designed in conjunction with the vapor barrier to create a negative pressure beneath the entire Site and prevent the migration of fugitive soil vapors into the proposed building. The SSDS will consist of a network of horizontal perforated pipes installed within a minimum of 18 inch layers of crushed stone beneath the building's 10-inch foundation floor. The perforated piping will consist of 4-inch diameter scheduled 40 PVC perforated pipe. A minimum of 4 inches of crushed stone will be placed above and below the pipes.

The horizontal depressurization piping will be connected to one or more vertical header pipes that will discharge above the first floor elevation. A wind-driven turbine fan will be installed on the exhaust pipe to maintain negative pressure beneath the building foundation. Following installation of the active SSDS, indoor air samples will be collected and analyzed to provide a basis for the SSDS to be operated as a passive wind-driven system. Design plans and specifications for the SSDS are provided in Figure 8.

### **4.4 Institutional Controls**

Institutional Controls (IC) will be 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 implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR. The property will continue to be registered with an E-Designation by the NYC Buildings Department.

Institutional Controls for this remedial action are:

- Continued to be registered with an E-Designation for the property. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the SMP which will

note that the property owner and property owner's successors and assigns must comply with the approved SMP;

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

#### **4.5 SITE MANAGEMENT PLAN**

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The 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 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 Brownfield 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 by OER on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by March 31 of the year following the reporting period.

#### **4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT**

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

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

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

Based on the results of the RIR, the contaminants of concern are:

**Soil:**

- Metals including arsenic, barium, copper, lead and mercury exceeded Restricted Residential SCOs.

**Groundwater:**

- VOCs and SVOCs detected above ground water standards included acetone and isopropylbenzene, benzo(b)fluoranthene, benzo (k)fluoranthene, chrysene, fluoranthene and indeno(1,2,3-c,d)pyrene.
- Iron, lead, magnesium, manganese, selenium and sodium were the only metals detected above groundwater standards in the dissolved samples.

**Soil Vapor:**

- Chlorinated VOC, Trichloroethylene was detected at a concentration above indoor air guidance matrices established by NYSDOH.

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

Based on the sampling results described above, the majority of the SVOC and metal contamination is restricted to shallow soils across the site.

Metals are present throughout the property at concentrations exceeding Restricted Residential Use SCOs. Soil vapor samples contained levels of both chlorinated and non-chlorinated compounds all below their respective guidance values with the exception of Trichloroethene (TCE). TCE was detected at elevated concentrations at locations across the site. The highest concentrations of the contaminants were detected on the eastern side of the property. TCE is a common component of industrial cleaners and degreasers and are likely to be found in historically industrial areas. The remaining compounds detected in sub-slab soil vapor such as cyclohexane, ethylbenzene, and hexanes are common components of petroleum and readily found in soil vapor in commercial areas

**Potential Routes of Exposure**

The five elements of an exposure pathway are: (1) a contaminant source, (2) contaminant release and transport mechanisms, (3) a point of exposure, (4) a route of exposure, and (5) a

receptor population.

An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

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

### **Existence of Human Health Exposure**

*Current Conditions:* The Site is currently vacant and the building will be gutted. Exposure to contaminated soil is unlikely because site access is restricted through the use of construction fencing and locks. Groundwater is not exposed at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, there is no potential for exposure. As there are no buildings, the potential for soil vapor does not exist.

*Construction/ Remediation Activities:* Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils, as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with any exposed impacted soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through dust controls, and through the implementation of the Community Air Monitoring Plan and Construction Health and Safety Plan. Groundwater is not anticipated to be encountered, and there will be no structures on-Site where soil vapor could accumulate.

*Proposed Future Conditions:* Under future remediated conditions, all soils in excess of Track 4 SCOs will be removed. The Site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and a vapor barrier system and sub-slab

depressurization system will prevent any exposure to potential off-Site soil vapors in the future. The Site is served by a public water supply, and groundwater is not used at the Site for potable supply. There are no plausible off-Site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

### **Receptor Populations**

The immediate area is mixed use residential and commercial, and is anticipated to remain as such. The new building at the Site will be utilized as a residential property. Potential receptor populations are as follows:

*On-Site Receptors* – The Site is currently a vacant. Therefore, the only potential on-Site receptors are Site representatives, trespassers and visitors granted access to the property. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents and visitors.

*Off-Site Receptors* - Potential off-Site receptors within a 0.25-mile radius of the Site include: adult and child residents; commercial and construction workers; pedestrians; trespassers; and passerby 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

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

There are potential complete exposure pathways for the current site condition. There is a potential complete exposure pathway that requires mitigation during implementation of the remedy. There is no complete exposure pathway under future conditions after the Site is

developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide surface cover cap, and a vapor barrier system and sub-slab depressurization system for the building. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

During the remedial action, on-Site exposure pathways will be eliminated by preventing access to the Site, through the implementation of soils/materials management, storm water pollution prevention, dust controls, employment of Community Air Monitoring Plan, and implementation of a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill or groundwater, as all soil that exceed Track 4 Site-Specific SCOs will have been removed and the vapor barrier, sub-slab depressurization system and concrete building slab will interrupt potential for soil vapor intrusion and vapor build-up inside the building.

## **5.0 REMEDIAL ACTION MANAGEMENT**

### **5.1 PROJECT ORGANIZATION AND OVERSIGHT**

Principal personnel who will participate in the remedial action include Yisong Yang (ACT) as the designated Site Safety Officer, Timothy Young (ACT) as the alternate Site Safety Officer and Theresa Burkard (ACT) as the Project Manager. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Andrew R. Levenbaum and Paul P. Stewart, respectively.

### **5.2 SITE SECURITY**

Site access will be controlled by a steel construction fence and gated entryway.

### **5.3 WORK HOURS**

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

### **5.4 CONSTRUCTION HEALTH AND SAFETY PLAN**

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be Yisong Yang. 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 ( $\text{mcg}/\text{m}^3$ ) 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  $150 \text{ mcg}/\text{m}^3$  above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within  $150 \text{ mcg}/\text{m}^3$  of the upwind level and in preventing visible dust migration.

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

## **5.6 AGENCY APPROVALS**

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

## **5.7 SITE PREPARATION**

### **Pre-Construction Meeting**

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

## **Mobilization**

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

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

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

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

## **Dewatering**

Groundwater at the site was detected approximately 7' bgs. Groundwater is unlikely to be encountered during the course of the site development.

## **Equipment and Material Staging**

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

## **Stabilized Construction Entrance**

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

## **Truck Inspection Station**

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

## **Extreme Storm Preparedness and Response Contingency Plan**

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

### **Storm Preparedness**

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

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

### **Storm Response**

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

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

### **Storm Response Reporting**

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

## **5.8 TRAFFIC CONTROL**

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is shown in Figure 11.

## **5.9 DEMOBILIZATION**

Demobilization will include:

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

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

## **5.10 REPORTING AND RECORD KEEPING**

### **Daily Reports**

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

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

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

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

### **Record Keeping and Photo-Documentation**

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

### **5.11 COMPLAINT MANAGEMENT**

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

### **5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN**

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

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

## **6.0 REMEDIAL ACTION REPORT**

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

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

- Reports and supporting material will be submitted in digital form.

## Remedial Action Report Certification

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

*I, [redacted], 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 [redacted] Site [redacted].*

*I, [redacted], am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the [redacted] Site [redacted]. (Optional)*

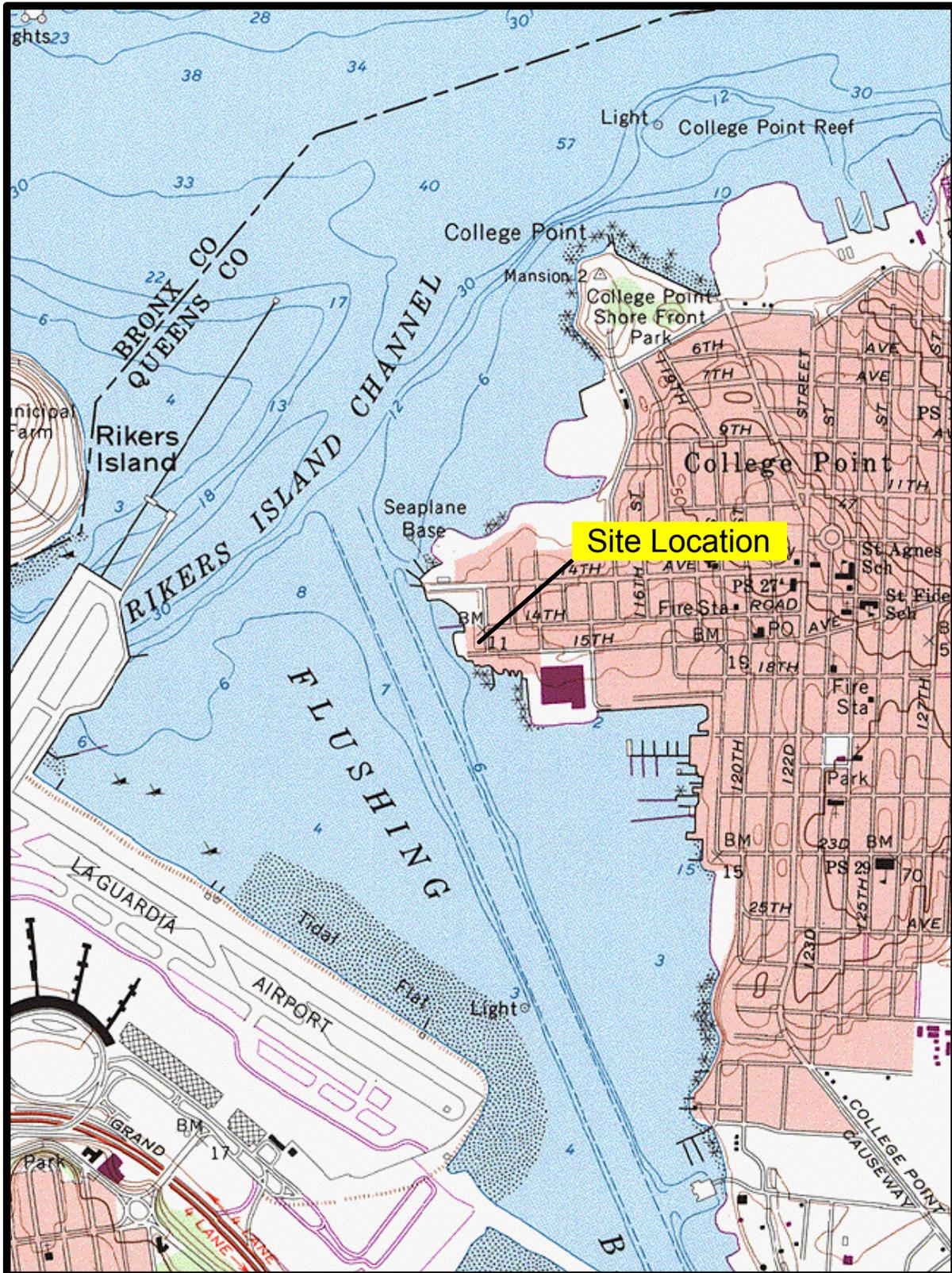
*I certify that the OER-approved Remedial Action Work Plan dated [redacted] and Stipulations in a letter dated [redacted] were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property 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 4 month remediation period is anticipated.

<b>Schedule Milestone</b>	<b>Weeks from Remedial Action Start</b>	<b>Duration (weeks)</b>
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	4	1
Remedial Excavation	5	3
Demobilization	8	
Record Declaration of Covenants and Restrictions		
Submit Remedial Action Report		

**FIGURE 1: SITE LOCATION**



From USGS 7.5 Minute Topographic Map Of Flushing, New York Quadrangle



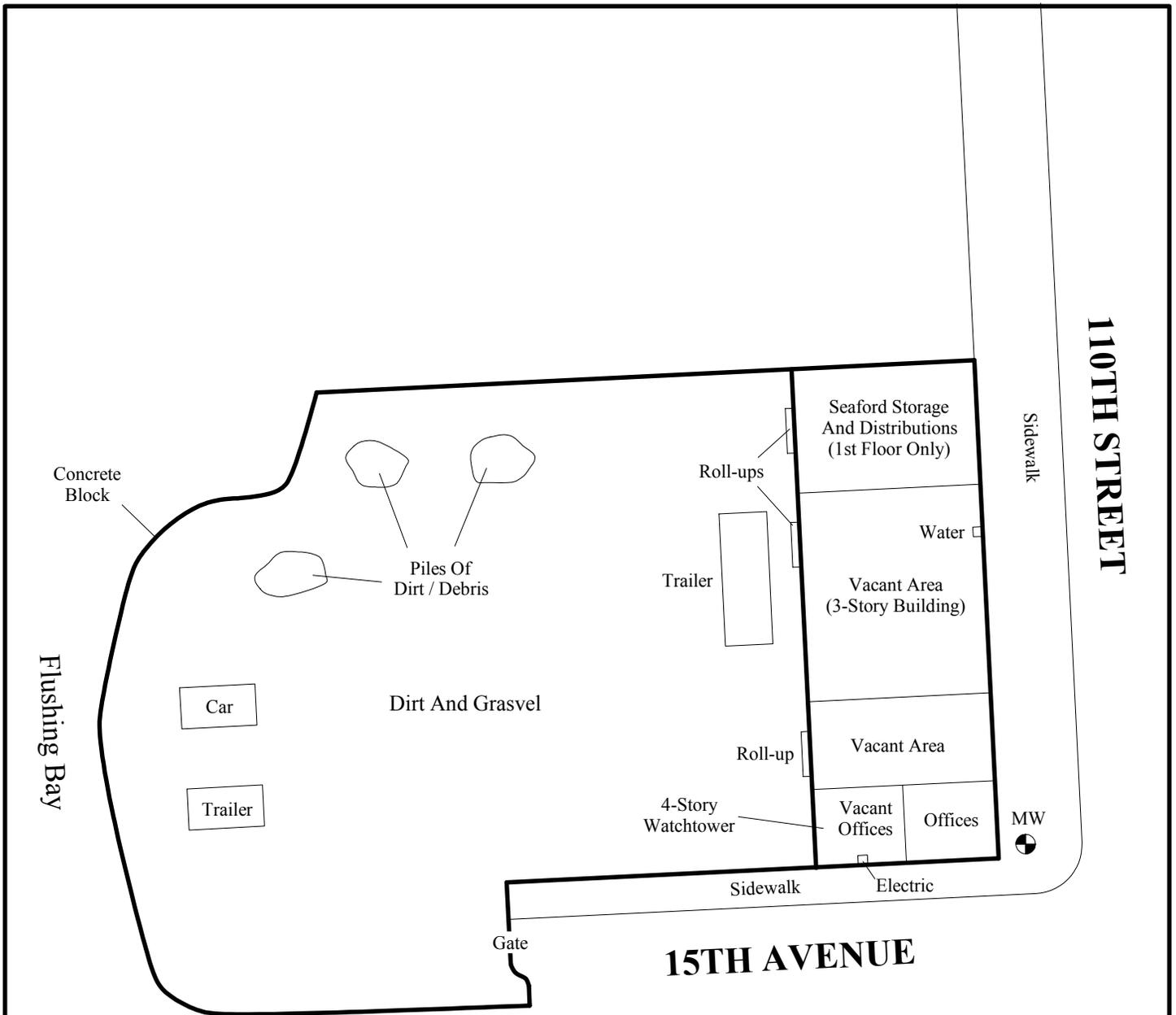
**Locational Diagram**

*Advanced Cleanup Technologies, Inc.*  
ENVIRONMENTAL CONSULTANTS

960 S. Broadway, Suite 100, Hicksville, New York 11801  
Tel: 516-933-0655 Fax: 516-933-0659

Project No.: 7233-CPNY	Figure No.: 1
Date: 09/22/2014	Scale: 1 inch = 2000 feet

**FIGURE 2: SITE DIAGRAM**



Legend



Monitoring Well



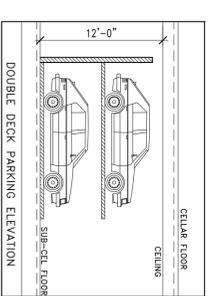
Site Diagram	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 7233-CPNY	Figure No.: 2
Date: 09/22/2014	Scale: Not To Scale

**FIGURE 3: REDEVELOPMENT PLANS**

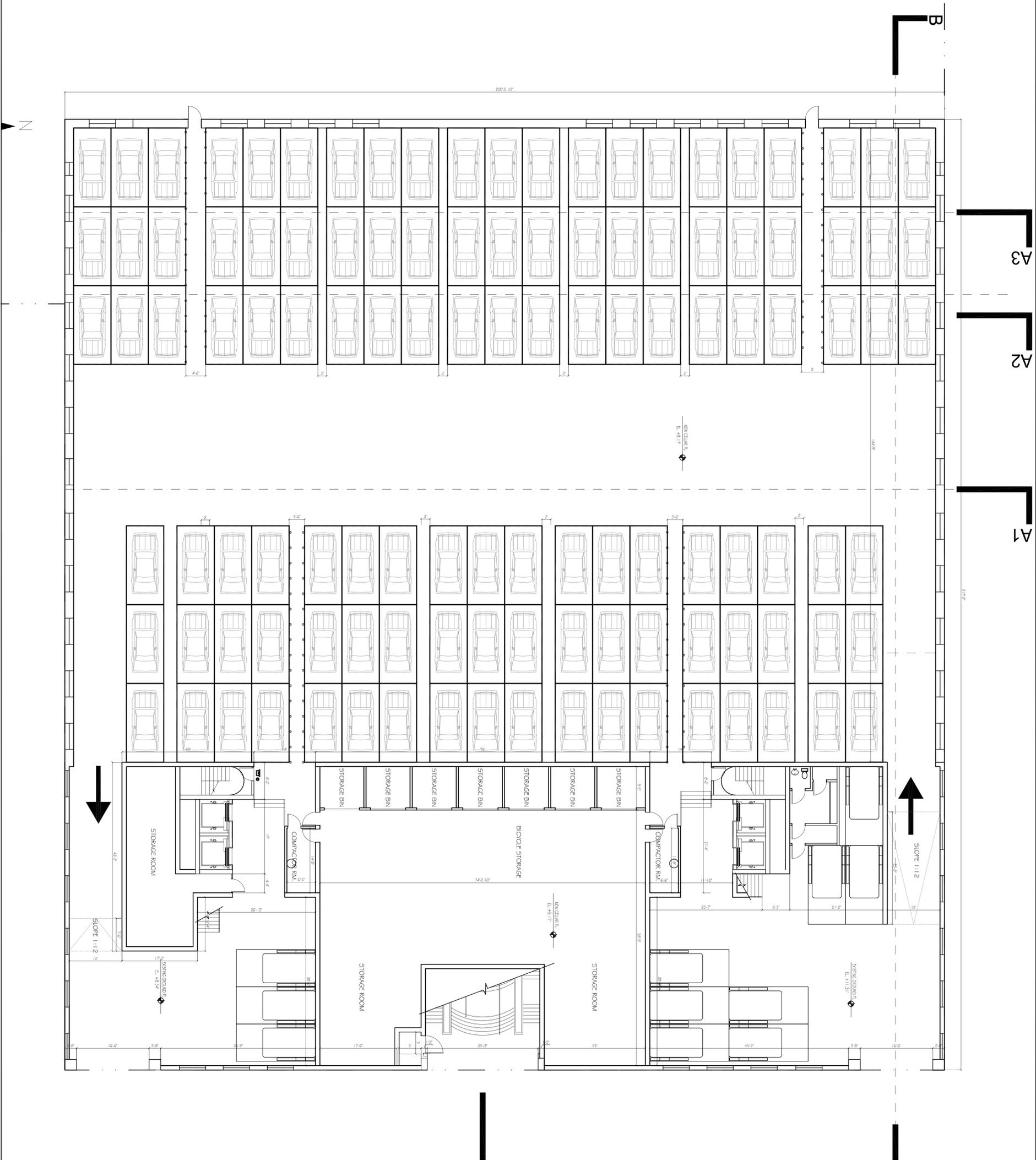
LEGEND	
	EXIST. WALL TO BE REMOVED
	EXIST. WALL TO BE REMAIN
	EXIST. 2 HR. FIRE RATED WALL
	C.M.U.
	BRICK
	CONCRETE
	2 HR. FIRE RATE WALL
	1 HR. FIRE RATE WALL
	EXIT SIGN
	FLOOR DRAIN
	ELEVATION MARK
	EXHAUST FAN
	SMOKE & CARBON MONOXIDE DETECTOR
	NEW DOOR
	EXISTING DOOR
	2 HEAD EMERGENCY LIGHT
	3 HEAD EMERGENCY LIGHT

1" INSUL. LOW E. GLASS  
 1/4" TEMPERED GLASS (TPG)  
 1/2" AIR SPACE (TPG)  
 1/4" TEMPERED GLASS (TPG)  
 CLEAR NON-FINISHED GLASS  
 VENTILATION NOTE:  
 BOILER ROOM 400 CFM  
 BATHROOM 75 CFM  
 KITCHENETTE 150 CFM

**ADDITIONAL LEGEND**  
 DESIGNATED SPACE FOR VEHICLE MANEUVERING (RESERVOIR SPACE)  
 DOUBLE-DECK PARKING  
 BOLLARDS  
 CAR QUEUE SPACES



8'-6" X 18'-0" PARKING SPACE WITH HARDING STEER INC. MECHANICAL & PARKING SYSTEM CAR-LIFT MEA. 176-88-5A (TPG.)



**LAM & LAM**  
 ENGINEERING D.P.C.

50 ALLEN STREET  
 1ST FLOOR  
 NY NY 10002  
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 FAX: 212 274 8899  
 INFO@LAMANDLAM.COM

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A-003.00	2ND FLOOR PLAN
A-004.00	3RD FLOOR PLAN
A-005.00	4TH FLOOR PLAN
A-006.00	5TH FLOOR PLAN
A-007.00	6TH FLOOR PLAN
A-008.00	ROOF FLOOR PLAN

JOB SITE:

109-09 15TH AVENUE  
 COLLEGE POINT, QUEENS, NY

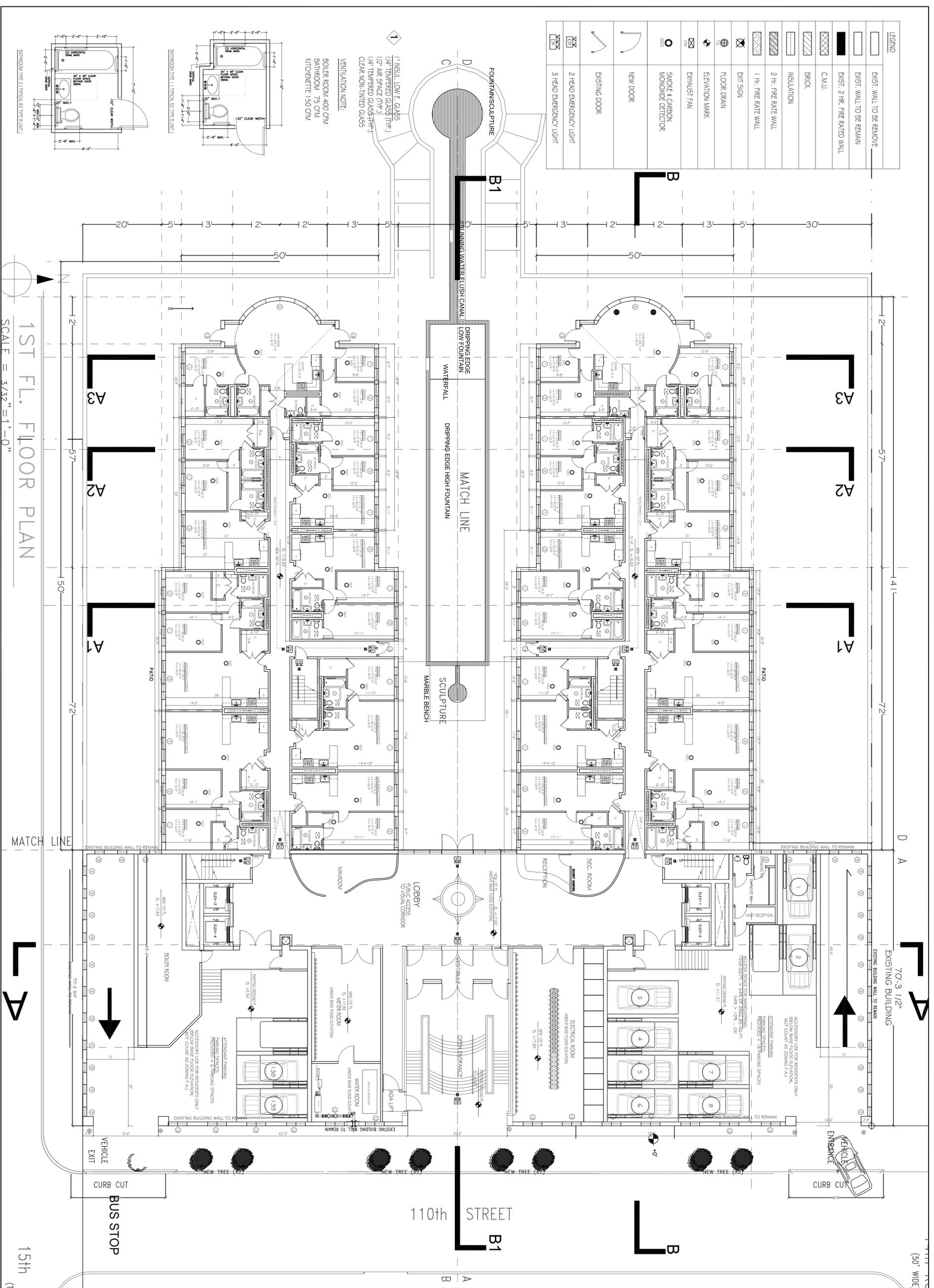
TITLE:  
 CELLAR PLAN  
 LEGEND

SEAL & SIGNATURE

DATE: 12/18/2010  
 DRAWING BY: RL  
 CHECK BY: RL  
 DRAWING NO.:  
**A-001.00**

JOB NUMBER:  
 401843617  
 SHEET NO.: 1 OF 8

LEGEND	
	EXIST. WALL TO BE REMOVED
	EXIST. WALL TO BE REMAIN
	EXIST. 2 HR. FIRE RATED WALL
	C.M.U.
	BRICK
	INSULATION
	2 Hr. FIRE RATE WALL
	1 Hr. FIRE RATE WALL
	EXIT SIGN
	FLOOR DRAIN
	ELEVATION MARK
	EXHAUST FAN
	SMOKE & CARBON MONOXIDE DETECTOR
	NEW DOOR
	EXISTING DOOR
	2 HEAD EMERGENCY LIGHT
	3 HEAD EMERGENCY LIGHT



1ST FL. FLOOR PLAN  
SCALE = 3/32" = 1'-0"

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ENGINEERING D.P.C.

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1ST FLOOR  
NY NY 10002  
TEL: 212 274 8833  
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FAX: (718) 461-8838

SHEET NO.:	TITLE SHEET
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A-002.00	1ST FLOOR PLAN
A-003.00	2ND FLOOR PLAN
A-004.00	3RD FLOOR PLAN
A-005.00	4TH FLOOR PLAN
A-006.00	5TH FLOOR PLAN
A-007.00	6TH FLOOR PLAN
A-008.00	ROOF FLOOR PLAN

JOB SITE:  
109-09 15TH AVENUE  
COLLEGE POINT, QUEENS, NY

TITLE:  
1ST FLOOR PLAN

SEAL & SIGNATURE

DATE: 12/18/2010  
DRAWING BY: RL  
CHECK BY: RL  
DRAWING NO.:  
**A-002.00**

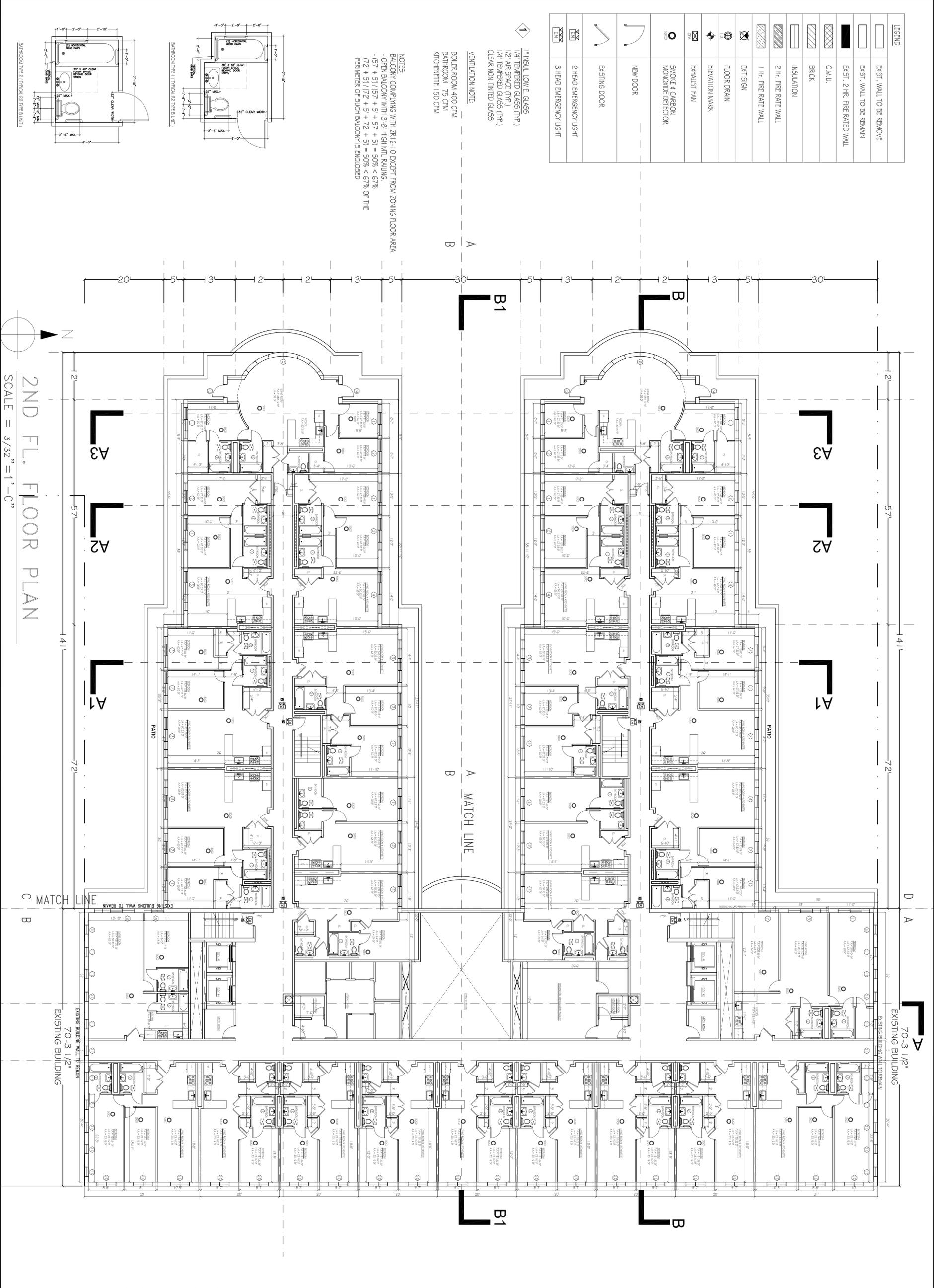
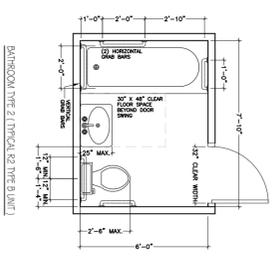
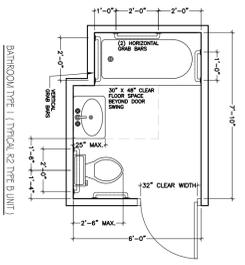
JOB NUMBER:  
401843617  
SHEET NO.: 2 OF 8

LEGEND	
	EXIST. WALL TO BE REMOVED
	EXIST. WALL TO BE REMAIN
	EXIST. 2 HR. FIRE RATED WALL
	C.M.U.
	BRICK
	INSULATION
	2 Hr. FIRE RATE WALL
	1 Hr. FIRE RATE WALL
	EXIT SIGN
	FLOOR DRAIN
	ELEVATION MARK
	EXHAUST FAN
	SMOKE & CARBON MONOXIDE DETECTOR
	NEW DOOR
	EXISTING DOOR
	2 HEAD EMERGENCY LIGHT
	3 HEAD EMERGENCY LIGHT

- 1" INSUL. LOW E. GLASS
- 1/4" TEMPERED GLASS (TYP.)
- 1/2" AIR SPACE (TYP.)
- 1/4" TEMPERED GLASS (TYP.)
- CLERK NON-TINTED GLASS

VENTILATION NOTE:  
 BOILER ROOM 400 CFM  
 BATHROOM 75 CFM  
 KITCHENETTE 150 CFM

NOTES:  
 BALCONY COMPLYING WITH ZR-2.10 EXCEPT FROM ZONING FLOOR AREA  
 - OPEN BALCONY WITH 3'-6" HIGH MET. RAILING.  
 - (57' + 51/12" + 5' + 57' + 51' = 50% < 67%  
 (72' + 51/12" + 5' + 72' + 51' = 50% < 67% OF THE  
 PERIMETER OF SUCH BALCONY IS ENCLOSED



2ND FL. FLOOR PLAN  
 SCALE = 3/32" = 1'-0"

**LAM & LAM**  
 ENGINEERING D.P.C.

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 1ST FLOOR  
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 TEL: 212 274 8833  
 FAX: 212 274 8889  
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 FLUSHING, NY 11354  
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 FAX: (718) 461-8838

SHEET NO.:	TITLE SHEET
A-001.00	CELLAR FLOOR PLAN
A-002.00	1ST FLOOR PLAN
A-003.00	2ND FLOOR PLAN
A-004.00	3RD FLOOR PLAN
A-005.00	4TH FLOOR PLAN
A-006.00	5TH FLOOR PLAN
A-007.00	6TH FLOOR PLAN
A-008.00	ROOF FLOOR PLAN

JOB SITE:  
 109-09 15TH AVENUE  
 COLLEGE POINT, QUEENS, NY

TITLE:  
 2ND FLOOR PLAN  
 LEGEND

SEAL & SIGNATURE	DATE: 12/18/2010
DRAWING BY: RL	CHECK BY: RL
DRAWING NO.:	<b>A-003.00</b>
SHEET NO.: 4 OF 8	
JOB NUMBER:	401843617



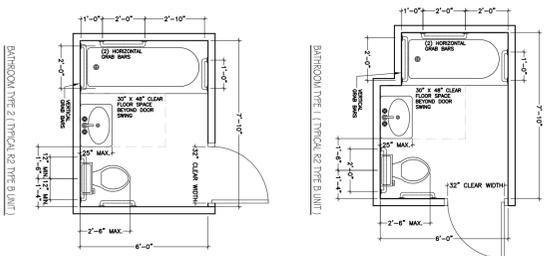
LEGEND	
	EXIST. WALL TO BE REMOVED
	EXIST. WALL TO BE REMAIN
	EXIST. 2 HR. FIRE RATED WALL
	C.M.U.
	BRICK
	INSULATION
	2 HR. FIRE RATE WALL
	1 HR. FIRE RATE WALL
	EXIT SIGN
	FLOOR DRAIN
	ELEVATION MARK
	EXHAUST FAN
	SMOKE & CARBON MONOXIDE DETECTOR
	NEW DOOR
	EXISTING DOOR
	2 HEAD EMERGENCY LIGHT
	3 HEAD EMERGENCY LIGHT

- 1" INSUL. LOW E. GLASS
- 1/4" TEMPERED GLASS (TYP)
- 1/2" AIR SPACE (TYP)
- 1/4" TEMPERED GLASS (TYP)
- CLEAR NON-TINTED GLASS

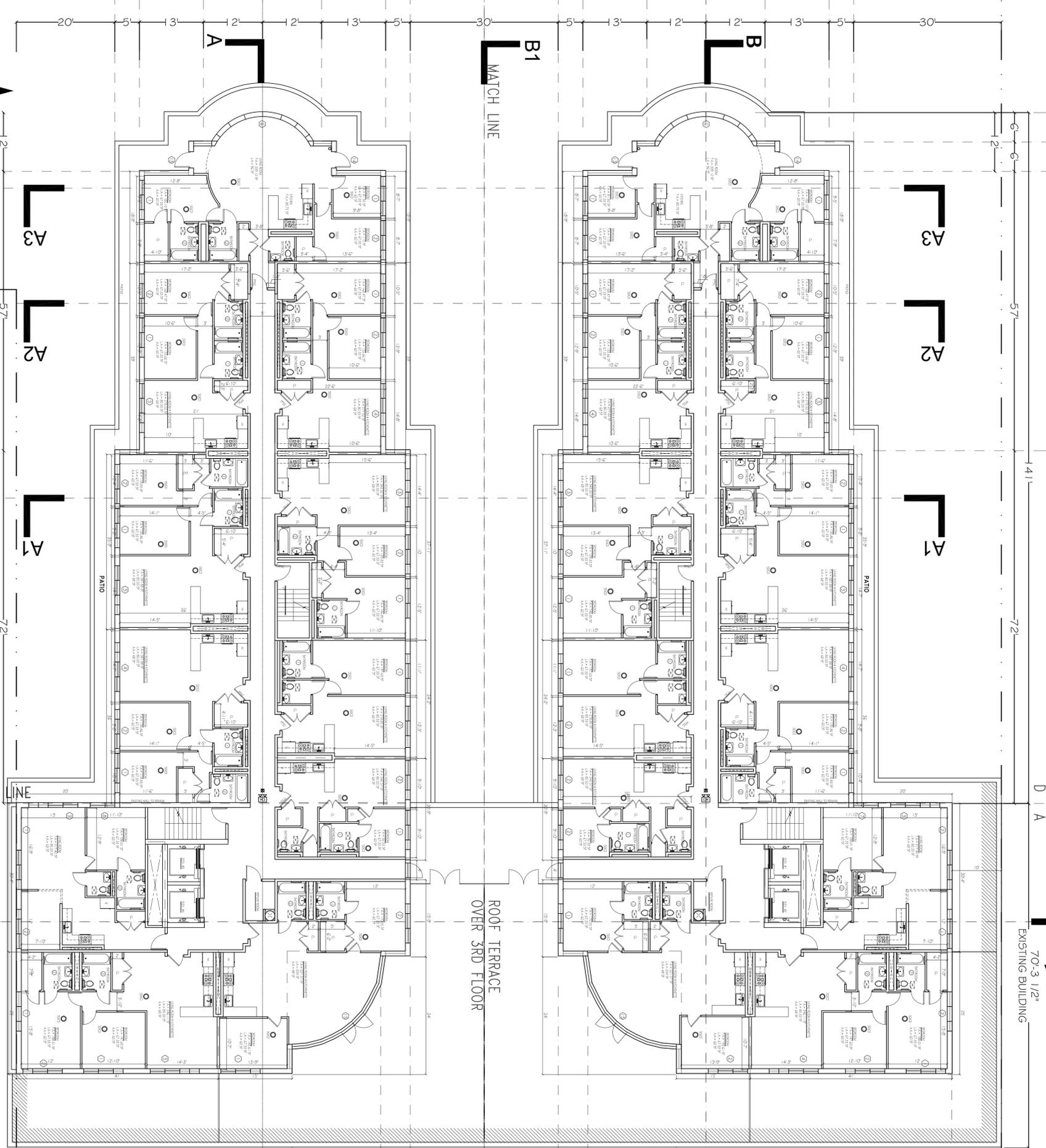
VENTILATION NOTE:

BOILER ROOM 400 CFM  
 BATHROOM 75 CFM  
 KITCHENETTE 150 CFM

NOTES:  
 BALCONY COMPLYING WITH ZR-2.10 EXCEPT FROM ZONING FLOOR AREA  
 - OPEN BALCONY WITH 3'-6" HIGH MET. RAILING.  
 - 157' + 51/157" + 5' + 57" + 51' = 50% < 67%  
 - 72' + 51/172" + 5' + 72' + 51' = 50% < 67% OF THE PERIMETER OF SUCH BALCONY IS ENCLOSED



4TH FL. FLOOR PLAN  
 SCALE = 3/32" = 1'-0"



50 ALLEN STREET  
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 NY NY 10002  
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 FAX: (718) 461-8838

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A-001.00	CELLAR FLOOR PLAN
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A-003.00	2ND FLOOR PLAN
A-004.00	3RD FLOOR PLAN
A-005.00	4TH FLOOR PLAN
A-006.00	5TH FLOOR PLAN
A-007.00	6TH FLOOR PLAN
A-008.00	ROOF FLOOR PLAN

JOB SITE:  
 109-09 15TH AVENUE  
 COLLEGE POINT, QUEENS, NY

TITLE:  
 4TH FLOOR PLAN  
 LEGEND

SEAL & SIGNATURE  
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 CHECK BY: RL  
 DRAWING NO.:  
**A-005.00**  
 SHEET NO.: 5 OF 8

JOB NUMBER:  
 401843617

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FLUSHING, NY 11354  
TEL: (718) 461-8833  
FAX: (718) 461-8838

SHEET NO.:	TITLE SHEET
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A-002.00	1ST FLOOR PLAN
A-003.00	2ND FLOOR PLAN
A-004.00	3RD FLOOR PLAN
A-005.00	4TH FLOOR PLAN
A-006.00	5TH FLOOR PLAN
A-007.00	6TH FLOOR PLAN
A-008.00	ROOF FLOOR PLAN

**JOB SITE:**

109-09 15TH AVENUE  
COLLEGE POINT, QUEENS, NY

**TITLE:**  
5TH FLOOR PLAN  
LEGEND

SEAL & SIGNATURE	DATE: 12/18/2010
DRAWING BY: RL	
CHECK BY: RL	
DRAWING NO.:	<b>A-006.00</b>
SHEET NO.:	6 OF 8
JOB NUMBER:	401843617

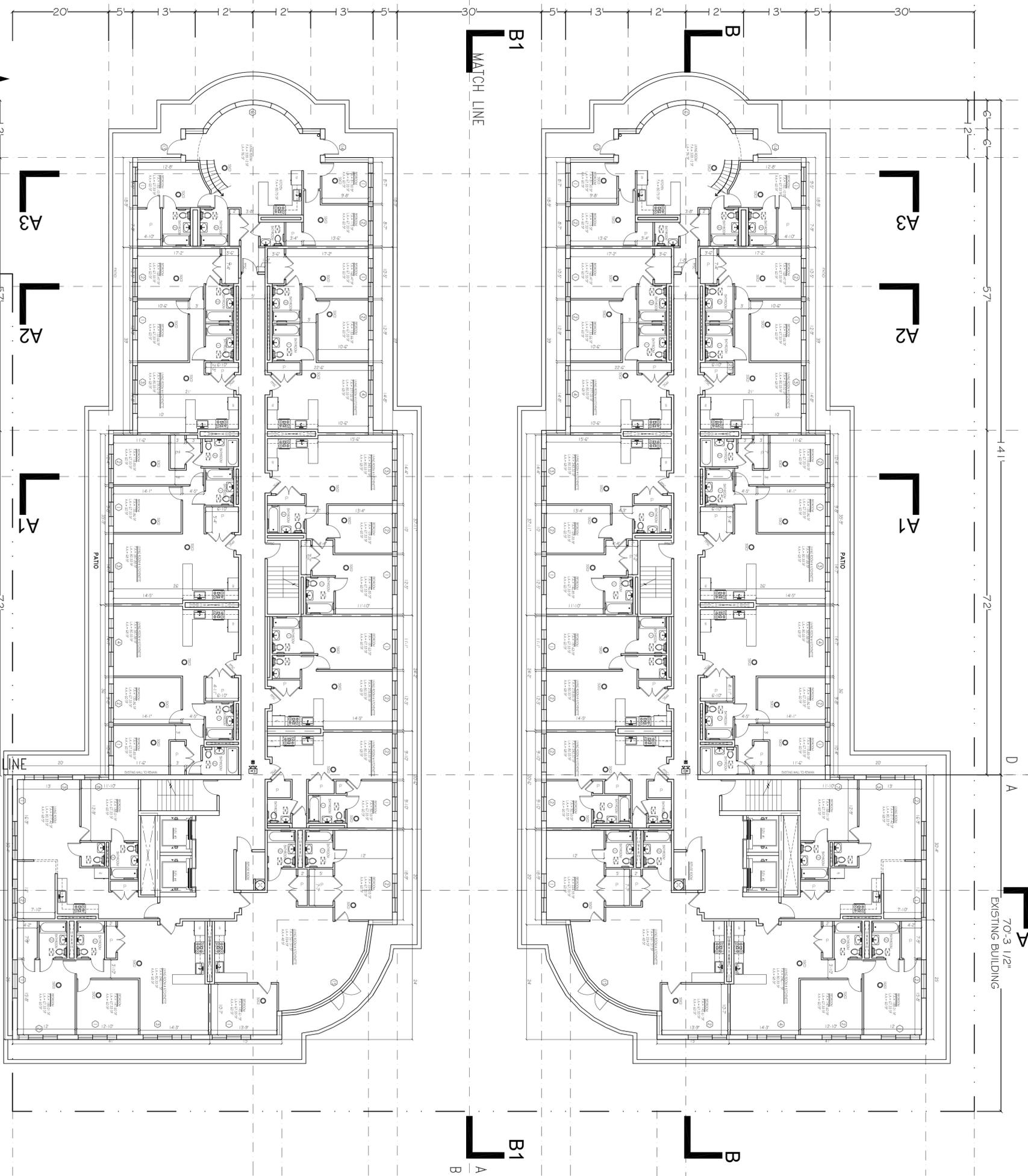
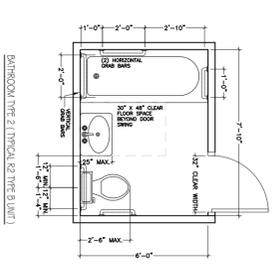
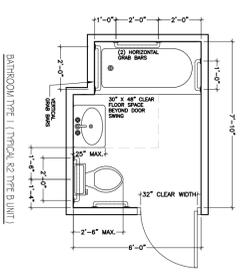
**LEGEND**

	EXIST. WALL TO BE REMOVED
	EXIST. WALL TO BE REMAIN
	EXIST. 2 HR. FIRE RATED WALL
	C.M.U.
	BRICK
	INSULATION
	2 Hr. FIRE RATE WALL
	1 Hr. FIRE RATE WALL
	EXIT SIGN
	FLOOR DRAIN
	ELEVATION MARK
	EXHAUST FAN
	SMOKE & CARBON MONOXIDE DETECTOR
	NEW DOOR
	EXISTING DOOR
	2 HEAD EMERGENCY LIGHT
	3 HEAD EMERGENCY LIGHT

- 1" INSUL. LOW E. GLASS
- 1/4" TEMPERED GLASS (TYP.)
- 1/2" AIR SPACE (TYP.)
- 1/4" TEMPERED GLASS (TYP.)
- CLEAR NON-TINTED GLASS

**VENTILATION NOTE:**  
BOILER ROOM 400 CFM  
BATHROOM 75 CFM  
KITCHENETTE 150 CFM

**NOTES:**  
BALCONY COMPLYING WITH RC-1.2.10 EXCEPT FROM ZONING FLOOR AREA  
- OPEN BALCONY WITH 3'-6" HIGH MET. RAILING.  
- (57' + 51' / 57' + 5' + 57' + 51' = 50% < 67%  
- (72' + 51' / 72' + 5' + 72' + 51' = 50% < 67% OF THE PERIMETER OF SUCH BALCONY IS ENCLOSED

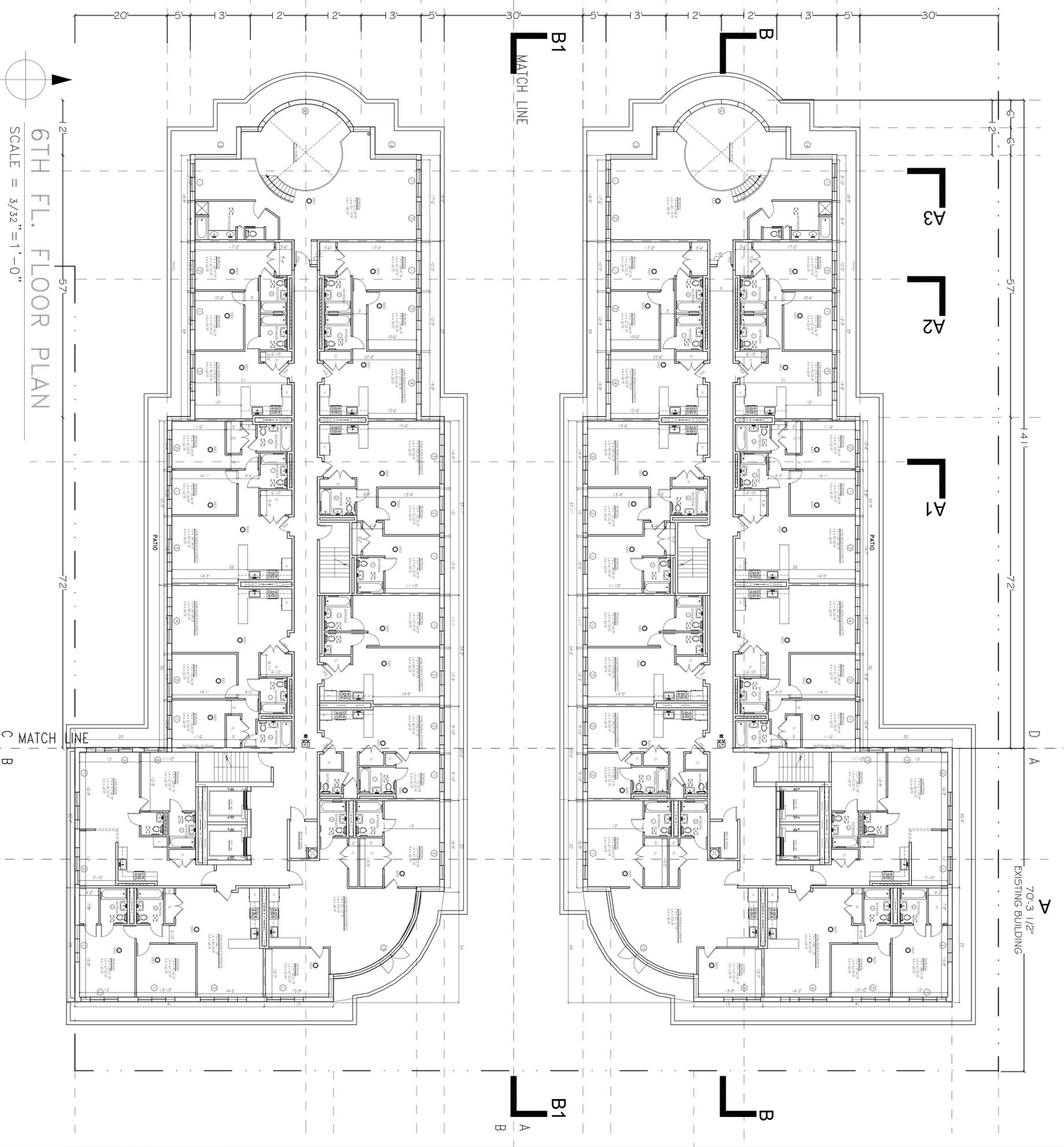
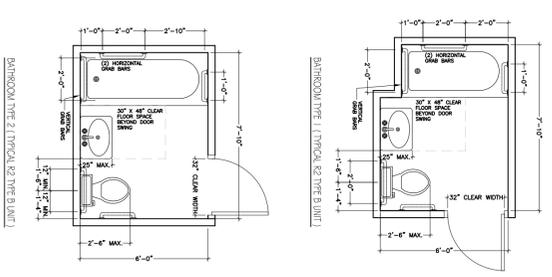


**5TH FL. FLOOR PLAN**  
SCALE = 3/32" = 1'-0"

LEGEND	
	EXIST. WALL TO BE REMOVE
	EXIST. WALL TO BE REMAIN
	EXIST. 2 HR. FIRE RATED WALL
	C.M.U.
	BRICK
	INSULATION
	2 Hr. FIRE RATE WALL
	1 Hr. FIRE RATE WALL
	EXIT SIGN
	FLOOR DRAIN
	ELEVATION MARK
	EXHAUST FAN
	SMOKE & CARBON MONOXIDE DETECTOR
	NEW DOOR
	EXISTING DOOR
	2 HEAD EMERGENCY LIGHT
	3 HEAD EMERGENCY LIGHT

- 1 INSUL. LOW E GLASS
- 1/4" TEMPERED GLASS (TPG)
- 1/2" AIR SPACE (TPG)
- 1/4" TEMPERED GLASS (TPG)
- CLEAR NON-TINTED GLASS

VENTILATION NOTE:  
 BOILER ROOM 400 CFM  
 BATHROOM 75 CFM  
 KITCHENETTE 150 CFM



**LAM & LAM**  
 ENGINEERING D.P.C.

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SHEET NO.:	TITLE SHEET
A-001.00	CELLAR FLOOR PLAN
A-002.00	1ST FLOOR PLAN
A-003.00	2ND FLOOR PLAN
A-004.00	3RD FLOOR PLAN
A-005.00	4TH FLOOR PLAN
A-006.00	5TH FLOOR PLAN
A-007.00	6TH FLOOR PLAN
A-008.00	ROOF FLOOR PLAN

JOB SITE:

109-09 15TH AVENUE  
 COLLEGE POINT, QUEENS, NY

TITLE:  
 6TH FLOOR PLAN  
 LEGEND

SEAL & SIGNATURE

DATE: 12/18/2010  
 DRAWING BY: RL  
 CHECK BY: RL  
 DRAWING NO.:  
**A-007.00**

SHEET NO.: 7 OF 8

JOB NUMBER:  
 401843617

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FAX: (718) 461-8838

SHEET NO.:	TITLE SHEET
A-001.00	CELLAR FLOOR PLAN
A-002.00	1ST FLOOR PLAN
A-003.00	2ND FLOOR PLAN
A-004.00	3RD FLOOR PLAN
A-005.00	4TH FLOOR PLAN
A-006.00	5TH FLOOR PLAN
A-007.00	6TH FLOOR PLAN
A-008.00	ROOF FLOOR PLAN

**JOB SITE:**

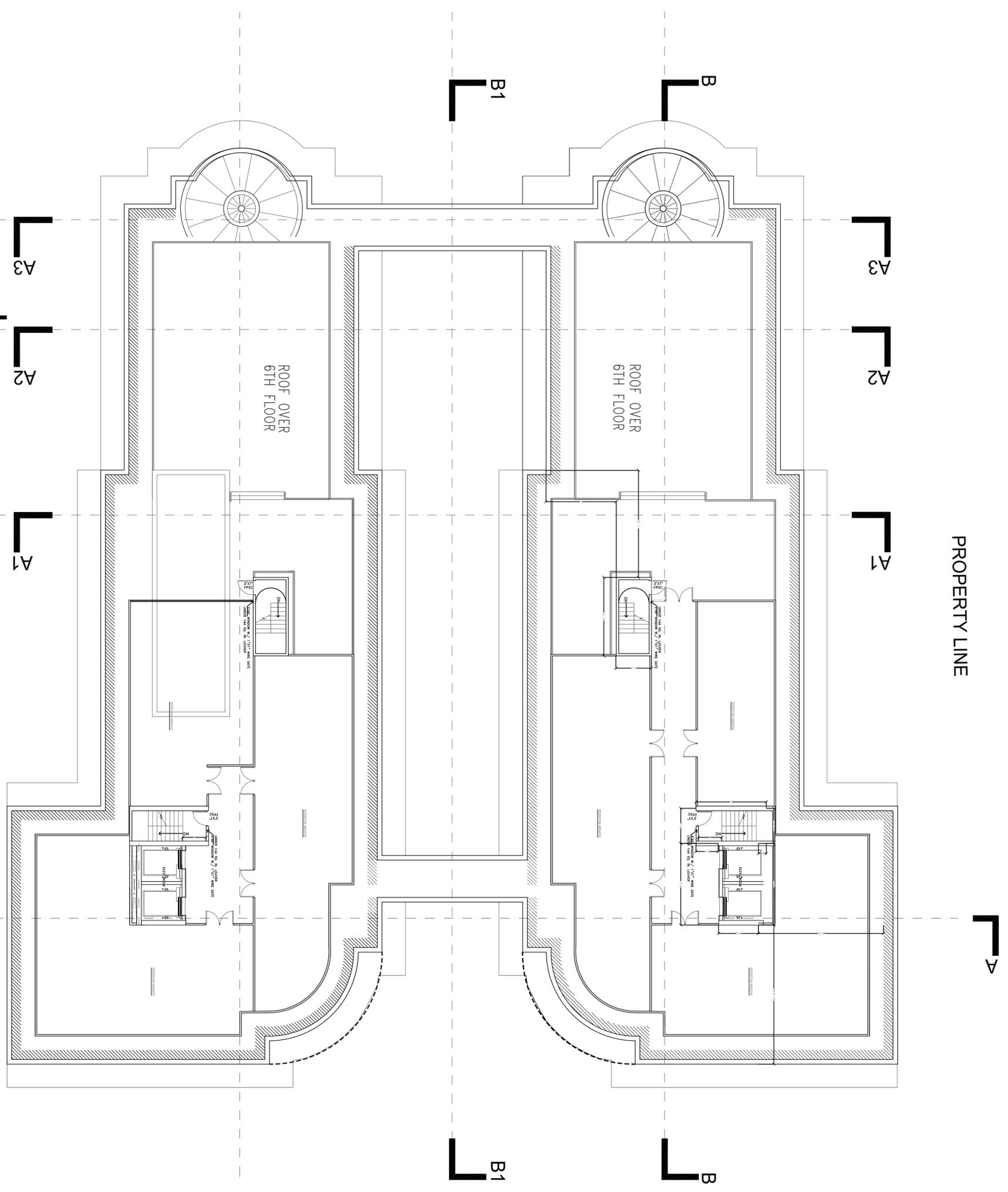
109-09 15TH AVENUE  
COLLEGE POINT, QUEENS, NY

**TITLE:**  
ROOF FLOOR PLAN  
**LEGEND**

SEAL & SIGNATURE	DATE: 12/18/2010
DRAWING BY: RL	CHECK BY: RL
DRAWING NO.:	<b>A-008.00</b>
SHEET NO.: 8 OF 8	
JOB NUMBER:	401843617

LEGEND	
	EXIST. WALL TO BE REMOVE
	EXIST. WALL TO BE REMAIN
	EXIST. 2 HR. FIRE RATED WALL
	C.M.U.
	BRICK
	INSULATION
	2 HR. FIRE RATE WALL
	1 HR. FIRE RATE WALL
	EXIT SIGN
	FLOOR DRAIN
	ELEVATION MARK
	EXHAUST FAN
	SMOKE & CARBON MONOXIDE DETECTOR
	NEW DOOR
	EXISTING DOOR
	2 HEAD EMERGENCY LIGHT
	3 HEAD EMERGENCY LIGHT

- 1" INSUL. LOW E. GLASS
  - 1/4" TEMPERED GLASS (TPG)
  - 1/2" AIR SPACE (TPG)
  - 1/4" TEMPERED GLASS (TPG)
  - CLEAR NON-TINTED GLASS
- VENTILATION NOTE:  
BOILER ROOM 400 CFM  
BATHROOM 75 CFM  
KITCHENETTE 150 CFM



ROOF FLOOR PLAN  
SCALE = 3/32" = 1'-0"

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FLUSHING, NY 11354  
TEL: (718) 461-8833  
FAX: (718) 461-8838

SHEET NO.:	TITLE SHEET
A-201.00	FRONT & REAR ELEVATIONS
A-202.00	NORTH & SOUTH ELEVATIONS
A-203.00	NORTH & SOUTH INNER ELEVATIONS
A-204.00	CROSS SECTION B
A-205.00	CROSS SECTION A3
A-206.00	CROSS SECTION A2
A-207.00	CROSS SECTION A1
A-208.00	CROSS SECTION A
A-209.00	CROSS SECTION B1

JOB SITE:

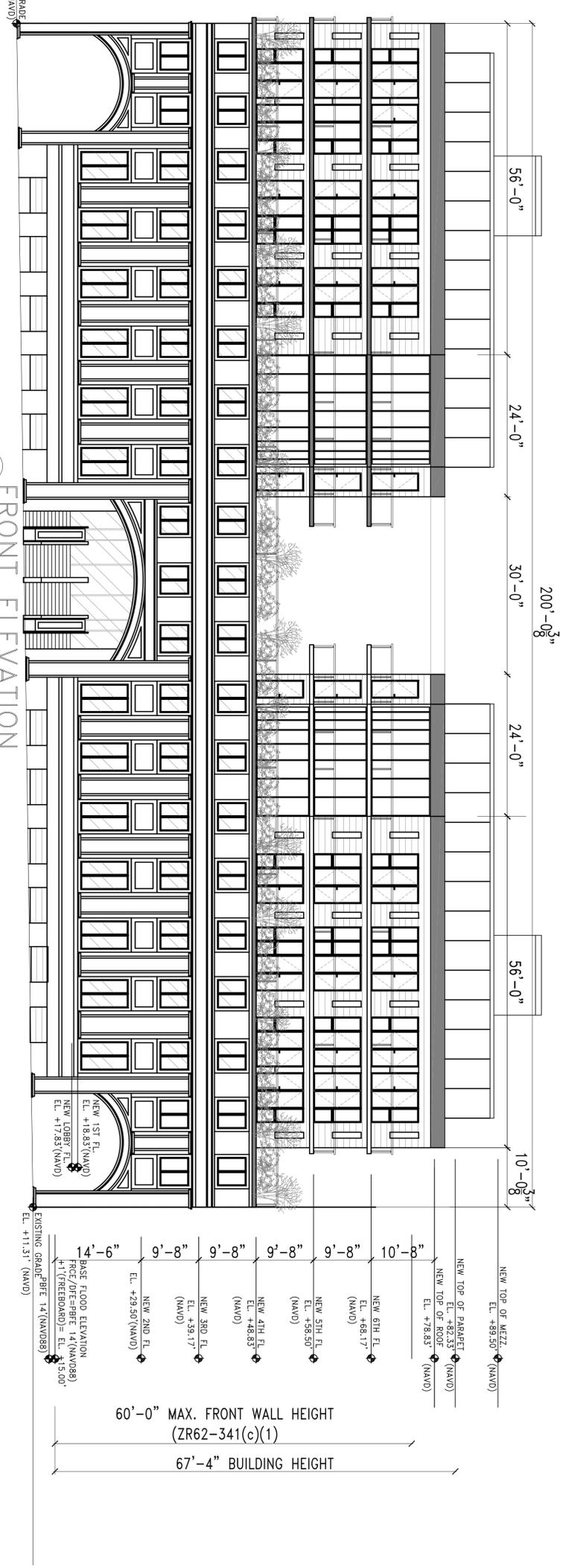
109-09 15TH AVENUE  
COLLEGE POINT, QUEENS, NY

TITLE:  
FRONT ELEVATION  
REAR ELEVATION

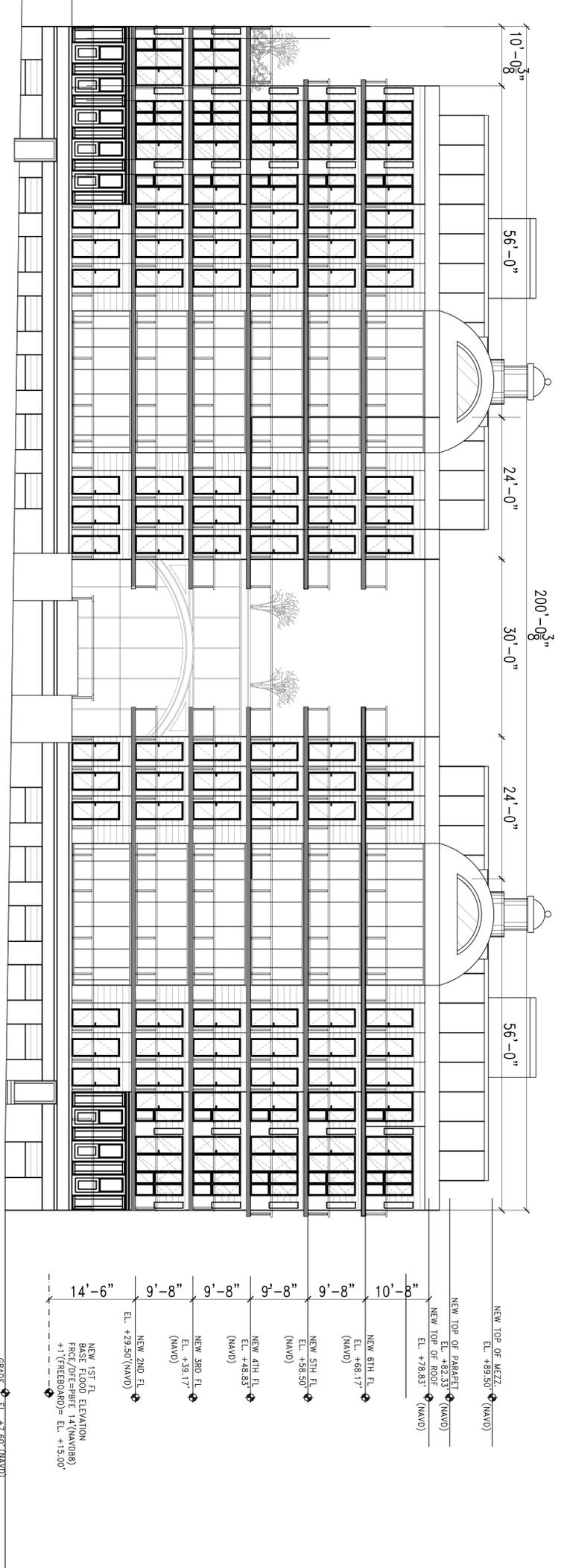
SEAL & SIGNATURE  
DATE: 2/28/2012  
DRAWING BY: R.L.  
CHECK BY: R.L.

DRAWING NO.:  
**A-201.00**

JOB NUMBER:  
401843617  
SHEET NO.: 11 OF 26



1 FRONT ELEVATION  
SCALE = 3/32" = 1'-0"

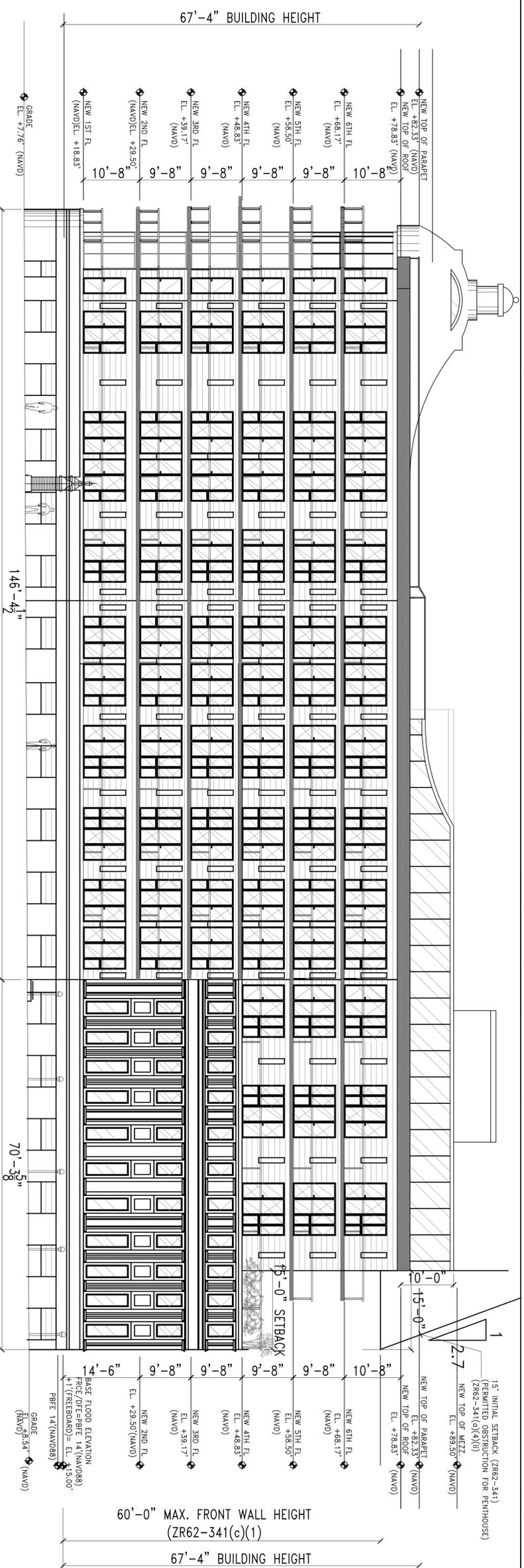


1 REAR ELEVATION  
SCALE = 3/32" = 1'-0"

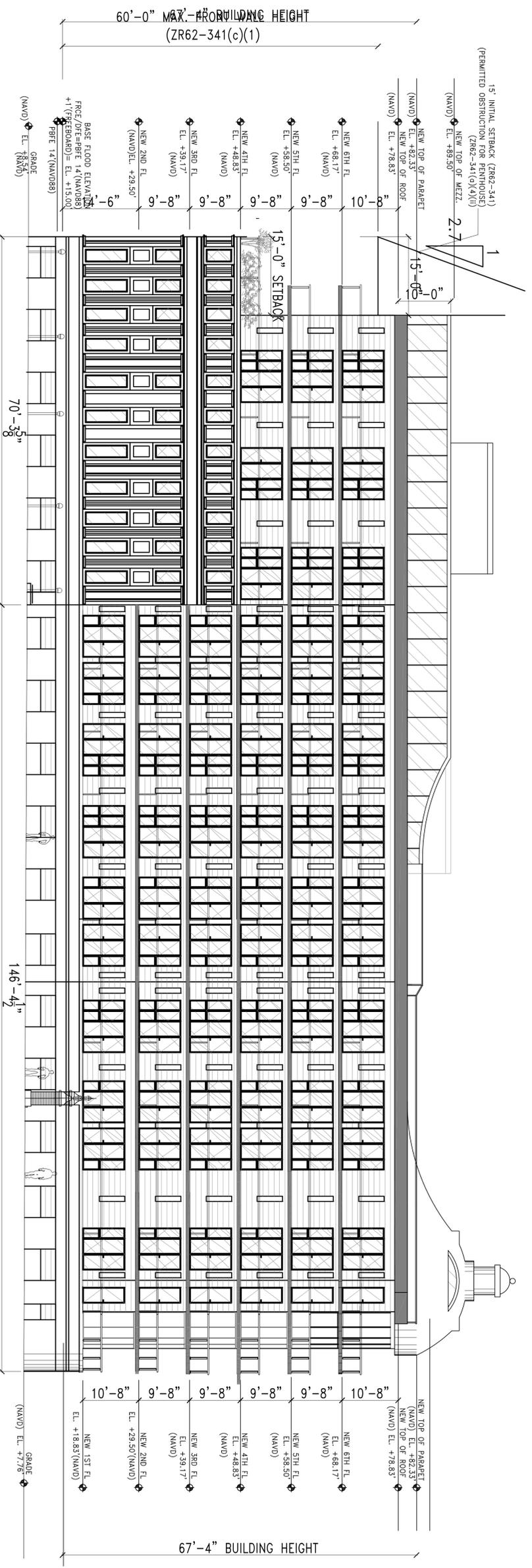
GRADE EL. +10.52'

NEW 1ST FL. (NAV)  
EL. +18.83'

GRADE EL. +7.60' (NAV)



1 SOUTH ELEVATION  
SCALE = 3/32" = 1'-0"



2 NORTH ELEVATION  
SCALE = 3/32" = 1'-0"

**LAM & LAM**  
ENGINEERING D.P.C.

50 ALLEN STREET  
1ST FLOOR  
NY NY 10002

TEL: 212 274 8833  
FAX: 212 274 8889  
INFO@LAMANDLAM.COM

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SHEET NO.:	TITLE SHEET
A-201.00	FRONT & REAR ELEVATIONS
A-202.00	NORTH & SOUTH ELEVATIONS
A-203.00	NORTH & SOUTH INNER ELEVATIONS
A-204.00	CROSS SECTION B
A-205.00	CROSS SECTION A3
A-206.00	CROSS SECTION A2
A-207.00	CROSS SECTION A1
A-208.00	CROSS SECTION A
A-209.00	CROSS SECTION B1

JOB SITE:  
  
109-09 15TH AVENUE  
COLLEGE POINT, QUEENS, NY

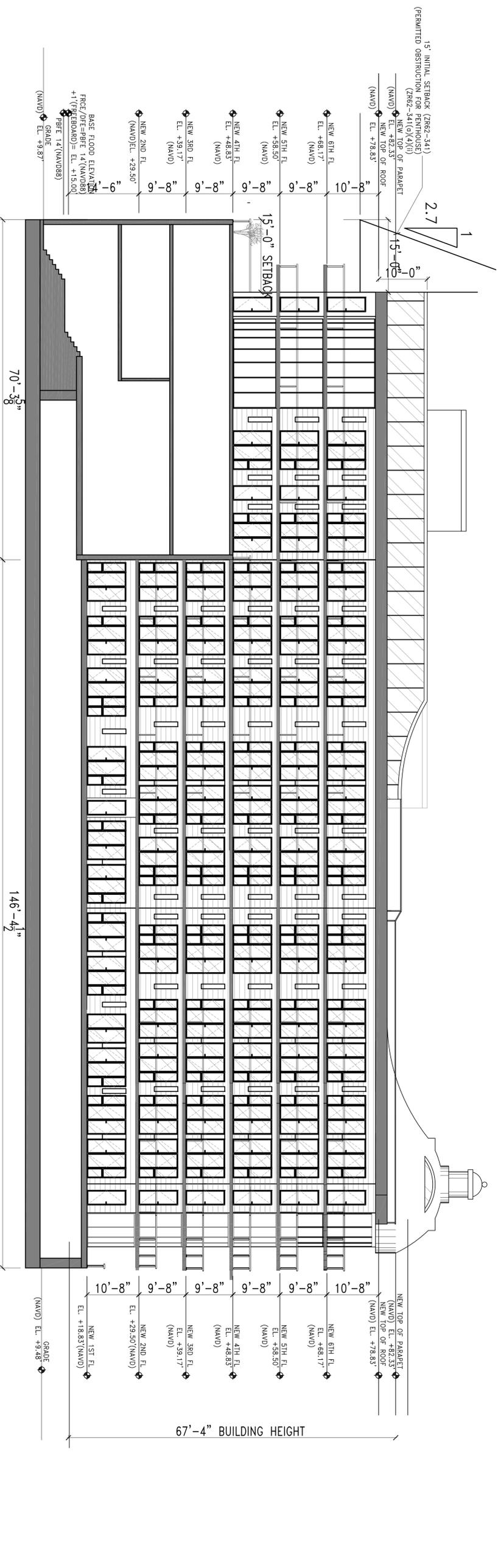
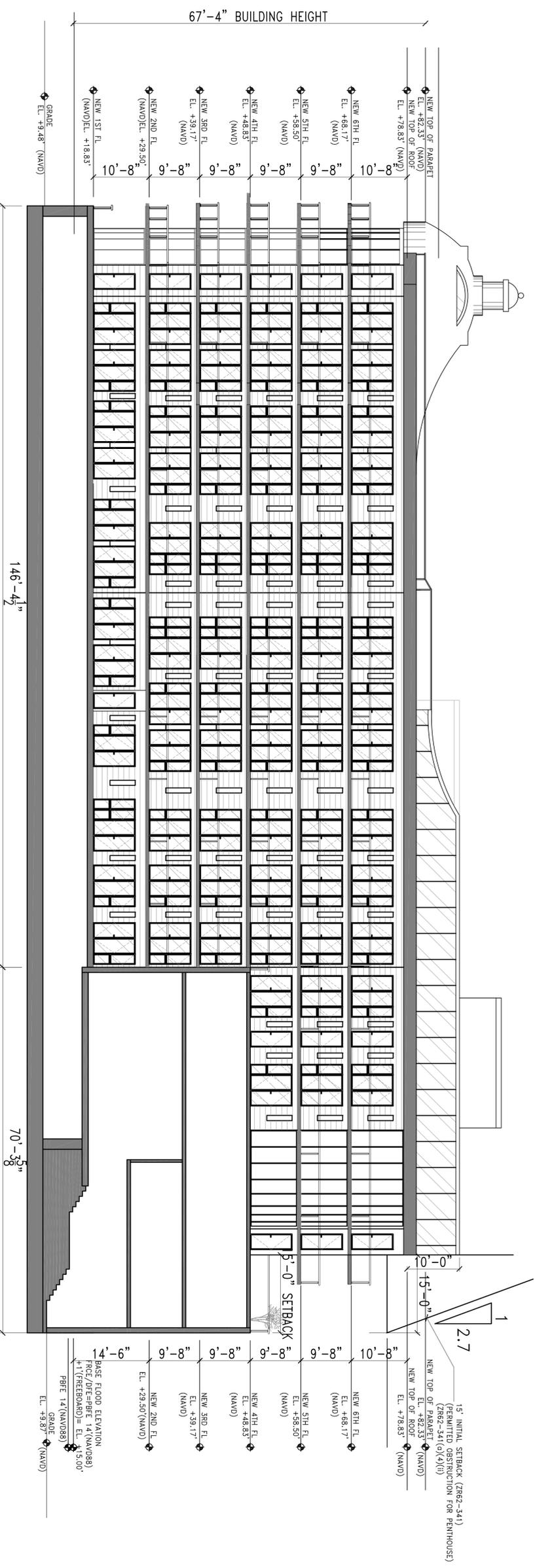
TITLE:  
SOUTH ELEVATION  
NORTH ELEVATION

SEAL & SIGNATURE  
DATE: 12/18/2010  
DRAWING BY: R.L.  
CHECK BY: R.L.

DRAWING NO.:  
**A-202.00**

SHEET NO.: 12 OF 26

JOB NUMBER:  
**401843617**



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A-207.00	CROSS SECTION A1
A-208.00	CROSS SECTION A
A-209.00	CROSS SECTION B1

JOB SITE:  
109-09 15TH AVENUE  
COLLEGE POINT, QUEENS, NY

TITLE:  
SOUTH INNER ELEVATION  
NORTH INNER ELEVATION

SEAL & SIGNATURE

DATE: 12/18/2010

DRAWING BY: R.L.

CHECK BY: R.L.

DRAWING NO.:

**A-203.00**

SHEET NO.: 13 OF 26

JOB NUMBER:  
**401843617**

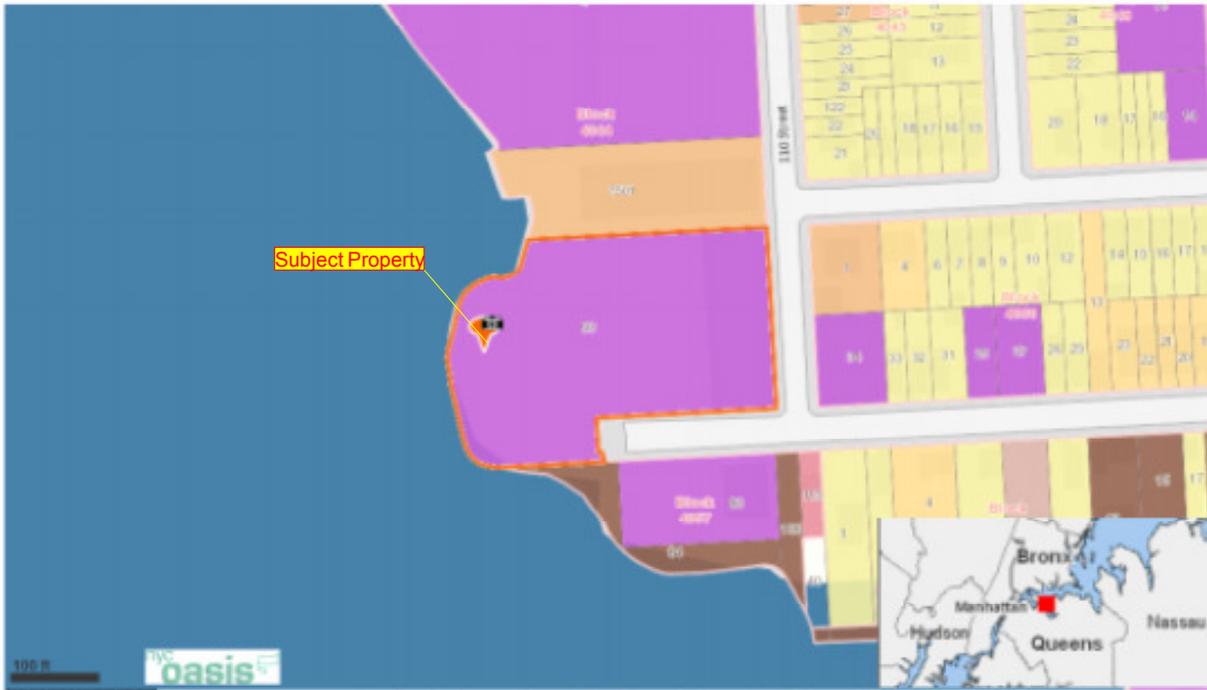
**FIGURE 4: SURROUNDING LAND USAGE**

# Surrounding Land Use



## Legend

- Transit, Roads, Reference Features**
  - Roads, ferries, commuter rail, neighborhood names
  - Roads
  - Major Roads
  - Interstate Highways
  - Tunnels
  - NYC subway routes and stations
  - Neighborhood/Town Labels
  - County Boundaries
  - Ferry
  - Commuter Rail
- Parks, Playgrounds, & Open Space**
  - Parks & Public Lands
  - Forested Areas (NJ)
  - Community Gardens
  - School property with garden
  - Playgrounds
  - Green Spaces Along Streets
  - Golf Courses
  - Baseball/Soccer/Football Fields
  - Tennis/Basketball/Handball Courts &
  - Tracks
  - Cemeteries
- Land Use**
  - Block/Lot Boundaries
  - (Building footprints in gray)
  - 1 & 2 Family Residential
  - Multi-family Residential
  - Mixed Use
  - Open space & outdoor recreation
  - Commercial
  - Institutions
  - Industrial
  - Parking
  - Transportation / Utilities
  - Vacant Lots



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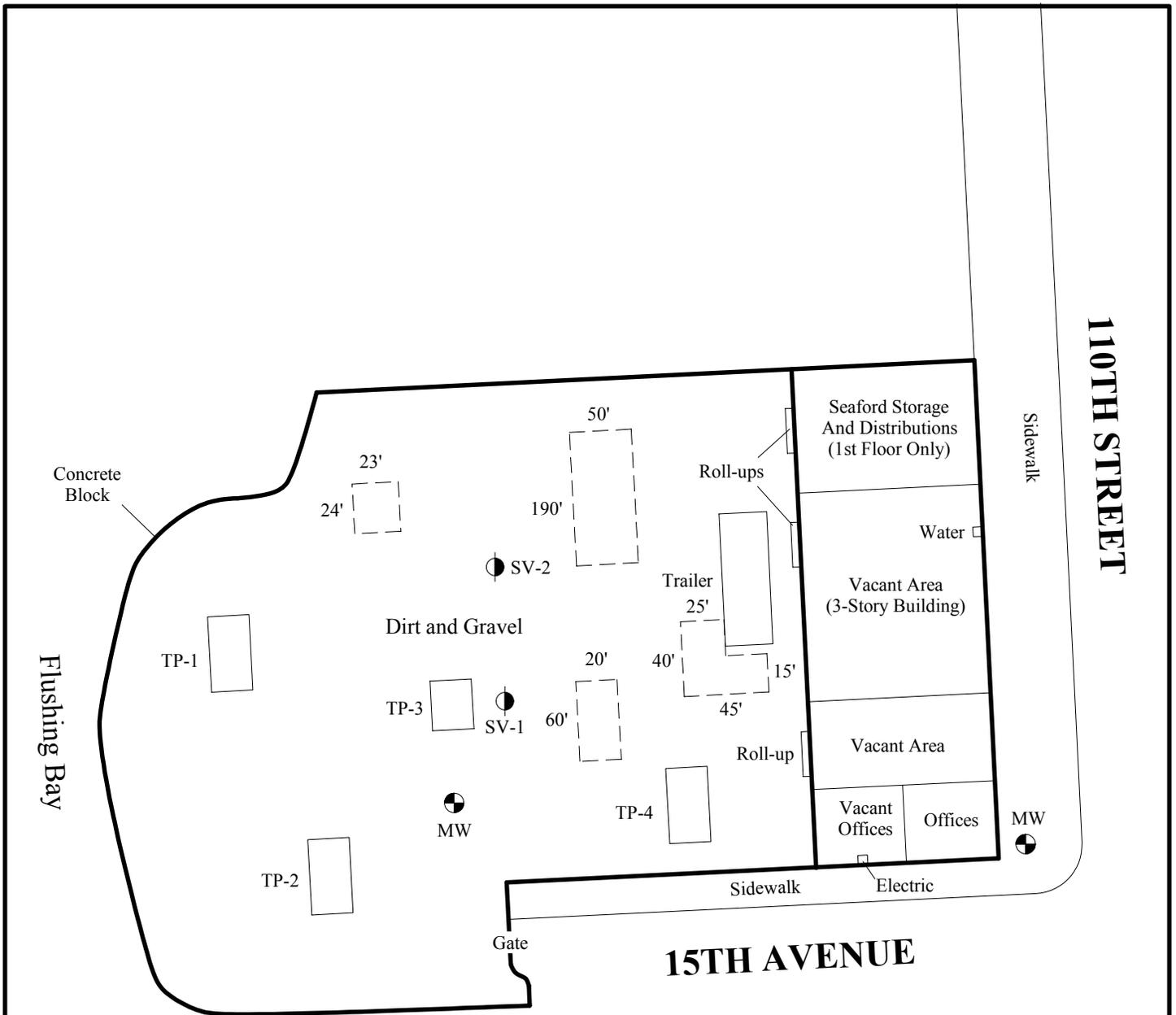
Source: oasis.net/map

(Not all items in the legend may be visible on the map.)



Surrounding Land Use Diagram	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 7233-CPNY	Figure No.: 4
Date: 12/03/2014	Scale: Not To Scale

**FIGURE 5: SAMPLING DIAGRAM**



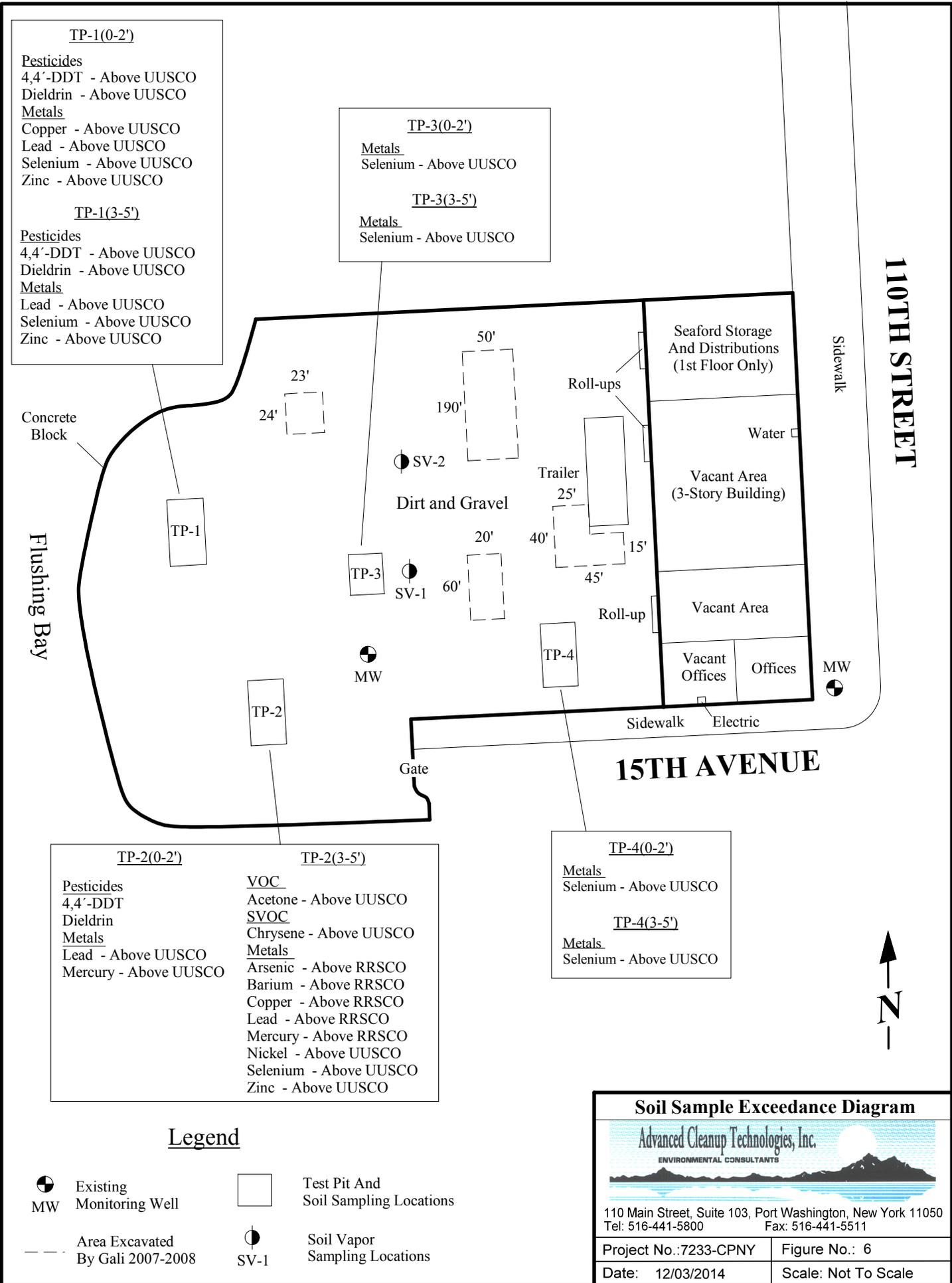
Legend

-  Existing Monitoring Well
-  Area Excavated By Gali 2007-2008
-  Test Pit And Soil Sampling Locations
-  Soil Vapor Sampling Locations



<b>Sampling Diagram</b>	
	
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Project No.: 7233-CPNY	Figure No.: 5
Date: 12/03/2014	Scale: Not To Scale

**FIGURE 6: SAMPLING POINT EXCEEDENCE DIAGRAMS**



TP-1(0-2')  
Pesticides  
 4,4'-DDT - Above UUSCO  
 Dieldrin - Above UUSCO  
Metals  
 Copper - Above UUSCO  
 Lead - Above UUSCO  
 Selenium - Above UUSCO  
 Zinc - Above UUSCO

TP-1(3-5')  
Pesticides  
 4,4'-DDT - Above UUSCO  
 Dieldrin - Above UUSCO  
Metals  
 Lead - Above UUSCO  
 Selenium - Above UUSCO  
 Zinc - Above UUSCO

TP-3(0-2')  
Metals  
 Selenium - Above UUSCO

TP-3(3-5')  
Metals  
 Selenium - Above UUSCO

TP-2(0-2')  
Pesticides  
 4,4'-DDT  
 Dieldrin  
Metals  
 Lead - Above UUSCO  
 Mercury - Above UUSCO

TP-2(3-5')  
VOC  
 Acetone - Above UUSCO  
SVOC  
 Chrysene - Above UUSCO  
Metals  
 Arsenic - Above RRSCO  
 Barium - Above RRSCO  
 Copper - Above RRSCO  
 Lead - Above RRSCO  
 Mercury - Above RRSCO  
 Nickel - Above UUSCO  
 Selenium - Above UUSCO  
 Zinc - Above UUSCO

TP-4(0-2')  
Metals  
 Selenium - Above UUSCO

TP-4(3-5')  
Metals  
 Selenium - Above UUSCO

**Legend**

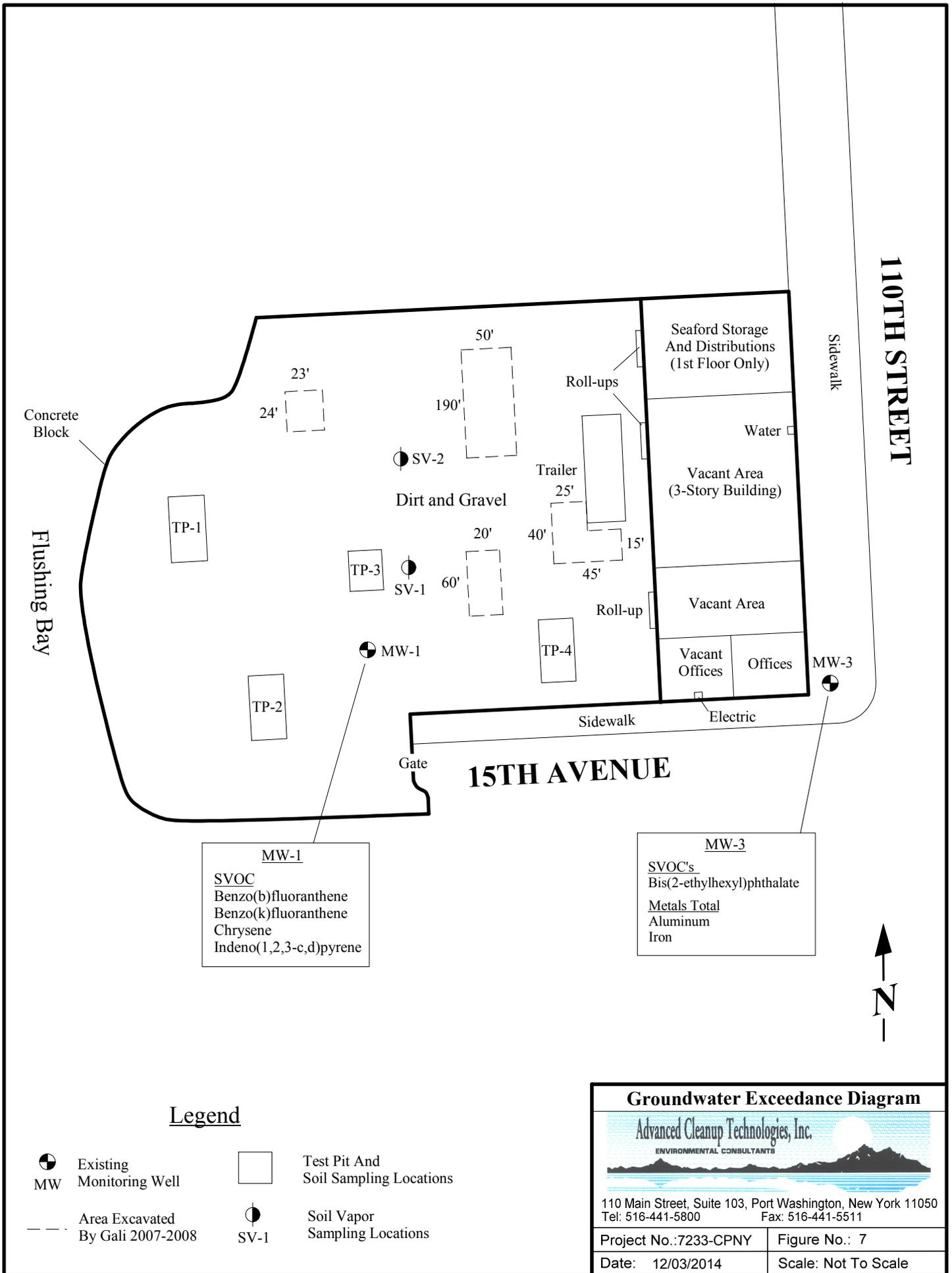
- Existing Monitoring Well
- Test Pit And Soil Sampling Locations
- Area Excavated By Gali 2007-2008
- Soil Vapor Sampling Locations

**Soil Sample Exceedance Diagram**

*Advanced Cleanup Technologies, Inc.*  
 ENVIRONMENTAL CONSULTANTS

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 Tel: 516-441-5800 Fax: 516-441-5511

Project No.: 7233-CPNY	Figure No.: 6
Date: 12/03/2014	Scale: Not To Scale



110TH STREET

Sidewalk

Seaford Storage  
And Distributions  
(1st Floor Only)

Water

Vacant Area  
(3-Story Building)

Dirt and Gravel

Trailer

Roll-ups

Vacant Area

Roll-up

Vacant  
Offices

Offices

MW-3

Sidewalk

Electric

15TH AVENUE

Gate

Flushing Bay

Concrete  
Block

MW-1  
SVOC  
Benzo(b)fluoranthene  
Benzo(k)fluoranthene  
Chrysene  
Indeno(1,2,3-c,d)pyrene

MW-3  
SVOC's  
Bis(2-ethylhexyl)phthalate  
Metals Total  
Aluminum  
Iron



Legend

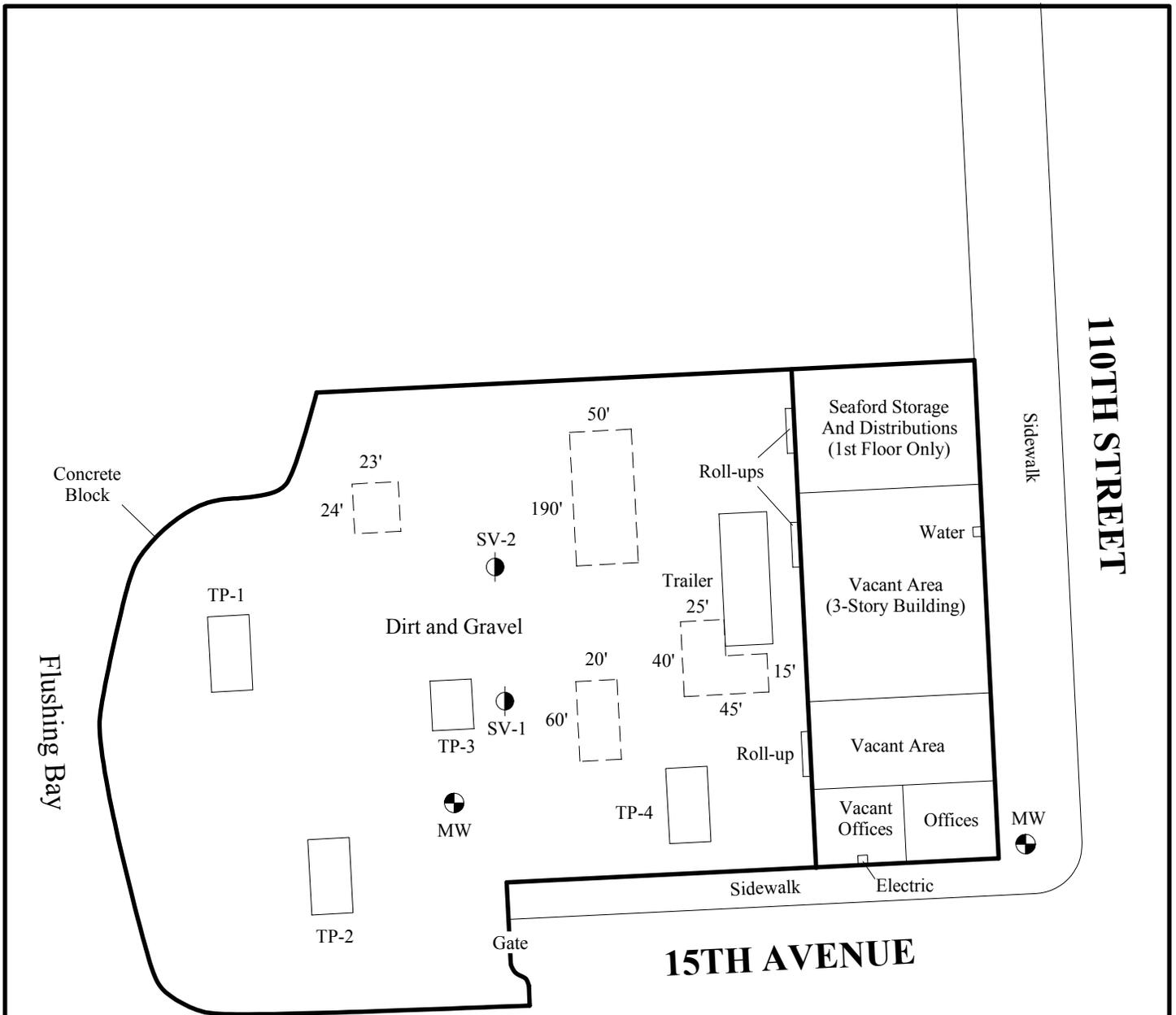
- Existing Monitoring Well
- Test Pit And Soil Sampling Locations
- Area Excavated By Gali 2007-2008
- Soil Vapor Sampling Locations

**Groundwater Exceedance Diagram**

*Advanced Cleanup Technologies, Inc.*  
ENVIRONMENTAL CONSULTANTS

110 Main Street, Suite 103, Port Washington, New York 11050  
Tel: 516-441-5800 Fax: 516-441-5511

Project No.: 7233-CPNY	Figure No.: 7
Date: 12/03/2014	Scale: Not To Scale



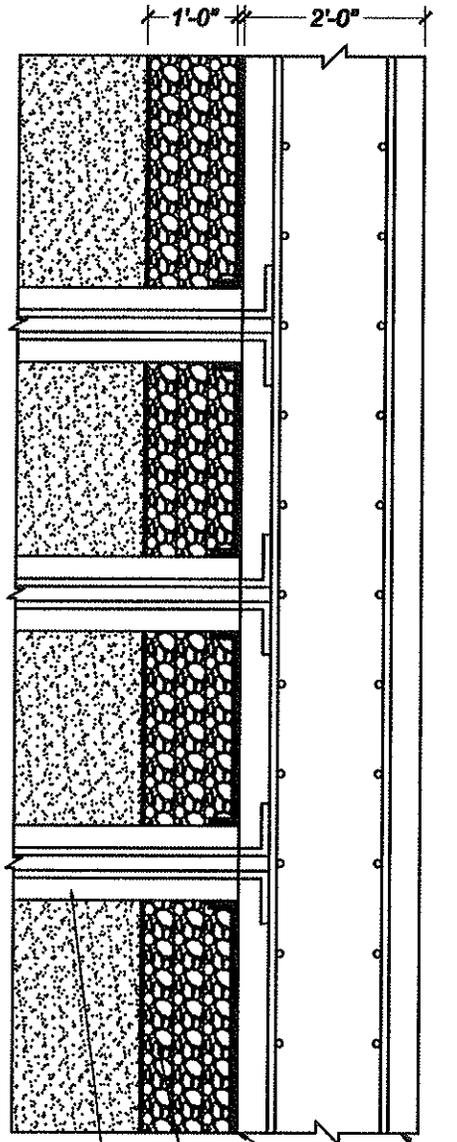
Legend

-  Existing Monitoring Well
-  Area Excavated By Gali 2007-2008
-  Test Pit And Soil Sampling Locations
-  Soil Vapor Sampling Locations



<b>Soil Vapor Exceedance Diagram</b>	
	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 7233-CPNY	Figure No.: 8
Date: 12/03/2014	Scale: Not To Scale

**FIGURE 7: VAPOR BARRIER SPECIFICATIONS/CERTIFICATION**



24" THICK MAT FOUNDATION

20 MIL VAPOR BARRIER STEGO OR EQUIVALENT LIQUID BOOT TO BE SUPPLIED FOR PENETRATIONS

TYPICAL 1 1/2" GRAVEL LAYER FOR DEPRESSURIZATION

TYPICAL 1'0" AUGER CAST PILE

JOB NO.		109-09 15TH AVE, COLLEGE POINT, NY
DATE 1/2/15		
SCALE NTS	DRAWN BY DJA	KINGS USA GROUP, INC.
CHECKED BY WT	DESIGNED BY RG	

1/2/2015 1:26:10 PM

SEAL



# STEGO® WRAP VAPOR BARRIER

ASTM E 1745 Class A-B-C Compliant

## STEGO® WRAP VAPOR BARRIER

is made with our proven trade secret blend of prime virgin resins and additives. Stego Wrap Vapor Barrier is an ASTM E 1745 Class A Vapor Barrier (Below 0.01 perms). We focus on producing a product that will maintain its extremely low permeance for the life of a building. The protection of Stego Wrap Vapor Barrier provides the flexibility to change flooring types and overall building use without worrying about below-slab moisture vapor.

### FEATURES & BENEFITS

**Unsurpassed Permeance Characteristics**

**Life of the Building Protection**

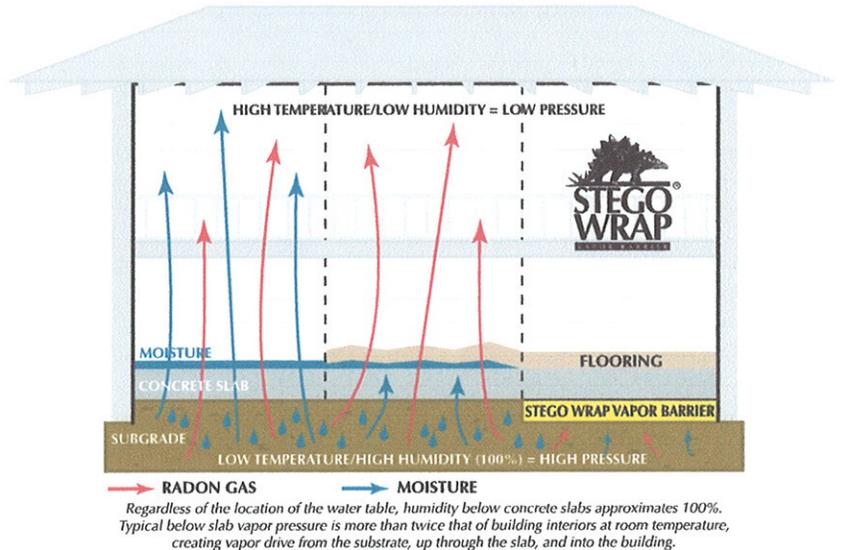
**Exceptional Tear and Puncture Resistance**

**Easy, Reliable Installation**

**Competitively Priced**

**Available Nationwide**

**Local Support**



### THE STEGO® ADVANTAGES

#### **SUPERIOR DEFENSE Against Floor Failures:**

Experts say "the need for a vapor barrier (as opposed to a vapor retarder) is becoming increasingly clear." Concrete Construction Magazine, August 2003, p.18.

Infiltration of moisture through concrete slabs is a major building defect liability. Stego Wrap Vapor Barrier has an extremely low permeance preventing water vapor, soil gases (i.e. Radon), alkaline salts and soil sulfates from compromising the integrity of the building envelope and leading to serious problems with the concrete slab, floor coverings and indoor air quality. Stego Wrap Vapor Barrier is the best protection against these costly failures.

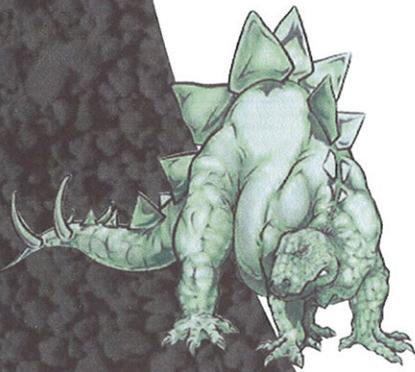
#### **MOLD PREVENTION:**

Mold needs three things to survive: moisture, sustained temperature (between 50° and 122° F), and a food source (dust, drywall, etc.). In any given building environment, contractors can only control one of these variables: moisture. Mold spores are present in 100% of building interiors. If moisture is allowed into your building environment, mold can and will grow. Toxic molds like *Stachybotrys* can be fatal for nearly 5% of people (Institute of Medicine 1993), and cause a variety of serious health problems in others. Several recent well-publicized cases involving toxic mold have resulted in multimillion-dollar insurance settlements. Many of the nation's leading Insurance companies have severely limited or removed coverage for mold claims fearing that these claims will bankrupt their companies. Now more than ever, it is critically important that extra attention be paid to preventing the intrusion of moisture vapor from your below-slab environment. Stego Wrap Vapor Barrier offers the level of protection that many architects are now seeking and is considered to be inexpensive insurance against these costly failures.

#### **LONGEVITY AND STRENGTH:**

Stego Wrap Vapor Barrier is NOT made with recycled materials and will not degrade. Prime, virgin resins are the key. Molecules within Stego Wrap "interlock" to provide strength, durability and unprecedented resistance to moisture vapor and radon gas. Stego Wrap's puncture resistance is excellent. Stego Wrap will not tear, crack, flake, snag or puncture, even when 18,000 lb. laser-screed machines are driving directly across the barrier (see the reverse side for Stego Wrap Vapor Barrier's specifications).

Stego Industries, LLC • San Clemente, CA  
Tel: 949-257-4100 • Toll Free: 877-464-7834 • Fax: 949-257-4113  
[www.stegoindustries.com](http://www.stegoindustries.com)





## Stego Wrap Vapor Barrier - Not Just For Retarding Water Vapor

It's no secret that Stego Wrap Vapor Barrier has been used as an effective barrier against water vapor for the last 10+ years. It has been the most widely specified and installed high-performance vapor barrier for the better part of a decade. What you may not know is that Stego's unique blend of virgin, prime resins combined with our proprietary extrusion methods yields a membrane that has been used in applications where sulfates, methane, radon, chlorinated solvents, hydrocarbons, etc. are an issue. When severe conditions exist that call for the need of a warranted product/system, there is no substitute for the peace of mind that comes with a guaranteed installation. However, when the conditions are such that you decide that a warranted system isn't required, then, Stego Wrap Vapor Barrier might be used in order to recognize potentially significant cost savings. When might Stego Wrap Vapor Barrier be used? That decision is entirely up to the design professional. However, we have given you a great start...

To determine if Stego Wrap Vapor Barrier fits the needs of your next brownfield project, please review the attached tests we have conducted. They include a simulated dry cleaning brownfield (chlorinated solvents), a simulated service station or fuel spill brownfield (BTEX), a severe sulfate contamination site, as well as standard tests for methane and radon.

Stego Wrap Vapor Barrier has been used as a successful membrane in many of the above situations. Since there are no standards in place for acceptable levels of degradation and permeation of many of the brownfield chemicals, the use of Stego Wrap in these situations has been up to the design professional. As discussed above, we now have a nice catalogue of tests to help you decide if Stego Wrap is right for your next brownfield project. Please let us know if you have any questions.

Regards,

Joe Marks  
Director of Engineering  
Stego Industries



### Setup:

To simulate a dry-cleaning brownfield site, a senior chemist at a research and testing lab prepared contaminated water to contain 3600 ppb perchloroethylene (PCE), 12500 PPB trichloroethylene (TCE), 16200 PPB CIS-1,2-dichloroethylene (C-DCE), AND 1700 PPB trans-1,2-dichloroethylene (T-DCE). Two liters of this mixture were placed in a 49 cm x 23.5 cm wide by 27 cm tall chamber. ASTM 20-30 sand was added to the vessel until it was 5 cm above the original water line. At this level, the sand was damp with no free standing water. Stego Wrap Vapor Barrier was placed on top of the damp sand, and the entire surface of the vapor barrier was weighted down with sand-filled plastic bags to ensure full contact of the Stego Wrap with the damp sand. The test vessel was covered and sealed. After 30 days of exposure under ambient laboratory conditions (21-25 °C), the samples were removed for evaluation.

In English now- We took an actual soils report from an old dry cleaning site and recreated the conditions, sort of. In the actual scenario the water table was 20 feet below the vapor barrier. In our setup we created a contaminated water table just 2 *inches* below Stego Wrap Vapor Barrier. After a 30 day exposure we examined the material via mass and volume changes as well as tested it for water vapor permeance.

### Results:

#### Mass and Volume:

The chemist conducted mass and volume measurements before and after exposure. The following comes directly from her report: *“Almost all of the test coupons exhibited slight changes in mass and volume, no matter what their exposure conditions were. Statistical analysis by t-test showed that the changes for the pollutant-exposed coupons were not significantly different from the changes for the control-exposed coupons.”* In other words, Stego Wrap Vapor Barrier’s mass and volume were not significantly affected by the exposure.

#### Permeance:

The testing lab then sent exposed samples to the industry leader in permeation testing for post-exposure testing. The results were fantastic. The permeance of Stego Wrap Vapor Barrier stayed below the industry’s “Barrier” benchmark of 0.01 grain/(ft<sup>2</sup>\*hr\*inHg). At **0.0092 grain/(ft<sup>2</sup>\*hr\*inHg)**, Stego Wrap Vapor Barrier’s permeance rose no more than it does for the ASTM E 1745 prescribed conditioning tests (ASTM E 154 Sections 8,11,12, and 13).

We hope this information helps in your evaluation of using Stego Wrap in your next brownfield project.

If you have any questions about the above testing or the corresponding results, please contact Joe Marks, Director of Engineering at Stego Industries.

[joemarks@stegoindustries.com](mailto:joemarks@stegoindustries.com).



**Setup:**

To simulate a hydrocarbon contaminated brownfield site, a senior chemist at a research and testing lab prepared contaminated water to contain 1,000 ppb of each benzene, toluene, ethylbenzene, and xylene. This cocktail is commonly referred to as BTEX and represents hydrocarbons seen in many of today's brownfields. Two liters of this mixture were placed in a 49 cm x 23.5 cm wide by 27 cm tall chamber. ASTM 20-30 sand was added to the vessel until it was 5 cm above the original water line. At this level, the sand was damp with no free standing water. Two layers of Stego Wrap Vapor Barrier were placed on top of the damp sand, and the entire surface of the vapor barriers were weighted down with sand-filled plastic bags to ensure full contact of the Stego Wrap with the damp sand. The test vessel was covered and sealed. After 30 days of exposure under ambient laboratory conditions (21-25 °C), the samples were removed for evaluation.

In English now- We took relatively large amounts of often-seen hydrocarbons resulting from fuel spills and old service station sites and put them into a water table just two inches below a sample of Stego Wrap. This can be considered an extreme situation in that water tables are not typically that close to the slab and vapor barrier membrane. After a 30 day exposure we examined the material via mass and volume changes as well as tested it for water vapor permeance.

**Results:****Mass and Volume:**

The chemist conducted mass and volume measurements before and after exposure. The following comes directly from her report: *"Almost all of the test coupons exhibited slight changes in mass and volume, no matter what their exposure conditions were. Statistical analysis by t-test showed that the changes for the pollutant-exposed coupons were not significantly different from the changes for the control-exposed coupons."* In other words, Stego Wrap Vapor Barrier's mass and volume were not significantly affected by the exposure. So, physically, the Stego Wrap was virtually unaffected.

**Permeance:**

The testing lab then sent exposed samples to the industry leader in permeation testing for post-exposure testing. The results were fantastic. The layer in contact with the contaminated sand came out with a permeance right at the industry's barrier threshold of 0.01 perms. The top layer was completely unaffected by the exposure. The resulting permeance was 0.008 perms, the same as Stego Wrap Vapor Barrier's baseline permeance result.

We hope this information helps in your evaluation of using Stego Wrap in your next brownfield project.

If you have any questions about the test setup and/or results above, please contact Joe Marks, Director of Engineering at Stego Industries. [joemarks@stegoindustries.com](mailto:joemarks@stegoindustries.com).



## Stego Wrap Vapor Barrier Brownfield Testing – Sulfate Exposure

### Setup:

Two separate tests were conducted to measure Stego Wrap Vapor Barrier's ability to be used in sulfate-rich environments. They are described below:

**Test A – Sulfate Exposure.** To simulate the worst possible sulfate exposure, a senior chemist at a research and testing lab prepared water contaminated with 10,000 PPM of SO<sub>4</sub> (sulfate.) This sulfate concentration was chosen because it was rated as "very severe" (the highest or worst classification) by UC Berkeley professors conducting research for the Caltrans Long Life Pavement Rehabilitation Strategy (LLPRS) Program. The Chemist took this worst case scenario concentration and soaked samples of Stego in it for 28 days. Upon removal, the samples were analyzed for changes in mass, volume, tensile and water vapor permeation.

**Test B – Sulfate Permeation.** In addition, Stego Wrap 15-mil samples were tested for sulfate permeation. Measurements were taken at 24 hrs, 72hrs, 7 days, 2 weeks, 4 weeks, and 5 weeks of exposure.

### Test A Results:

#### Mass & Volume:

The chemist conducted mass and volume measurements before and after exposure. The following comes directly from her report: *"Almost all of the test coupons exhibited slight changes in mass and volume, no matter what their exposure conditions were. Statistical analysis by t-test showed that the changes for the pollutant-exposed coupons were not significantly different from the changes for the control-exposed coupons."* In other words, Stego Wrap Vapor Barrier's mass and volume were not significantly affected by the exposure.

#### Tensile:

The tensile strengths of the samples after the 28-day extreme sulfate exposure were 69.2 lbf/in and 74.2 lbf/in for cross and machine directions respectively. These results were no different than the water-exposed control samples. For another point of comparison, consider that to be labeled as Class A per ASTM E 1745, new-material tensile need only test at 45 lbf/in. Conclusion: Extreme sulfate exposure has little to no effect on Stego's physical integrity in below-slab applications.

#### Water Vapor Permeance:

The testing lab then sent exposed samples to the industry leader in permeation testing for post-exposure testing. The results were fantastic. The permeance stayed right at Stego Wrap Vapor Barrier's baseline permeance of 0.008 perm. Extreme sulfate exposure had no effect on Stego Wrap Vapor Barrier's ability to retard water vapor.

### Test B Results:

#### Sulfate Permeance:

No amount of sulfate was detected in *any* of the 6 readings during the permeation testing. Conclusion: Stego Wrap Vapor Barrier is also an excellent sulfate barrier.

We hope this information helps in your evaluation of using Stego Wrap in your next brownfield project.

If you have any questions regarding the test setups or results described above, please contact Joe Marks, Director of Engineering at Stego Industries. [joemarks@stegoindustries.com](mailto:joemarks@stegoindustries.com).



**STEGO® WRAP VAPOR BARRIER INDEPENDENT TEST RESULTS**



**COLOR:** YELLOW  
**THICKNESS:** 15-MILS  
**TYPE:** VAPOR BARRIER  
**ASTM E 1745:** CLASS A  
**COMPOSITION:** MULTI-LAYER EXTRUDED POLYOLEFIN MEMBRANE

PRODUCTION RUN TEST RESULTS PERFORMED/WITNESSED BY INDEPENDENT LABORATORIES:

DESCRIPTION	ASTM DESIGNATION	RESULT	UNITS
Puncture	D1709	2326.5	grams
Tensile (Machine Direction)	D882	85.58	lbf/in
Tensile (Transverse Direction)	D882	79.62	lbf/in
Permeance (Baseline)	F1249	0.0084	grain/ft <sup>2</sup> *hr*inHg
Permeance (After Wetting, Drying, Soaking)	E154 Section 8, F1249	0.0091	grain/ft <sup>2</sup> *hr*inHg
Permeance (After Heat Cond.)	E154 Section 11, F1249	0.0092	grain/ft <sup>2</sup> *hr*inHg
Permeance (After Low Temperature Cond.)	E154 Section 12, F1249	0.0089	grain/ft <sup>2</sup> *hr*inHg
Permeance (After Soil Organism Exposure)	E154 Section 13, F1249	0.0092	grain/ft <sup>2</sup> *hr*inHg
Methane Permeability	D 1434	7.54E-15	mol/m <sup>2</sup> *s*Pa
Radon Diffusion Coefficient	N/A	1.30E-13	m <sup>2</sup> /s
Coefficient of Kinetic Friction (Stego on Stego)	D 1894	0.27	-----
Coefficient of Static Friction (Stego on Stego)	D 1894	0.30	-----
Flame Spread	E 84	4.89	-----



**Kayla Rivers CSI**  
Northeast Regional Manager

**STEGO**  
INDUSTRIES, LLC

**Mobile: (617) 605-4590**  
**Fax: (949) 325-2083**

13 January 2015

Theresa Burkard  
Advanced Cleanup Technologies, Inc  
110 Main Street, Suite 103  
Port Washington, NY 11050

SUBJECT: Stego Wrap 20 mil Installation  
PROJECT: 109-09 15<sup>th</sup> Avenue, College Point, New York  
SITE ADDRESS: 109-09 15<sup>th</sup> Avenue, College Point, New York

Dear *Theresa*,

On 1/13/15, I was contacted and asked to write a letter regarding the suitability of using Stego Wrap 20 mil on the on the above-referenced project due to soil contaminates. We were provided with a recommended template for this letter.

Stego Wrap products have been used on numerous contaminated sites in the past. Included with this letter are test results we have conducted on Stego Wrap 15 mil for several simulated brownfield sites. We suggest you review the concentrations on your site versus the concentrations used in our testing. Please keep in mind that the results in this packet are for Stego Wrap 15 mil. We have not completed the tests for Stego Wrap 20 mil yet. Stego Wrap 20 mil is the same blend as Stego Wrap 15 mil but 33% thicker.

Ultimately, we cannot say definitively if Stego Wrap 20 mil is appropriate or not for your application. We can only provide our brownfield testing data as a means to provide more information for the design team to make a decision.

Thank you very much for your consideration of Stego products for your project. If you have any questions or concerns, please feel free to contact me at the above numbers or [kaylarivers@stegoindustries.com](mailto:kaylarivers@stegoindustries.com).

Sincerely,



Kayla Rivers  
Stego Industries, LLC

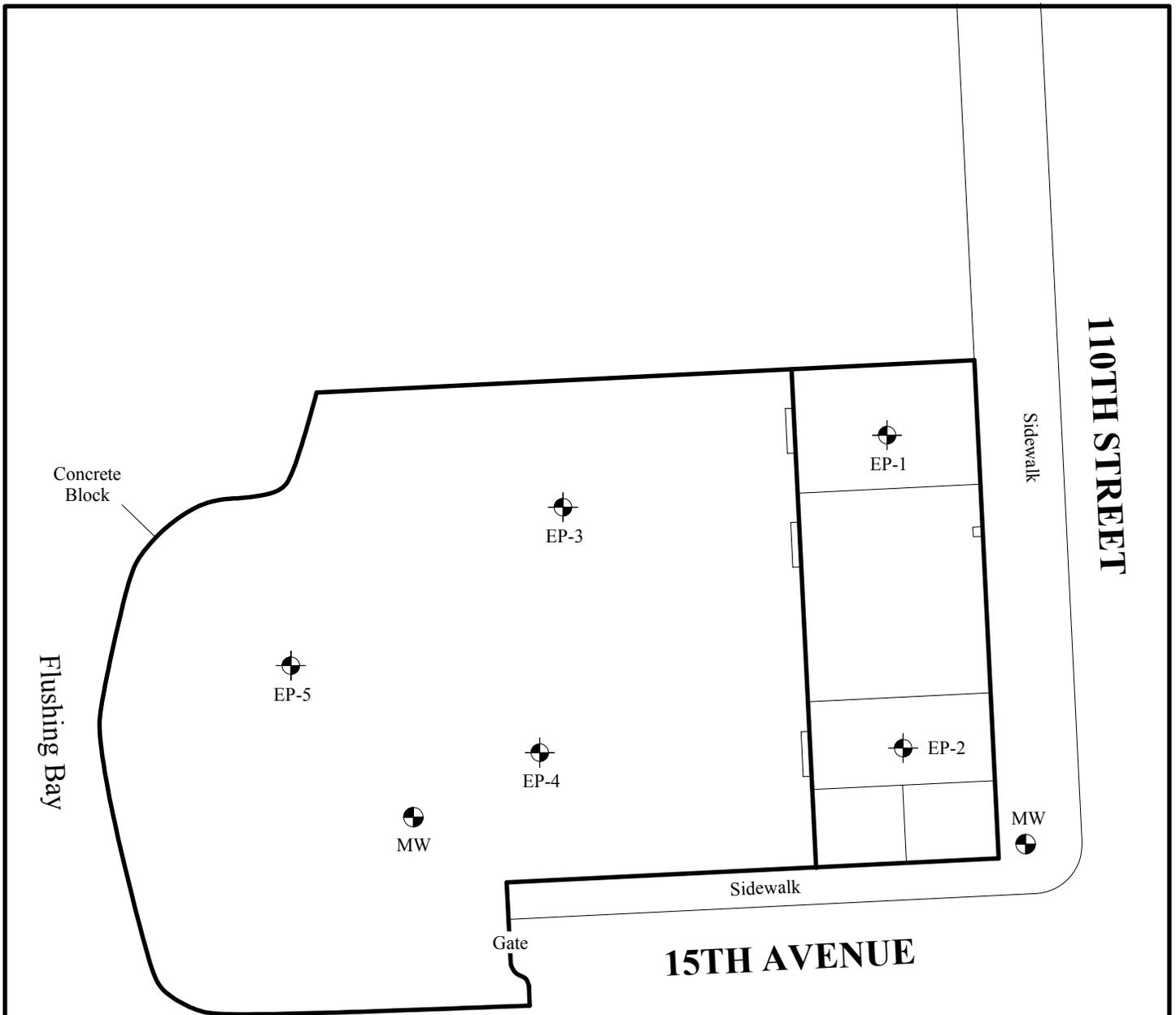
While Stego Industries uses ASTM E 1643 - *Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs* as a guide when reviewing project sites, Stego and their representatives are not licensed design professionals nor inspectors and are not involved in the product selection process. So, when visiting projects Stego representatives can only review the installation for general compliance with the installation portions of the standard. Because Stego does not perform the installation or place the concrete, Stego Industries assumes no liability for the selection or performance of the system, including but not limited to any materials placed beneath the Stego Wrap and/or Stego accessory products.

Corporate Headquarters: 216 Avenida Fabricante, Suite 101, San Clemente, CA 92672  
Phone: (949) 257-4100 Fax: (949) 257-4113 Toll Free: (877) GO-4-STEGO (877) 464-7834  
[www.stegoindustries.com](http://www.stegoindustries.com)

**FIGURE 8: ACTIVE SUB-SLAB DEPRESSURIZATION SYSTEM SPECIFICATIONS**



**FIGURE 9: ENDPPOINT SAMPLING LOCATION DIAGRAM**



Legend

-  Existing Monitoring Well
-  Proposed End Point Sampling Location



<b>Proposed End Point Sampling Diagram</b>	
	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 7233-CPNY	Figure No.: 9
Date: 01/13/2015	Scale: Not To Scale

**FIGURE 10: COMPOSITE COVER DIAGRAM**

**FIGURE 11: TRUCK ROUTE**

AND LOT  
 12,928  
 7,410  
 00338.18  
 WARD LOT  
 18,700  
 AL AREA  
 .038.18

LOT 60

SEAWARD LOT  
 28,700 SF

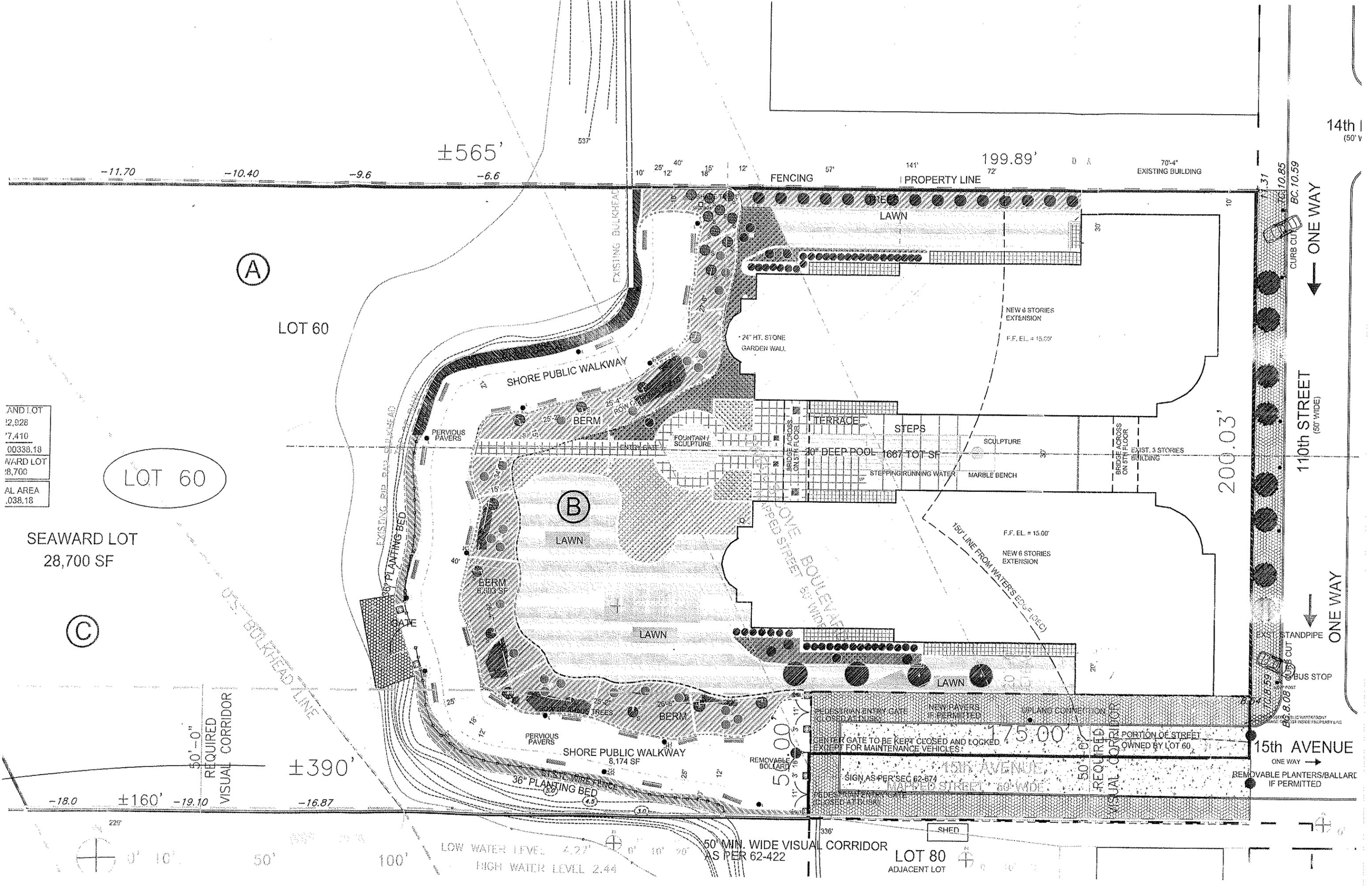
50'-0"  
 REQUIRED  
 VISUAL  
 CORRIDOR



LOW WATER LEVEL 4.27'  
 HIGH WATER LEVEL 2.44'

50' MIN. WIDE VISUAL CORRIDOR  
 AS PER 62-422

LOT 80  
 ADJACENT LOT



14th I (50' V)

ONE WAY

110th STREET (60' WIDE)

ONE WAY

EXST. STANDPIPE  
 CURB CUT  
 BUS STOP  
 POST

15th AVENUE ONE WAY

REMOVABLE PLANTERS/BALLARS  
 IF PERMITTED

(A)

(B)

(C)

LOT 60

200.03'

-11.70

-10.40

-9.6

-6.6

±565'

±390'

±160'

-16.87

199.89'

FENCING

PROPERTY LINE

EXISTING BUILDING

LAWN

SHORE PUBLIC WALKWAY

24" HT. STONE GARDEN WALL

NEW 6 STORIES EXTENSION  
F.F. EL. = 15.00'

PERVIOUS PAVERS

BERM

FOUNTAIN / SCULPTURE

TERRACE

STEPS

SCULPTURE

30" DEEP POOL 1667 TOT SF

STEPPING RUNNING WATER

MARBLE BENCH

BRIDGE ACROSS ON 5TH FLOOR

EXIST. 3 STORIES BUILDING

F.F. EL. = 15.00'

NEW 6 STORIES EXTENSION

LAWN

LAWN

LAWN

PERVIOUS PAVERS

SHORE PUBLIC WALKWAY 8,174 SF

36" PLANTING BED (4.5)

REMOVABLE BOLLARD

PEDESTRIAN ENTRY GATE  
 (CLOSED AT DUSK)  
 CENTER GATE TO BE KEPT CLOSED AND LOCKED  
 EXCEPT FOR MAINTENANCE VEHICLES

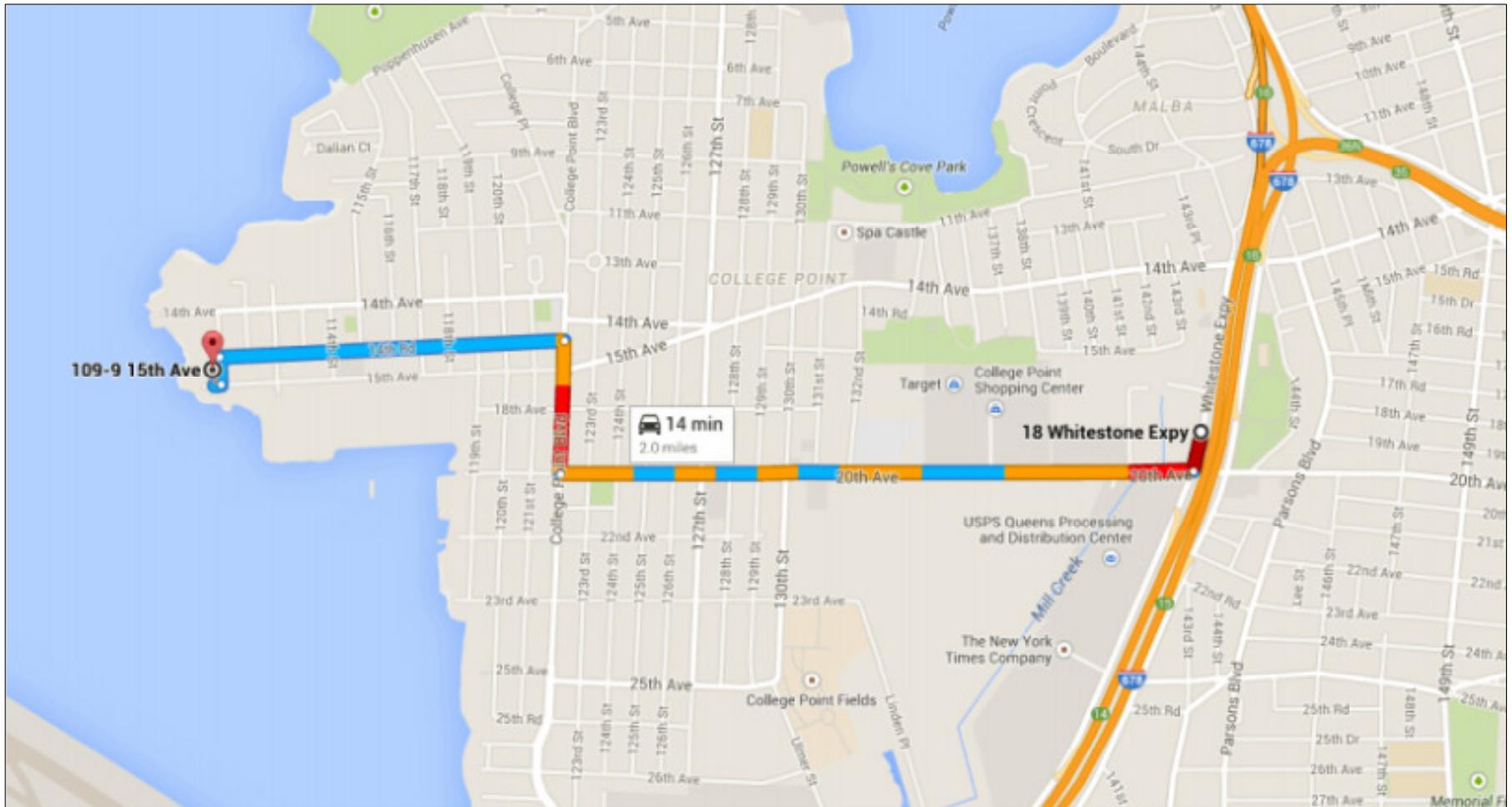
SIGN AS PER SEC 62-874

SHED

50'-0"  
 REQUIRED  
 VISUAL  
 CORRIDOR

PORTION OF STREET  
 OWNED BY LOT 60

REMOVABLE PLANTERS/BALLARS  
 IF PERMITTED



Source Google Maps



### Truck Route



110 Main Street, Suite 103, Port Washington, New York 11050  
 Tel: 516-441-5800 Fax: 516-441-5511

Project No.: 7233-CPNY	Figure No.: 11
Date: 01/13/2015	Scale: Not To Scale

**Table 1**  
**Volatile Organic Compounds in Soil (ug/kg-dry)**  
**EPA Method 8260**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard		TP-1 (0-2) 11/3/14	TP-1 (3-5) 11/3/14	TP-2 (0-2) 11/3/14	TP-2 (3-5) 11/3/14
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>				
1,1,1,2-Tetrachloroethane	NS	NS	<2.3	<2.6	<2.8	<3.2
1,1,1-Trichloroethane	680	100,000	<2.3	<2.6	<2.8	<3.2
1,1,2,2-Tetrachloroethane	NS	NS	<2.3	<2.6	<2.8	<3.2
1,1,2-Trichloro-1,2,2-trifluoroethane	NS	NS	<2.3	<2.6	<2.8	<3.2
1,1,2-Trichloroethane	NS	NS	<2.3	<2.6	<2.8	<3.2
1,1-Dichloroethane	270	26,000	<2.3	<2.6	<2.8	<3.2
1,1-Dichloroethene	330	100,000	<2.3	<2.6	<2.8	<3.2
1,2,4-Trichlorobenzene	NS	NS	<2.3	<2.6	<2.8	<3.2
1,2,4-Trimethylbenzene	4,700	5,200	<2.3	<2.6	<2.8	<3.2
1,2-Dibromo-3-chloropropane	NS	NS	<2.3	<2.6	<2.8	<3.2
1,2-Dibromoethane	NS	NS	<2.3	<2.6	<2.8	<3.2
1,2-Dichlorobenzene	1,100	100,000	<2.3	<2.6	<2.8	<3.2
1,2-Dichloroethane	20	3,100	<2.3	<2.6	<2.8	<3.2
1,2-Dichloropropane	NS	NS	<2.3	<2.6	<2.8	<3.2
1,3,5-Trimethylbenzene	4,700	5,200	<2.3	<2.6	<2.8	<3.2
1,3-Dichlorobenzene	2,400	49,000	<2.3	<2.6	<2.8	<3.2
1,4-Dichlorobenzene	1,800	13,000	<2.3	<2.6	<2.8	<3.2
1,4-Dioxane	980	1,300	<45	<52	<56	<65
2-Butanone	120	100,000	<2.3	<2.6	<2.8	<3.2
2-Hexanone	NS	NS	<2.3	<2.6	<2.8	<3.2
4-Methyl-2-pentanone	NS	NS	<2.3	<2.6	<2.8	<3.2
Acetone	50	100,000	<b>13</b>	<b>9.2</b>	<b>18</b>	<b>200</b>
Acrolein	NS	NS	<2.3	<2.6	<2.8	<3.2
Acrylonitrile	NS	NS	<2.3	<2.6	<2.8	<3.2
Benzene	60	4,800	<2.3	<2.6	<2.8	<3.2
Bromodichloromethane	NS	NS	<2.3	<2.6	<2.8	<3.2
Bromoform	NS	NS	<2.3	<2.6	<2.8	<3.2
Bromomethane	NS	NS	<2.3	<2.6	<2.8	<3.2
Carbon disulfide	NS	NS	<2.3	<2.6	<2.8	<3.2
Carbon tetrachloride	760	2,400	<2.3	<2.6	<2.8	<3.2
Chlorobenzene	1,100	100,000	<2.3	<2.6	<2.8	<3.2
Chloroethane	NS	NS	<2.3	<2.6	<2.8	<3.2
Chloroform	370	49,000	<2.3	<2.6	<2.8	<3.2
Chloromethane	NS	NS	<2.3	<2.6	<2.8	<3.2
cis-1,2-Dichloroethene	250	100,000	<2.3	<2.6	<2.8	<b>39</b>
cis-1,3-Dichloropropene	NS	NS	<2.3	<2.6	<2.8	<3.2
Dibromochloromethane	NS	NS	<2.3	<2.6	<2.8	<3.2
Dibromomethane	NS	NS	<2.3	<2.6	<2.8	<3.2
Dichlorodifluoromethane	NS	NS	<2.3	<2.6	<2.8	<3.2
Ethylbenzene	1,000	41,000	<2.3	<2.6	<2.8	<3.2
Hexachlorobutadine	NS	NS	<2.3	<2.6	<2.8	<3.2
Isopropylbenzene	NS	NS	<2.3	<2.6	<2.8	<3.2
Methyl acetate	NS	NS	<2.3	<2.6	<2.8	<3.2
Methyl tert-butyl ether	930	100,000	<2.3	<2.6	<2.8	<3.2
Methylene chloride	50	100,000	<4.5	<5.2	<5.6	<6.5
n-Butylbenzene	NS	NS	<2.3	<2.6	<2.8	<3.2
n-Propylbenzene	NS	NS	<2.3	<2.6	<2.8	<3.2
o-Xylene	NS	NS	<2.3	<2.6	<2.8	<3.2
p- & m- Xylenes	NS	NS	<4.5	<5.2	<5.6	<6.5
p-Isopropyltoluene	NS	NS	<2.3	<2.6	<2.8	<3.2
sec-Butylbenzene	NS	NS	<2.3	<2.6	<2.8	<3.2
Styrene	NS	NS	<2.3	<2.6	<2.8	<3.2
tert-Butyl alcohol (TBA)	NS	NS	<2.3	<2.6	<2.8	<3.2
tert-Butylbenzene	NS	NS	<2.3	<2.6	<2.8	<3.2
Tetrachloroethene	1,300	19,000	<2.3	<2.6	<2.8	<3.2
Toluene	700	100,000	<2.3	<2.6	<2.8	<3.2
trans-1,2-Dichloroethene	100,000	100,000	<2.3	<2.6	<2.8	<3.2
trans-1,3-Dichloropropene	NS	NS	<2.3	<2.6	<2.8	<3.2
Trichloroethene	470	21,000	<2.3	<2.6	<2.8	<b>120</b>
Trichlorofluoromethane	NS	NS	<2.3	<2.6	<2.8	<3.2
Vinyl chloride	20	900	<2.3	<2.6	<2.8	<3.2
Xylenes (Total)	260	100,000	<6.8	<7.8	<8.3	<9.7

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006  
<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006  
**Bolded values signify detection above method detection limit**  
**Highlighted values signify exceedance of regulatory standard**  
**NS = No Standard**

Table 1 continued.

Volatile Organic Compounds in Soil (ug/kg-dry)  
EPA Method 8260  
109-09 15th Avenue  
College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard		TP-3 (0-2) 11/3/14	TP-3 (3-5) 11/3/14	TP-4 (0-2) 11/3/14	TP-4 (3-5) 11/3/14
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>				
1,1,1,2-Tetrachloroethane	NS	NS	<2.9	<2.5	<2.3	<2.2
1,1,1-Trichloroethane	680	100,000	<2.9	<2.5	<2.3	<2.2
1,1,2-Tetrachloroethane	NS	NS	<2.9	<2.5	<2.3	<2.2
1,1,2-Trichloro-1,2,2-trifluoroethane	NS	NS	<2.9	<2.5	<2.3	<2.2
1,1,2-Trichloroethane	NS	NS	<2.9	<2.5	<2.3	<2.2
1,1-Dichloroethane	270	26,000	<2.9	<2.5	<2.3	<2.2
1,1-Dichloroethene	330	100,000	<2.9	<2.5	<2.3	<2.2
1,2,4-Trichlorobenzene	NS	NS	<2.9	<2.5	<2.3	<2.2
1,2,4-Trimethylbenzene	4,700	5,200	<2.9	<2.5	<2.3	<2.2
1,2-Dibromo-3-chloropropane	NS	NS	<2.9	<2.5	<2.3	<2.2
1,2-Dibromoethane	NS	NS	<2.9	<2.5	<2.3	<2.2
1,2-Dichlorobenzene	1,100	100,000	<2.9	<2.5	<2.3	<2.2
1,2-Dichloroethane	20	3,100	<2.9	<2.5	<2.3	<2.2
1,2-Dichloropropane	NS	NS	<2.9	<2.5	<2.3	<2.2
1,3,5-Trimethylbenzene	4,700	5,200	<2.9	<2.5	<2.3	<2.2
1,3-Dichlorobenzene	2,400	49,000	<2.9	<2.5	<2.3	<2.2
1,4-Dichlorobenzene	1,800	13,000	<2.9	<2.5	<2.3	<2.2
1,4-Dioxane	980	1,300	<58	<49	<46	<43
2-Butanone	120	100,000	<2.9	<2.5	<2.3	<2.2
2-Hexanone	NS	NS	<2.9	<2.5	<2.3	<2.2
4-Methyl-2-pentanone	NS	NS	<2.9	<2.5	<2.3	<2.2
Acetone	50	100,000	<5.8	<b>19</b>	<b>12</b>	<4.3
Acrolein	NS	NS	<2.9	<2.5	<2.3	<2.2
Acrylonitrile	NS	NS	<2.9	<2.5	<2.3	<2.2
Benzene	60	4,800	<2.9	<2.5	<2.3	<2.2
Bromodichloromethane	NS	NS	<2.9	<2.5	<2.3	<2.2
Bromoform	NS	NS	<2.9	<2.5	<2.3	<2.2
Bromomethane	NS	NS	<2.9	<2.5	<2.3	<2.2
Carbon disulfide	NS	NS	<2.9	<2.5	<2.3	<2.2
Carbon tetrachloride	760	2,400	<2.9	<2.5	<2.3	<2.2
Chlorobenzene	1,100	100,000	<2.9	<2.5	<2.3	<2.2
Chloroethane	NS	NS	<2.9	<2.5	<2.3	<2.2
Chloroform	370	49,000	<2.9	<2.5	<2.3	<2.2
Chloromethane	NS	NS	<2.9	<2.5	<2.3	<2.2
cis-1,2-Dichloroethene	250	100,000	<2.9	<2.5	<2.3	<2.2
cis-1,3-Dichloropropene	NS	NS	<2.9	<2.5	<2.3	<2.2
Dibromochloromethane	NS	NS	<2.9	<2.5	<2.3	<2.2
Dibromomethane	NS	NS	<2.9	<2.5	<2.3	<2.2
Dichlorodifluoromethane	NS	NS	<2.9	<2.5	<2.3	<2.2
Ethylbenzene	1,000	41,000	<2.9	<2.5	<2.3	<2.2
Hexachlorobutadiene	NS	NS	<2.9	<2.5	<2.3	<2.2
Isopropylbenzene	NS	NS	<2.9	<2.5	<2.3	<2.2
Methyl acetate	NS	NS	<2.9	<2.5	<2.3	<2.2
Methyl tert-butyl ether	930	100,000	<2.9	<2.5	<2.3	<2.2
Methylene chloride	50	100,000	<5.8	<4.9	<4.6	<4.3
n-Butylbenzene	NS	NS	<2.9	<2.5	<2.3	<2.2
n-Propylbenzene	NS	NS	<2.9	<2.5	<2.3	<2.2
o-Xylene	NS	NS	<2.9	<2.5	<2.3	<2.2
p- & m- Xylenes	NS	NS	<5.8	<4.9	<4.6	<4.3
p-Isopropyltoluene	NS	NS	<2.9	<2.5	<2.3	<2.2
sec-Butylbenzene	NS	NS	<2.9	<2.5	<2.3	<2.2
Styrene	NS	NS	<2.9	<2.5	<2.3	<2.2
tert-Butyl alcohol (TBA)	NS	NS	<2.9	<2.5	<2.3	<2.2
tert-Butylbenzene	NS	NS	<2.9	<2.5	<2.3	<2.2
Tetrachloroethene	1,300	19,000	<2.9	<2.5	<2.3	<2.2
Toluene	700	100,000	<2.9	<2.5	<2.3	<2.2
trans-1,2-Dichloroethene	100,000	100,000	<2.9	<2.5	<2.3	<2.2
trans-1,3-Dichloropropene	NS	NS	<2.9	<2.5	<2.3	<2.2
Trichloroethene	470	21,000	<2.9	<2.5	<2.3	<2.2
Trichlorofluoromethane	NS	NS	<2.9	<2.5	<2.3	<2.2
Vinyl chloride	20	900	<2.9	<2.5	<2.3	<2.2
Xylenes (Total)	260	100,000	<6.8	<6.8	<6.8	<6.5

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory standard

NS = No Standard

Table 1 Continued.

**Volatile Organic Compounds in Soil (ug/kg)**  
**EPA Method 8260**  
**109-09 15th Avenue**  
**College Point, NY**

**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard		SB-2 (9.5-10.5')	SB-5 (11-12')	SB-6 (9.5-10.5')	SB-8 (10-12')
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	5/30/13	5/29/13	5/30/13	5/30/13
1,1,1-Trichloroethane	680	100,000	< 13	< 14	< 15	<12
1,1,2,2-Tetrachloroethane	NS	NS	< 13	< 14	< 15	<12
1,1,2-Trichloro-1,2,2-trifluoroethane	NS	NS	< 13	< 14	< 15	<12
1,1,2-Trichloroethane	NS	NS	< 13	< 14	< 15	<12
1,1-Dichloroethane	270	26,000	< 13	< 14	< 15	<12
1,1-Dichloroethene	330	100,000	< 13	< 14	< 15	<12
1,2,4-Trichlorobenzene	NS	NS	< 13	< 14	< 15	<12
1,2-Dibromo-3-chloropropane	NS	NS	< 13	< 14	< 15	<12
1,2-Dibromoethane	NS	NS	< 13	< 14	< 15	<12
1,2-Dichlorobenzene	1,100	100,000	< 13	< 14	< 15	<12
1,2-Dichloroethane	20	3,100	< 13	< 14	< 15	<12
1,2-Dichloropropane	NS	NS	< 13	< 14	< 15	<12
1,3-Dichlorobenzene	2,400	49,000	< 13	< 14	< 15	<12
1,4-Dichlorobenzene	1,800	13,000	< 13	< 14	< 15	<12
2-Butanone	120	100,000	< 13	<b>23.0</b>	< 15	<12
2-Hexanone	NS	NS	< 13	< 14	< 15	<12
4-Methyl-2-pentanone	NS	NS	< 13	< 14	< 15	<12
Acetone	50	100,000	<b>30.0</b>	<b>120</b>	<b>28.0</b>	<12
Benzene	60	4,800	< 13	< 14	< 15	<12
Bromodichloromethane	NS	NS	< 13	< 14	< 15	<12
Bromoform	NS	NS	< 13	< 14	< 15	<12
Bromomethane	NS	NS	< 13	< 14	< 15	<12
Carbon disulfide	NS	NS	< 13	< 14	< 15	<12
Carbon tetrachloride	760	2,400	< 13	< 14	< 15	<12
Chlorobenzene	1,100	100,000	< 13	< 14	< 15	<12
Chloroethane	NS	NS	< 13	< 14	< 15	<12
Chloroform	370	49,000	< 13	< 14	< 15	<12
Chloromethane	NS	NS	< 13	< 14	< 15	<12
cis-1,2-Dichloroethene	250	100,000	< 13	< 14	< 15	<12
cis-1,3-Dichloropropene	NS	NS	< 13	< 14	< 15	<12
Cyclohexane	NS	NS	< 13	< 14	< 15	<12
Dibromochloromethane	NS	NS	< 13	< 14	< 15	<12
Dichlorodifluoromethane	NS	NS	< 13	< 14	< 15	<12
Ethylbenzene	1,000	41,000	< 13	< 14	< 15	<12
Isopropylbenzene	NS	NS	< 13	<b>9,500</b>	< 15	<12
Methyl Acetate	NS	NS	< 13	< 14	< 15	<12
Methyl tert-butyl ether	930	100,000	< 13	< 14	< 15	<12
Methylcyclohexane	NS	NS	< 13	< 14	< 15	<12
Methylene chloride	50	100,000	< 13	< 14	< 15	<12
Styrene	NS	NS	< 13	< 14	< 15	<12
Tetrachloroethene	1,300	19,000	< 13	< 14	< 15	<12
Toluene	700	100,000	< 13	< 14	< 15	<12
trans-1,2-Dichloroethene	NS	NS	< 13	< 14	< 15	<12
trans-1,3-Dichloropropene	NS	NS	< 13	< 14	< 15	<12
Trichloroethene	470	21,000	< 13	< 14	< 15	<12
Trichlorofluoromethane	NS	NS	< 13	< 14	< 15	<12
Vinyl chloride	20	900	< 13	< 14	< 15	<12
Xylenes (Total)	260	100,000	< 13	< 14	< 15	<12

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006

<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory standard

NS = No Standard

**Table 2**  
**Semi Volatile Organic Compounds in Soil (ug/kg-dry)**  
**EPA Method 8270**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard		TP-1 (0-2)	TP-1 (3-5)	TP-2 (0-2)	TP-2 (3-5)
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	11/3/14	11/3/14	11/3/14	11/3/14
Acenaphthene	20,000	100,000	<567	<1130	<559	<1170
Acenaphthylene	100,000	100,000	<567	<1130	<559	<1170
Acetophenone	NS	NS	<567	<1130	<559	<1170
Anthracene	100,000	100,000	<567	<1130	<559	<1170
Atrazine	NS	NS	<567	<1130	<559	<1170
Benzaldehyde	NS	NS	<567	<1130	<559	<1170
Benidine	NS	NS	<2270	<4510	<2230	<4680
Benzo(a)anthracene	1,000	1,000	<567	<1130	<559	<1170
Benzo(a)pyrene	1,000	1,000	<567	<1130	<559	<1170
Benzo(b)fluoranthene	1,000	1,000	<567	<1130	<559	<1170
Benzo(g,h,i)perylene	100,000	100,000	<567	<1130	<559	<1170
Benzoic acid	NS	NS	<567	<1130	<559	<1170
Benzo(k)fluoranthene	800	3,900	<567	<1130	<559	<1170
Benzyl butyl phthalate	NS	NS	<567	<1130	<559	<1170
1,1'-Biphenyl	NS	NS	<567	<1130	<559	<1170
4-Bromophenyl-phenylether	NS	NS	<567	<1130	<559	<1170
Caprolactam	NS	NS	<1130	<2250	<1120	<2340
Carbazole	NS	NS	<567	<1130	<559	<1170
Bis(2-chloroethoxy)methane	NS	NS	<567	<1130	<559	<1170
Bis(2-chloroethyl)ether	NS	NS	<567	<1130	<559	<1170
Bis(2-chloroisopropyl)ether	NS	NS	<567	<1130	<559	<1170
2-Chloronaphthalene	NS	NS	<567	<1130	<559	<1170
2-Chlorophenol	NS	NS	<567	<1130	<559	<1170
4-Chlorophenyl phenyl ether	NS	NS	<567	<1130	<559	<1170
Chrysene	1,000	3,900	<567	<1130	<559	<b>1,850</b>
Dibenzo(a,h)anthracene	330	330	<567	<1130	<559	<1170
Dibenzofuran	NS	NS	<567	<1130	<559	<1170
Di-n-butyl phthalate	NS	NS	<567	<1130	<559	<1170
1,2-Dichlorobenzene	100,000	100,000	<567	<1130	<559	<1170
1,3-Dichlorobenzene	17,000	49,000	<567	<1130	<559	<1170
1,4-Dichlorobenzene	980	13,000	<567	<1130	<559	<1170
3,3'-Dichlorobenzidine	NS	NS	<567	<1130	<559	<1170
2,4-Dichlorophenol	NS	NS	<567	<1130	<559	<1170
Diethyl phthalate	NS	NS	<567	<1130	<559	<1170
2,4-Dimethylphenol	NS	NS	<567	<1130	<559	<1170
Dimethyl phthalate	NS	NS	<567	<1130	<559	<1170
4,6-Dinitro-2-methylphenol	NS	NS	<1130	<2250	<1120	<2340
2,4-Dinitrophenol	NS	NS	<1130	<2250	<1120	<2340
2,4-Dinitrotoluene	NS	NS	<567	<1130	<559	<1170
2,6-Dinitrotoluene	NS	NS	<567	<1130	<559	<1170
Di-n-octyl phthalate	NS	NS	<567	<1130	<559	<1170
1,2-Diphenylhydrazine	NS	NS	<567	<1130	<559	<1170
Bis(2-ethylhexyl)phthalate	NS	NS	<567	<1130	<559	<1170
Fluoranthene	100,000	100,000	<567	<1130	<559	<b>3,680</b>
Fluorene	30,000	100,000	<567	<1130	<559	<1170
Hexachlorobenzene	33	12	<567	<1130	<559	<1170
Hexachlorobutadiene	NS	NS	<567	<1130	<559	<1170
Hexachlorocyclopentadiene	NS	NS	<567	<1130	<559	<1170
Hexachloroethane	NS	NS	<567	<1130	<559	<1170
Indeno(1,2,3-c,d)pyrene	500	500	<567	<1130	<559	<1170
Isophorone	NS	NS	<567	<1130	<559	<1170
2-Methylnaphthalene	NS	NS	<567	<1130	<559	<1170
2-Methylphenol	330	100,000	<567	<1130	<559	<1170
3- & 4-Methylphenols	NS	NS	<567	<1130	<559	<1170
Naphthalene	12,000	100,000	<567	<1130	<559	<1170
4-Nitroaniline	NS	NS	<1130	<2250	<1120	<2340
2-Nitroaniline	NS	NS	<1130	<2250	<1120	<2340
3-Nitroaniline	NS	NS	<1130	<2250	<1120	<2340
Nitrobenzene	NS	NS	<567	<1130	<559	<1170
2-Nitrophenol	NS	NS	<567	<1130	<559	<1170
4-Nitrophenol	NS	NS	<1130	<2250	<1120	<2340
N-Nitrosodi-n-propylamine	NS	NS	<567	<1130	<559	<1170
N-Nitrosodimethylamine	NS	NS	<567	<1130	<559	<1170
N-Nitrosodiphenylamine	NS	NS	<567	<1130	<559	<1170
Pentachlorophenol	800	6,700	<567	<1130	<559	<1170
Phenanthrene	100,000	100,000	<567	<1130	<559	<b>2,220</b>
Phenol	330	100,000	<567	<1130	<559	<1170
Pyrene	100,000	100,000	<567	<1130	<559	<b>3,030</b>
1,2,4-Trichlorobenzene	NS	NS	<567	<1130	<559	<1170
2,4,6-Trichlorophenol	NS	NS	<567	<1130	<559	<1170
2,4,5-Trichlorophenol	NS	NS	<567	<1130	<559	<1170

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006

<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit  
Highlighted values signify exceedance of regulatory guidance  
NS = No Standard

Table 2 continued.

**Semi Volatile Organic Compounds in Soil (ug/kg-dry)**  
**EPA Method 8270**  
**109-09 15th Avenue**  
**College Point, NY**

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard		TP-3 (0-2)	TP-3 (3-5)	TP-4 (0-2)	TP-4 (3-5)
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	11/3/14	11/3/14	11/3/14	11/3/14
Acenaphthene	20,000	100,000	<115	<566	<44.8	<21.7
Acenaphthylene	100,000	100,000	<115	<566	<44.8	<21.7
Acetophenone	NS	NS	<115	<566	<44.8	<21.7
Anthracene	100,000	100,000	<115	<566	<44.8	<21.7
Atrazine	NS	NS	<115	<566	<44.8	<21.7
Benzaldehyde	NS	NS	<115	<566	<44.8	<21.7
Benzidine	NS	NS	<458	<2260	<179	<86.8
Benzo(a)anthracene	1,000	1,000	<b>249</b>	<566	<b>91.5</b>	<21.7
Benzo(a)pyrene	1,000	1,000	<115	<566	<44.8	<21.7
Benzo(b)fluoranthene	1,000	1,000	<115	<566	<44.8	<21.7
Benzo(g,h,i)perylene	100,000	100,000	<115	<566	<44.8	<21.7
Benzoic acid	NS	NS	<115	<566	<44.8	<21.7
Benzo(k)fluoranthene	800	3,900	<115	<566	<44.8	<21.7
Benzyl butyl phthalate	NS	NS	<115	<566	<44.8	<21.7
1,1'-Biphenyl	NS	NS	<115	<566	<44.8	<21.7
4-Bromophenyl-phenylether	NS	NS	<115	<566	<44.8	<21.7
Caprolactam	NS	NS	<229	<1130	<89.5	<43.3
Carbazole	NS	NS	<115	<566	<44.8	<21.7
Bis(2-chloroethoxy)methane	NS	NS	<115	<566	<44.8	<21.7
Bis(2-chloroethyl)ether	NS	NS	<115	<566	<44.8	<21.7
Bis(2-chloroisopropyl)ether	NS	NS	<115	<566	<44.8	<21.7
2-Chloronaphthalene	NS	NS	<115	<566	<44.8	<21.7
2-Chlorophenol	NS	NS	<115	<566	<44.8	<21.7
4-Chlorophenyl phenyl ether	NS	NS	<115	<566	<44.8	<21.7
Chrysene	1,000	3,900	<b>305</b>	<566	<b>104</b>	<21.7
Dibenzo(a,h)anthracene	330	330	<115	<566	<44.8	<21.7
Dibenzofuran	NS	NS	<115	<566	<44.8	<21.7
Di-n-butyl phthalate	NS	NS	<115	<566	<44.8	<21.7
1,2-Dichlorobenzene	100,000	100,000	<115	<566	<44.8	<21.7
1,3-Dichlorobenzene	17,000	49,000	<115	<566	<44.8	<21.7
1,4-Dichlorobenzene	980	13,000	<115	<566	<44.8	<21.7
3,3'-Dichlorobenzidine	NS	NS	<115	<566	<44.8	<21.7
2,4-Dichlorophenol	NS	NS	<115	<566	<44.8	<21.7
Diethyl phthalate	NS	NS	<115	<566	<44.8	<21.7
2,4-Dimethylphenol	NS	NS	<115	<566	<44.8	<21.7
Dimethyl phthalate	NS	NS	<115	<566	<44.8	<21.7
4,6-Dinitro-2-methylphenol	NS	NS	<229	<1130	<89.5	<43.3
2,4-Dinitrophenol	NS	NS	<229	<1130	<89.5	<43.3
2,4-Dinitrotoluene	NS	NS	<115	<b>10,100</b>	<44.8	<21.7
2,6-Dinitrotoluene	NS	NS	<115	<566	<44.8	<21.7
Di-n-octyl phthalate	NS	NS	<115	<566	<44.8	<21.7
1,2-Diphenylhydrazine	NS	NS	<115	<566	<44.8	<21.7
Bis(2-ethylhexyl)phthalate	NS	NS	<115	<566	<44.8	<21.7
Fluoranthene	100,000	100,000	<b>611</b>	<566	<b>144</b>	<21.7
Fluorene	30,000	100,000	<115	<566	<44.8	<21.7
Hexachlorobenzene	33	12	<115	<566	<44.8	<21.7
Hexachlorobutadiene	NS	NS	<115	<566	<44.8	<21.7
Hexachlorocyclopentadiene	NS	NS	<115	<566	<44.8	<21.7
Hexachloroethane	NS	NS	<115	<566	<44.8	<21.7
Indeno(1,2,3-c,d)pyrene	500	500	<115	<566	<44.8	<21.7
Isophorone	NS	NS	<115	<566	<44.8	<21.7
2-Methylnaphthalene	NS	NS	<115	<566	<44.8	<21.7
2-Methylphenol	330	100,000	<115	<566	<44.8	<21.7
3- & 4-Methylphenols	NS	NS	<115	<566	<44.8	<21.7
Naphthalene	12,000	100,000	<115	<566	<44.8	<21.7
4-Nitroaniline	NS	NS	<229	<1130	<89.5	<43.3
2-Nitroaniline	NS	NS	<229	<1130	<89.5	<43.3
3-Nitroaniline	NS	NS	<229	<1130	<89.5	<43.3
Nitrobenzene	NS	NS	<115	<566	<44.8	<21.7
2-Nitrophenol	NS	NS	<115	<566	<44.8	<21.7
4-Nitrophenol	NS	NS	<229	<1130	<89.5	<43.3
N-Nitrosodi-n-propylamine	NS	NS	<115	<566	<44.8	<21.7
N-Nitrosodimethylamine	NS	NS	<115	<566	<44.8	<21.7
N-Nitrosodiphenylamine	NS	NS	<115	<566	<44.8	<21.7
Pentachlorophenol	800	6,700	<115	<566	<44.8	<21.7
Phenanthrene	100,000	100,000	<b>280</b>	<b>830</b>	<b>165</b>	<21.7
Phenol	330	100,000	<115	<566	<44.8	<21.7
Pyrene	100,000	100,000	<b>523</b>	<566	<b>228</b>	<21.7
1,2,4-Trichlorobenzene	NS	NS	<115	<566	<44.8	<21.7
2,4,6-Trichlorophenol	NS	NS	<115	<566	<44.8	<21.7
2,4,5-Trichlorophenol	NS	NS	<115	<566	<44.8	<21.7

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance

NS = No Standard

Table 2 continued.

Semi Volatile Organic Compounds in Soil (ug/kg)  
EPA Method 8270  
109-09 15th Avenue  
College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard		SB-2 (9.5-10.5')	SB-5 (11-12')	SB-6 (9.5-10.5')	SB-8 (10-12')
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	5/30/13	5/29/13	5/30/13	5/30/13
1,1'-Biphenyl	NS	NS	<400	<370	<430	<390
2,2'-oxybis(1-chloropropane)	NS	NS	<400	<370	<430	<390
2,4,5-Trichlorophenol	NS	NS	<1,000	<930	<1,100	<980
2,4,6-Trichlorophenol	NS	NS	<400	<370	<430	<390
2,4-Dichlorophenol	NS	NS	<400	<370	<430	<390
2,4-Dimethylphenol	NS	NS	<400	<370	<430	<390
2,4-Dinitrophenol	NS	NS	<1,000	<930	<1,100	<980
2,4-Dinitrotoluene	NS	NS	<400	<370	<430	<390
2,6-Dinitrotoluene	NS	NS	<400	<370	<430	<390
2-Chloronaphthalene	NS	NS	<400	<370	<430	<390
2-Chlorophenol	NS	NS	<400	<370	<430	<390
2-Methylnaphthalene	NS	NS	<400	<370	<430	<390
2-Methylphenol	330	100,000	<400	<370	<430	<390
2-Nitroaniline	NS	NS	<1,000	<930	<1,100	<980
2-Nitrophenol	NS	NS	<400	<370	<430	<390
3,3'-Dichlorobenzidine	NS	NS	<400	<370	<430	<390
3-Nitroaniline	NS	NS	<1,000	<930	<1,100	<980
4,6-Dinitro-2-methylphenol	NS	NS	<1,000	<930	<1,100	<980
4-Bromophenyl-phenylether	NS	NS	<400	<370	<430	<390
4-Chloro-3-methylphenol	NS	NS	<400	<370	<430	<390
4-Chloroaniline	NS	NS	<400	<370	<430	<390
4-Chlorophenyl phenyl ether	NS	NS	<400	<370	<430	<390
4-Methylphenol	NS	NS	<400	<370	<430	<390
4-Nitroaniline	NS	NS	<1,000	<930	<1,100	<980
4-Nitrophenol	NS	NS	<1,000	<930	<1,100	<980
Acenaphthene	20,000	100,000	<400	<b>500</b>	<430	<390
Acenaphthylene	100,000	100,000	<400	<370	<430	<390
Acetophenone	NS	NS	<400	<370	<430	<390
Anthracene	100,000	100,000	<400	<370	<430	<390
Atrazine	NS	NS	<400	<370	<430	<390
Benzaldehyde	NS	NS	<400	<370	<430	<390
Benzo(a)anthracene	1,000	1,000	<b>580</b>	<370	<430	<390
Benzo(a)pyrene	1,000	1,000	<b>500</b>	<370	<430	<390
Benzo(b)fluoranthene	1,000	1,000	<b>650</b>	<370	<430	<390
Benzo(g,h,i)perylene	100,000	100,000	<400	<370	<430	<390
Benzo(k)fluoranthene	800	3,900	<400	<370	<430	<390
Bis(2-chloroethoxy)methane	NS	NS	<400	<370	<430	<390
Bis(2-chloroethyl)ether	NS	NS	<400	<370	<430	<390
Bis(2-ethylhexyl)phthalate	NS	NS	<400	<370	<430	<390
Butyl benzyl phthalate	NS	NS	<400	<370	<430	<390
Caprolactam	NS	NS	<400	<370	<430	<390
Carbazole	NS	NS	<400	<370	<430	<390
Chrysene	1,000	3,900	<b>610</b>	<370	<430	<390
Dibenzo(a,h)anthracene	330	330	<400	<370	<430	<390
Dibenzofuran	NS	NS	<400	<370	<430	<390
Diethyl phthalate	NS	NS	<400	<370	<430	<390
Dimethyl phthalate	NS	NS	<400	<370	<430	<390
Di-n-butyl phthalate	NS	NS	<400	<370	<430	<390
Di-n-octyl phthalate	NS	NS	<400	<370	<430	<390
Fluoranthene	100,000	100,000	<b>1,200</b>	<370	<430	<390
Fluorene	30,000	100,000	<400	<b>630</b>	<430	<390
Hexachlorobenzene	NS	NS	<400	<370	<430	<390
Hexachlorobutadiene	NS	NS	<400	<370	<430	<390
Hexachlorocyclopentadiene	NS	NS	<400	<370	<430	<390
Hexachloroethane	NS	NS	<400	<370	<430	<390
Indeno(1,2,3-c,d)pyrene	500	500	<400	<370	<430	<390
Isophorone	NS	NS	<400	<370	<430	<390
Naphthalene	12,000	100,000	<400	<370	<430	<390
Nitrobenzene	NS	NS	<400	<370	<430	<390
N-Nitrosodi-n-propylamine	NS	NS	<400	<370	<430	<390
N-Nitrosodiphenylamine	NS	NS	<400	<370	<430	<390
Pentachlorophenol	800	6,700	<1,000	<930	<1,100	<980
Phenanthrene	100,000	100,000	<b>800</b>	<b>1,300</b>	<430	<390
Phenol	330	100,000	<400	<370	<430	<390
Pyrene	100,000	100,000	<b>1,200</b>	<370	<430	<390

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance

NS = No Standard

**Table 3**  
**PCBs and Pesticides in Soil (ug/kg-dry)**  
**EPA Method 8081/8082**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard		TP-1 (0-2)	TP-1 (3-5)	TP-2 (0-2)	TP-2 (3-5)
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	11/3/14	11/3/14	11/3/14	11/3/14
Aldrin	5	19	<1.79	<1.78	<1.77	<1.85
alpha-BHC	20	97	<1.79	<1.78	<1.77	<1.85
beta-BHC	36	72	<1.79	<1.78	<1.77	<1.85
delta-BHC	40	100,000	<1.79	<1.78	<1.77	<1.85
gamma-BHC	100	280	<1.79	<1.78	<1.77	<1.85
Chlordane, total	NS	NS	<b>176</b>	<b>138</b>	<b>101</b>	<b>26.2</b>
4,4'-DDD	3.3	2,600	<1.79	<1.78	<1.77	<1.85
4,4'-DDE	3.3	1,800	<1.79	<b>2.05</b>	<b>1.92</b>	<1.85
4,4'-DDT	3.3	1,700	<b>4.17</b>	<b>6.36</b>	<b>14.3</b>	<1.85
Dieldrin	5	39	<b>5.14</b>	<b>5.12</b>	<b>9.58</b>	<1.85
Endosulfan I	2,400	4,800	<1.79	<1.78	<1.77	<1.85
Endosulfan II	2,400	4,800	<1.79	<1.78	<1.77	<1.85
Endosulfan sulfate	2,400	4,800	<1.79	<1.78	<1.77	<1.85
Endrin	14	2,200	<1.79	<1.78	<1.77	<1.85
Endrin aldehyde	NS	NS	<1.79	<1.78	<1.77	<1.85
Endrin ketone	NS	NS	<1.79	<1.78	<1.77	<1.85
Heptachlor	42	420	<b>1.90</b>	<1.78	<1.77	<1.85
Heptachlor epoxide	NS	NS	<1.79	<1.78	<1.77	<1.85
Methoxychlor	NS	NS	<8.96	<8.92	<8.83	<9.25
Toxaphene	NS	NS	<90.7	<90.3	<89.3	<93.7
Aroclor 1016	100	1,000	<0.0181	<0.0180	<0.0178	<19.2
Aroclor 1221	100	1,000	<0.0181	<0.0180	<0.0178	<19.2
Aroclor 1232	100	1,000	<0.0181	<0.0180	<0.0178	<19.2
Aroclor 1242	100	1,000	<0.0181	<0.0180	<0.0178	<19.2
Aroclor 1248	100	1,000	<0.0181	<0.0180	<0.0178	<19.2
Aroclor 1254	100	1,000	<0.0181	<0.0180	<0.0178	<19.2
Aroclor 1260	100	1,000	<0.0181	<b>0.0358</b>	<b>0.0873</b>	<b>0.106</b>

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006  
<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006  
**Bolded values signify detection above method detection limit**  
**Highlighted values signify exceedance of regulatory standard**  
NS = No Standard

**Table 3 continued.**  
**PCBs and Pesticides in Soil (ug/kg-dry)**  
**EPA Method 8081/8082**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard		TP-3 (0-2)	TP-3 (3-5)	TP-4 (0-2)	TP-4 (3-5)
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	11/3/14	11/3/14	11/3/14	11/3/14
Aldrin	5	19	<1.81	<1.79	<1.77	<1.72
alpha-BHC	20	97	<1.81	<1.79	<1.77	<1.72
beta-BHC	36	72	<1.81	<1.79	<1.77	<1.72
delta-BHC	40	100,000	<1.81	<1.79	<1.77	<1.72
gamma-BHC	100	280	<1.81	<1.79	<1.77	<1.72
Chlordane, total	NS	NS	<b>358</b>	<b>71.3</b>	<b>288</b>	<b>135</b>
4,4'-DDD	3.3	2,600	<1.81	<1.79	<1.77	<1.72
4,4'-DDE	3.3	1,800	<1.81	<1.79	<1.77	<1.72
4,4'-DDT	3.3	1,700	<1.81	<1.79	<1.77	<1.72
Dieldrin	5	39	<1.81	<1.79	<b>2.31</b>	<1.72
Endosulfan I	2,400	4,800	<1.81	<1.79	<1.77	<1.72
Endosulfan II	2,400	4,800	<1.81	<1.79	<1.77	<1.72
Endosulfan sulfate	2,400	4,800	<1.81	<1.79	<1.77	<1.72
Endrin	14	2,200	<1.81	<1.79	<1.77	<1.72
Endrin aldehyde	NS	NS	<1.81	<1.79	<1.77	<1.72
Endrin ketone	NS	NS	<1.81	<1.79	<1.77	<1.72
Heptachlor	42	420	<b>2.33</b>	<1.79	<b>6.13</b>	<1.72
Heptachlor epoxide	NS	NS	<b>5.53</b>	<1.79	<1.77	<1.72
Methoxychlor	NS	NS	<9.05	<8.93	<8.85	<8.58
Toxaphene	NS	NS	<91.6	<90.4	<89.6	<86.8
Aroclor 1016	100	1,000	<0.0183	<0.0180	<0.0179	<0.0173
Aroclor 1221	100	1,000	<0.0183	<0.0180	<0.0179	<0.0173
Aroclor 1232	100	1,000	<0.0183	<0.0180	<0.0179	<0.0173
Aroclor 1242	100	1,000	<0.0183	<0.0180	<0.0179	<0.0173
Aroclor 1248	100	1,000	<0.0183	<0.0180	<0.0179	<0.0173
Aroclor 1254	100	1,000	<0.0183	<0.0180	<0.0179	<0.0173
Aroclor 1260	100	1,000	<b>0.0344</b>	<0.0180	<0.0179	<0.0173

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006  
<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006  
**Bolded values signify detection above method detection limit**  
**Highlighted values signify exceedance of regulatory standard**  
NS = No Standard

Table 3 continued.

PCBs and Pesticides in Soil (ug/kg)  
 EPA Method 8081/8082  
 109-09 15th Avenue  
 College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	UUSCO <sup>1</sup>	Standard RRSCO <sup>2</sup>	CSCO <sup>3</sup>	SB-2 (9.5-10.5') 5/30/13	SB-5 (11-12') 5/29/13	SB-6 (9.5-10.5') 5/30/13	SB-8 (10-12') 5/30/13
4,4'-DDD	3.3	2,600	92,000	<4.0	<3.7	<4.3	<3.9
4,4'-DDE	3.3	1,800	62,000	<4.0	<3.7	<4.3	<3.9
4,4'-DDT	3.3	1,700	47,000	<4.0	<3.7	<4.3	<3.9
Aldrin	5	19	680	<2.1	<1.9	<2.2	<2.0
alpha-BHC	20	97	3,400	<2.1	<1.9	<2.2	<2.0
alpha-Chlordane	94	4,200	24,000	<2.1	<1.9	<2.2	<2.0
Aroclor 1016	100	1,000	1,000	<40	<37	<43	<39
Aroclor 1221	100	1,000	1,000	<81	<75	<87	<79
Aroclor 1232	100	1,000	1,000	<40	<37	<43	<39
Aroclor 1242	100	1,000	1,000	<40	<37	<43	<39
Aroclor 1248	100	1,000	1,000	<40	<37	<43	<39
Aroclor 1254	100	1,000	1,000	<40	<37	<43	<39
Aroclor 1260	100	1,000	1,000	<40	<37	<43	<39
beta-BHC	36	72	3,000	<2.1	<1.9	<2.2	<2.0
delta-BHC	40	100,000	500,000	<2.1	<1.9	<2.2	<2.0
Dieldrin	5	39	1,400	<4.0	<3.7	<4.3	<3.9
Endosulfan I	2,400	4,800	200,000	<2.1	<1.9	<2.2	<2.0
Endosulfan II	2,400	4,800	200,000	<4.0	<3.7	<4.3	<3.9
Endosulfan sulfate	2,400	4,800	200,000	<4.0	<3.7	<4.3	<3.9
Endrin	14	2,200	89,000	<4.0	<3.7	<4.3	<3.9
Endrin aldehyde	NS	NS	NS	<4.0	<3.7	<4.3	<3.9
Endrin ketone	NS	NS	NS	<4.0	<3.7	<4.3	<3.9
gamma-BHC	100	280	9,200	<2.1	<1.9	<2.2	<2.0
gamma-Chlordane	NS	NS	NS	<2.1	<1.9	<2.2	<2.0
Heptachlor	42	420	15,000	<2.1	<1.9	<2.2	<2.0
Heptachlor epoxide	NS	NS	NS	<2.1	<1.9	<2.2	<2.0
Methoxychlor	NS	NS	NS	<21	<19	<22	<20
Toxaphene	NS	NS	NS	<210	<190	<220	<200

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006

<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

<sup>3</sup> Commercial Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory standard

**Table 4**  
**Metals in Soil (mg/kg-dry)**  
**EPA Method 6010**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard		TP-1 (0-2)	TP-1 (3-5)	TP-2 (0-2)	TP-2 (3-5)
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	11/3/14	11/3/14	11/3/14	11/3/14
Aluminum	NS	NS	<b>7,390</b>	<b>7,140</b>	<b>7,000</b>	<b>7,620</b>
Antimony	NS	NS	<0.543	<b>0.636</b>	<0.535	<b>13.4</b>
Arsenic	13	16	<b>5.60</b>	<b>4.72</b>	<b>3.09</b>	<b>37.4</b>
Barium	350	400	<b>188</b>	<b>108</b>	<b>101</b>	<b>2,480</b>
Beryllium	7.2	72	<0.109	<0.108	<0.107	<0.112
Cadmium	2.5	4.3	<0.326	<0.324	<0.321	<0.337
Calcium	NS	NS	<b>18,100</b>	<b>22,200</b>	<b>31,700</b>	<b>22,800</b>
Chromium	30	180	<b>24.7</b>	<b>20.6</b>	<b>20.5</b>	<b>232</b>
Cobalt	NS	NS	<b>7.43</b>	<b>5.80</b>	<b>6.48</b>	<b>50.4</b>
Copper	50	270	<b>53.4</b>	<b>39.2</b>	<b>26.8</b>	<b>307</b>
Iron	NS	NS	<b>24,900</b>	<b>14,200</b>	<b>13,700</b>	<b>22,200</b>
Lead	63	400	<b>84.9</b>	<b>115</b>	<b>75.5</b>	<b>2,730</b>
Magnesium	NS	NS	<b>4,550</b>	<b>6,930</b>	<b>10,500</b>	<b>10,700</b>
Manganese	1,600	2,000	<b>285</b>	<b>223</b>	<b>206</b>	<b>416</b>
Mercury	0.18	0.81	<b>0.143</b>	<b>0.214</b>	<b>0.254</b>	<b>1.36</b>
Nickel	30	310	<b>27.5</b>	<b>20.1</b>	<b>18.9</b>	<b>36.4</b>
Potassium	NS	NS	<b>1,660</b>	<b>1,130</b>	<b>2,210</b>	<b>1,820</b>
Selenium	3.9	180	<b>5.17</b>	<b>5.46</b>	<b>5.89</b>	<b>12.6</b>
Silver	2	180	<0.543	<0.541	<0.535	<0.561
Sodium	NS	NS	<b>177</b>	<b>112</b>	<b>325</b>	<b>478</b>
Thallium	NS	NS	<1.09	<1.08	<1.07	<1.12
Vanadium	NS	NS	<b>32.8</b>	<b>29.6</b>	<b>30.4</b>	<b>35.7</b>
Zinc	109	10,000	<b>133</b>	<b>130</b>	<b>91.6</b>	<b>890</b>

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006

<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory standard

NS = No Standard

**Table 4 continued.**  
**Metals in Soil (mg/kg-dry)**  
**EPA Method 6010**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard		TP-3 (0-2)	TP-3 (3-5)	TP-4 (0-2)	TP-4 (3-5)
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	11/3/14	11/3/14	11/3/14	11/3/14
Aluminum	NS	NS	<b>9,470</b>	<b>5,650</b>	<b>5,980</b>	<b>4,520</b>
Antimony	NS	NS	<0.549	<0.541	<0.536	<0.520
Arsenic	13	16	<b>2.84</b>	<b>3.56</b>	<b>2.47</b>	<b>1.56</b>
Barium	350	400	<b>86.5</b>	<b>33.0</b>	<b>54.3</b>	<b>54.2</b>
Beryllium	7.2	72	<0.110	<0.108	<0.107	<0.104
Cadmium	2.5	4.3	<0.329	<0.325	<0.322	<0.312
Calcium	NS	NS	<b>9,550</b>	<b>25900</b>	<b>11,200</b>	<b>5,090</b>
Chromium	30	180	<b>21.2</b>	<b>11.9</b>	<b>13.9</b>	<b>11.8</b>
Cobalt	NS	NS	<b>8.25</b>	<b>4.17</b>	<b>5.31</b>	<b>7.23</b>
Copper	50	270	<b>32.6</b>	<b>14.7</b>	<b>18.5</b>	<b>12.7</b>
Iron	NS	NS	<b>17,200</b>	<b>10,700</b>	<b>12,300</b>	<b>11,900</b>
Lead	63	400	<b>55.0</b>	<b>28.9</b>	<b>39.7</b>	<b>11.9</b>
Magnesium	NS	NS	<b>3,850</b>	<b>13,300</b>	<b>4,830</b>	<b>3,790</b>
Manganese	1,600	2,000	<b>310</b>	<b>185</b>	<b>240</b>	<b>504</b>
Mercury	0.18	0.81	<b>0.134</b>	<0.0998	<b>0.0771</b>	<0.0312
Nickel	30	310	<b>22.0</b>	<b>12.3</b>	<b>15.2</b>	<b>14.9</b>
Potassium	NS	NS	<b>2,410</b>	<b>740</b>	<b>1,000</b>	<b>907</b>
Selenium	3.9	180	<b>4.98</b>	<b>5.67</b>	<b>4.69</b>	<b>4.28</b>
Silver	2	180	<0.549	<0.541	<0.536	<0.520
Sodium	NS	NS	<b>87.9</b>	<b>48.2</b>	<b>89.6</b>	<b>18.1</b>
Thallium	NS	NS	<1.10	<1.08	<1.07	<1.04
Vanadium	NS	NS	<b>31.2</b>	<b>18.2</b>	<b>23.0</b>	<b>17.5</b>
Zinc	109	10,000	<b>69.0</b>	<b>35.5</b>	<b>42.1</b>	<b>26.9</b>

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006

<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory standard

NS = No Standard

Table 4 continued.

Metals in Soil (mg/kg)  
 EPA Method 6010 and 7471  
 109-09 15th Avenue  
 College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard		SB-2 (9.5-10.5')	SB-5 (11-12')	SB-6 (9.5-10.5')	SB-8 (10-12')
	UUSCO <sup>1</sup>	RRSCO <sup>2</sup>	5/30/13	5/29/13	5/30/13	5/30/13
Aluminum	NS	NS	<b>14,300</b>	<b>8,190</b>	<b>21,500</b>	<b>16,400</b>
Antimony	NS	NS	<7.32	<6.74	<7.85	<7.11
Arsenic	13	16	<b>4.0</b>	<1.12	<1.31	<b>2.0</b>
Barium	350	400	<b>103</b>	<b>39.1</b>	<b>221</b>	<b>171</b>
Beryllium	7.2	72	<0.61	<0.56	<0.65	<0.59
Cadmium	2.5	4.3	<0.61	<0.56	2.37	<0.59
Calcium	NS	NS	<b>1,050</b>	<b>972</b>	<b>1,470</b>	<b>1,490</b>
Chromium	30	180	<b>199</b>	<b>34.1</b>	<b>149</b>	<b>50.5</b>
Cobalt	NS	NS	<b>12.4</b>	<b>8.5</b>	<b>22.8</b>	<b>17.4</b>
Copper	50	270	<b>46.9</b>	<b>20.6</b>	<b>35.7</b>	<b>29.1</b>
Iron	NS	NS	<b>23,700</b>	<b>14,600</b>	<b>36,500</b>	<b>31,800</b>
Lead	63	400	<b>71.7</b>	<b>3.8</b>	<b>11.3</b>	<b>25.3</b>
Magnesium	NS	NS	<b>4,230</b>	<b>2,730</b>	<b>8,420</b>	<b>7,120</b>
Manganese	1,600	2,000	<b>233</b>	<b>197</b>	<b>535</b>	<b>649</b>
Mercury	0.18	0.81	<b>0.49</b>	<0.23	<0.26	<0.24
Nickel	30	310	<b>20.1</b>	<b>14.9</b>	<b>36.4</b>	<b>34.6</b>
Potassium	NS	NS	<b>2,780</b>	<b>1,900</b>	<b>9,870</b>	<b>7,960</b>
Selenium	3.9	180	<0.61	<0.56	<0.65	<0.59
Silver	2	180	<1.22	<1.12	<1.31	<1.18
Sodium	NS	NS	<b>2,020</b>	<b>156</b>	<b>225</b>	<b>515</b>
Thallium	NS	NS	<1.22	<1.12	<1.31	<1.18
Vanadium	NS	NS	<b>37.2</b>	<b>25.8</b>	<b>67.5</b>	<b>54.9</b>
Zinc	109	10,000	<b>82.7</b>	<b>31.1</b>	<b>233</b>	<b>141</b>

<sup>1</sup> Unrestricted Use Soil Cleanup Objectives, Table 375-6.8(a), 6 NYCRR 375, NYSDEC 2006

<sup>2</sup> Restricted Residential Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

<sup>3</sup> Commercial Soil Cleanup Objectives, Table 375-6.8(b), 6 NYCRR 375, NYSDEC 2006

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance

Table 5 Volatile Organic Compounds in Groundwater (ug/l) EPA Method 8260 109-09 15th Avenue College Point, NY ACT Project No.: 7233-CPNY			
Sample ID Sample Date	Standard <sup>1</sup>	MW-1 11/3/14	MW-3 11/3/14
1,1,1,2-Tetrachloroethane	5	<0.20	<0.20
1,1,1-Trichloroethane	5	<0.20	<0.20
1,1,2,2-Tetrachloroethane	0.2	<0.20	<0.20
1,1,2-Trichloro-1,2,2-trifluoroethane	NS	<0.20	<0.20
1,1,2-Trichloroethane	1	<0.20	<0.20
1,1-Dichloroethane	5	<b>0.45</b>	<0.20
1,1-Dichloroethene	0.7	<0.20	<0.20
1,2,4-Trichlorobenzene	5	<0.20	<0.20
1,2,4-Trimethylbenzene	5	<0.20	<0.20
1,2-Dibromo-3-chloropropane	0.04	<0.20	<0.20
1,2-Dibromoethane	NS	<0.20	<0.20
1,2-Dichlorobenzene	2	<0.20	<0.20
1,2-Dichloroethane	0.6	<0.20	<0.20
1,2-Dichloropropane	1	<0.20	<0.20
1,3,5-Trimethylbenzene	5	<0.20	<0.20
1,3-Dichlorobenzene	3	<0.20	<0.20
1,4-Dichlorobenzene	3	<0.20	<0.20
1,4-Dioxane	NS	<40	<40
2-Butanone	50	<b>1.0</b>	<0.50
2-Hexanone	50	<0.20	<0.20
4-Methyl-2-pentanone	NS	<0.20	<0.20
Acetone	50	<b>4.3</b>	<1.0
Acrolein	NS	<0.20	<0.20
Acrylonitrile	5	<0.20	<0.20
Benzene	0.7	<0.20	<0.20
Bromodichloromethane	50	<0.20	<0.20
Bromoform	50	<0.20	<0.20
Bromomethane	5	<0.20	<0.20
Carbon disulfide	NS	<0.20	<0.20
Carbon tetrachloride	5	<0.20	<0.20
Chlorobenzene	5	<0.20	<0.20
Chloroethane	5	<0.20	<0.20
Chloroform	7	<0.20	<b>0.54</b>
Chloromethane	NS	<0.20	<0.20
cis-1,2-Dichloroethene	5	<b>0.52</b>	<0.20
cis-1,3-Dichloropropene	0.4	<0.20	<0.20
Dibromochloromethane	50	<0.20	<0.20
Dibromomethane	5	<0.20	<0.20
Dichlorodifluoromethane	5	<0.20	<0.20
Ethylbenzene	5	<0.20	<0.20
Hexachlorobutadiene	0.5	<0.20	<0.20
Isopropylbenzene	5	<0.20	<0.20
Methyl Acetate	NS	<0.20	<0.20
Methyl tert-butyl ether	10	<b>0.59</b>	<b>0.35</b>
Methylene chloride	5	<1.0	<1.0
n-Butylbenzene	5	<0.20	<0.20
n-Propylbenzene	5	<0.20	<0.20
o-Xylene	5	<0.20	<0.20
p- & m-Xylenes	5	<0.50	<0.50
p-Isopropyltoluene	5	<0.20	<0.20
sec-Butylbenzene	5	<0.20	<0.20
Styrene	50	<0.20	<0.20
tert-Butyl alcohol (TBA)	NS	<0.50	<0.50
tert-Butylbenzene	5	<b>0.54</b>	<0.20
Tetrachloroethene	5	<0.20	<0.20
Toluene	5	<0.20	<0.20
trans-1,2-Dichloroethene	5	<0.20	<0.20
trans-1,3-Dichloropropene	NS	<0.20	<0.20
Trichloroethene	5	<b>1.4</b>	<0.20
Trichlorofluoromethane	5	<0.20	<0.20
Vinyl chloride	2	<0.50	<0.50
Xylene (total)	15	<0.60	<0.60

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance

NS = No Standard

Table 5 continued.

Volatile Organic Compounds in Groundwater (ug/l)  
EPA Method 8260  
109-09 15th Avenue  
College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard <sup>1</sup>	TW-2 5/30/13	TW-4 5/29/13	TW-5 5/29/13
1,1,1-Trichloroethane	5	<10	<10	<10
1,1,2,2-Tetrachloroethane	0.2	<10	<10	<10
1,1,2-Trichloro-1,2,2-trifluoroethane	NS	<10	<10	<10
1,1,2-Trichloroethane	1	<10	<10	<10
1,1-Dichloroethane	5	<10	<10	<10
1,1-Dichloroethene	0.7	<10	<10	<10
1,2,4-Trichlorobenzene	5	<10	<10	<10
1,2-Dibromo-3-chloropropane	0.04	<10	<10	<10
1,2-Dibromoethane	NS	<10	<10	<10
1,2-Dichlorobenzene	2	<10	<10	<10
1,2-Dichloroethane	0.6	<10	<10	<10
1,2-Dichloropropane	1	<10	<10	<10
1,3-Dichlorobenzene	3	<10	<10	<10
1,4-Dichlorobenzene	3	<10	<10	<10
2-Butanone	50	<b>13</b>	<10	<10
2-Hexanone	50	<10	<10	<10
4-Methyl-2-pentanone	NS	<10	<10	<10
Acetone	50	<b>110</b>	<10	<10
Benzene	0.7	<10	<10	<10
Bromodichloromethane	50	<10	<10	<10
Bromoform	50	<10	<10	<10
Bromomethane	5	<10	<10	<10
Carbon disulfide	NS	<10	<10	<10
Carbon tetrachloride	5	<10	<10	<10
Chlorobenzene	5	<10	<10	<10
Chloroethane	5	<10	<10	<10
Chloroform	7	<10	<10	<10
Chloromethane	NS	<10	<10	<10
cis-1,2-Dichloroethene	5	<10	<10	<10
cis-1,3-Dichloropropene	0.4	<10	<10	<10
Cyclohexane	NS	<10	<10	<10
Dibromochloromethane	50	<10	<10	<10
Dichlorodifluoromethane	5	<10	<10	<10
Ethylbenzene	5	<10	<10	<10
Isopropylbenzene	5	<10	<b>50</b>	<b>140</b>
Methyl Acetate	NS	<10	<10	<10
Methyl tert-butyl ether	10	<10	<10	<10
Methylcyclohexane	NS	<10	<10	<10
Methylene chloride	5	<10	<10	<10
Styrene	50	<10	<10	<10
Tetrachloroethene	5	<10	<10	<10
Toluene	5	<10	<10	<10
trans-1,2-Dichloroethene	5	<10	<10	<10
trans-1,3-Dichloropropene	NS	<10	<10	<10
Trichloroethene	5	<10	<10	<10
Trichlorofluoromethane	5	<10	<10	<10
Vinyl chloride	2	<10	<10	<10
Xylene (total)	15	<10	<10	<10

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance

NS = No Standard

**Table 6**  
**Semi Volatile Organic Compounds in Groundwater (ug/l)**  
**EPA Method 8270**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard <sup>1</sup>	MW-1 11/3/14	MW-3 11/3/14
Acenaphthene	20	<0.0500	<0.0526
Acenaphthylene	NS	<0.0500	<0.0526
Acetophenone	NS	<2.50	<2.63
Anthracene	50	<0.0500	<0.0526
Atrazine	7.5	<0.513	<0.526
Benzaldehyde	NS	<2.50	<2.63
Benzidine	5	<10.0	<10.5
Benzo(a)anthracene	NS	<b>0.0700</b>	<0.0526
Benzo(a)pyrene	NS	<b>0.110</b>	<0.0526
Benzo(b)fluoranthene	0.002	<b>0.220</b>	<0.0526
Benzo(g,h,i)perylene	NS	<b>0.100</b>	<0.0526
Benzoic acid	NS	<25.0	<26.3
Benzo(k)fluoranthene	0.002	<b>0.130</b>	<0.0526
Benzyl alcohol	NS	<2.50	<2.63
Benzyl butyl phthalate	50	<2.50	<2.63
1,1'-Biphenyl	5	<2.50	<2.63
4-Bromophenyl-phenylether	NS	<2.50	<2.63
Caprolactam	NS	<2.50	<2.63
Carbazole	NS	<2.50	<2.63
Bis(2-chloroethoxy)methane	5	<2.50	<2.63
Bis(2-chloroethyl)ether	1	<2.50	<2.63
Bis(2-chloroisopropyl)ether	5	<2.50	<2.63
2-Chloronaphthalene	10	<2.50	<2.63
2-Chlorophenol	NS	<2.50	<2.63
4-Chlorophenyl phenyl ether	NS	<2.50	<2.63
Chrysene	0.002	<b>0.150</b>	<0.0526
Dibenzo(a,h)anthracene	NS	<0.0500	<0.0526
Dibenzofuran	NS	<2.50	<2.63
Di-n-butyl phthalate	50	<2.50	<2.63
1,4-Dichlorobenzene	3	<2.50	<2.63
1,2-Dichlorobenzene	3	<2.50	<2.63
1,3-Dichlorobenzene	3	<2.50	<2.63
3,3'-Dichlorobenzidine	5	<2.50	<2.63
2,4-Dichlorophenol	0.3	<2.50	<2.63
Diethyl phthalate	50	<2.50	<2.63
2,4-Dimethylphenol	50	<2.50	<2.63
Dimethyl phthalate	50	<2.50	<2.63
4,6-Dinitro-2-methylphenol	NS	<2.50	<2.63
2,4-Dinitrophenol	10	<2.50	<2.63
2,4-Dinitrotoluene	5	<2.50	<2.63
2,6-Dinitrotoluene	0.07	<2.50	<2.63
Di-n-octyl phthalate	50	<2.50	<2.63
1,2-Diphenylhydrazine	NS	<2.50	<2.63
Bis(2-ethylhexyl)phthalate	5	<b>1.79</b>	<b>5.26</b>
Fluoranthene	50	<b>0.140</b>	<0.0526
Fluorene	50	<0.0500	<0.0526
Hexachlorobenzene	0.04	<0.0205	<0.0211
Hexachlorobutadiene	0.5	<0.513	<0.526
Hexachlorocyclopentadiene	5	<2.50	<2.63
Hexachloroethane	5	<0.500	<0.526
Indeno(1,2,3-c,d)pyrene	0.002	<b>0.0800</b>	<0.0526
Isophorone	50	<2.50	<2.63
2-Methylnaphthalene	42	<2.50	<2.63
2-Methylphenol	NS	<2.50	<2.63
3- & 4-Methylphenol	NS	<2.50	<2.63
Naphthalene	10	<b>0.400</b>	<0.0526
3-Nitroaniline	5	<2.50	<2.63
4-Nitroaniline	5	<2.50	<2.63
2-Nitroaniline	5	<2.50	<2.63
Nitrobenzene	0.4	<0.250	<0.256
4-Nitrophenol	NS	<2.50	<2.63
2-Nitrophenol	NS	<2.50	<2.63
N-Nitrosodi-n-propylamine	NS	<2.50	<2.63
N-Nitrosodimethylamine	NS	<0.500	<0.526
N-Nitrosodiphenylamine	50	<2.50	<2.63
Pentachlorophenol	NS	<0.250	<0.256
Phenanthrene	50	<0.0500	<0.0526
Phenol	NS	<2.50	<2.63
Pyrene	50	<b>0.150</b>	<0.0526
1,2,4-Trichlorobenzene	50	<2.50	<2.63
2,4,6-Trichlorophenol	NS	<2.50	<2.63
2,4,5-Trichlorophenol	NS	<2.50	<2.63

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998  
 Bolded values signify detection above method detection limit  
 Highlighted values signify exceedance of regulatory guidance  
 NS = No Standard

Table 6 continued.

**Semi Volatile Organic Compounds in Groundwater (ug/l)**  
**EPA Method 8270**  
**109-09 15th Avenue**  
**College Point, NY**

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard <sup>1</sup>	TW-4 5/29/13	TW-5 5/29/13
1,1'-Biphenyl	5	<10	<10
2,2'-oxybis(1-chloropropane)	NS	<10	<10
2,4,5-Trichlorophenol	NS	<25	<25
2,4,6-Trichlorophenol	NS	<10	<10
2,4-Dichlorophenol	0.3	<10	<10
2,4-Dimethylphenol	50	<10	<10
2,4-Dinitrophenol	10	<25	<25
2,4-Dinitrotoluene	5	<10	<10
2,6-Dinitrotoluene	0.07	<10	<10
2-Chloronaphthalene	10	<10	<10
2-Chlorophenol	NS	<10	<10
2-Methylnaphthalene	42	<10	<10
2-Methylphenol	NS	<10	<10
2-Nitroaniline	5	<25	<25
2-Nitrophenol	NS	<10	<10
3,3'-Dichlorobenzidine	5	<10	<10
3-Nitroaniline	5	<25	<25
4,6-Dinitro-2-methylphenol	NS	<25	<25
4-Bromophenyl-phenylether	NS	<10	<10
4-Chloro-3-methylphenol	NS	<10	<10
4-Chloroaniline	5	<10	<10
4-Chlorophenyl phenyl ether	NS	<10	<10
4-Methylphenol	NS	<10	<10
4-Nitroaniline	5	<25	<25
4-Nitrophenol	NS	<25	<25
Acenaphthene	20	<10	<10
Acenaphthylene	NS	<10	<10
Acetophenone	NS	<10	<10
Anthracene	50	<10	<10
Atrazine	7.5	<10	<10
Benzaldehyde	NS	<10	<10
Benzo(a)anthracene	NS	<10	<10
Benzo(a)pyrene	NS	<10	<10
Benzo(b)fluoranthene	0.002	<10	<10
Benzo(g,h,i)perylene	NS	<10	<10
Benzo(k)fluoranthene	0.002	<10	<10
Bis(2-chloroethoxy)methane	5	<10	<10
Bis(2-chloroethyl)ether	1	<10	<10
Bis(2-ethylhexyl)phthalate	5	<10	<10
Butyl benzyl phthalate	NS	<10	<10
Caprolactam	NS	<10	<10
Carbazole	NS	<10	<10
Chrysene	0.002	<10	<10
Dibenzo(a,h)anthracene	NS	<10	<10
Dibenzofuran	NS	<10	<10
Diethyl phthalate	50	<10	<10
Dimethyl phthalate	50	<10	<10
Di-n-butyl phthalate	50	<10	<10
Di-n-octyl phthalate	50	<10	<10
Fluoranthene	50	<10	<10
Fluorene	50	<10	<10
Hexachlorobenzene	0.04	<10	<10
Hexachlorobutadiene	0.5	<10	<10
Hexachlorocyclopentadiene	5	<10	<10
Hexachloroethane	5	<10	<10
Indeno(1,2,3-c,d)pyrene	0.002	<10	<10
Isophorone	50	<10	<10
Naphthalene	10	<10	<10
Nitrobenzene	0.4	<10	<10
N-Nitrosodi-n-propylamine	NS	<10	<10
N-Nitrosodiphenylamine	50	<10	<10
Pentachlorophenol	NS	<25	<25
Phenanthrene	50	<10	<10
Phenol	NS	<10	<10
Pyrene	50	<10	<10

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance

NS = No Standard

<b>Table 7</b> <b>PCBs and Pesticides in Groundwater (ug/l)</b> <b>EPA Method 8081/8082</b> <b>109-09 15th Avenue</b> <b>College Point, NY</b> <b>ACT Project No.: 7233-CPNY</b>			
<b>Sample ID</b>		<b>MW-1</b>	<b>MW-3</b>
<b>Sample Date</b>	<b>Standard <sup>1</sup></b>	<b>11/3/14</b>	<b>11/3/14</b>
Toxaphene	0.06	<0.103	<0.118
Methoxychlor	NS	<0.00410	<0.00471
Heptachlor epoxide	0.02	<0.00410	<0.00471
Heptachlor	0.1	<0.00410	<0.00471
gamma-BHC	0.06	<0.00410	<0.00471
Endrin ketone	NS	<0.0103	<0.118
Endrin aldehyde	NS	<0.0103	<0.0118
Endrin	0.1	<0.00410	<0.00471
Endosulfan sulfate	1	<0.00410	<0.00471
Endosulfan II	0.9	<0.00410	<0.00471
Endosulfan I	0.9	<0.00410	<0.00471
Dieldrin	0.044	<0.00205	<0.00205
delta-BHC	0.3	<0.00410	<0.00471
Chlordane, total	0.05	<0.0410	<0.0118
beta-BHC	0.2	<0.00410	<0.00471
alpha-BHC	0.11	<0.00410	<0.00471
Aldrin	0.041	<0.00410	<0.00471
4,4'-DDT	2.1	<0.00410	<0.00471
4,4'-DDE	2.1	<0.00410	<0.00471
4,4'-DDD	2.9	<0.00410	<0.00471
Aroclor 1260	10	<0.0513	<0.0588
Aroclor 1254	10	<0.0513	<0.0588
Aroclor 1248	10	<0.0513	<0.0588
Aroclor 1242	10	<0.0513	<0.0588
Aroclor 1232	10	<0.0513	<0.0588
Aroclor 1221	10	<0.0513	<0.0588
Aroclor 1016	10	<0.0513	<0.0588

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998  
 Bolded values signify detection above method detection limit  
 Highlighted values signify exceedance of regulatory guidance  
 NS = No Standard

Table 7 continued.

PCBs and Pesticides in Groundwater (ug/l)  
 EPA Method 8081/8082  
 109-09 15th Avenue  
 College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard <sup>1</sup>	TW-4 5/29/13	TW-5 5/29/13
4,4'-DDD	2.9	<0.10	<0.10
4,4'-DDE	2.1	<0.10	<0.10
4,4'-DDT	2.1	<0.10	<0.10
Aldrin	0.041	<0.050	<0.050
alpha-BHC	0.11	<0.050	<0.050
alpha-Chlordane	0.05	<0.050	<0.050
Aroclor 1016	10	<1.0	<1.0
Aroclor 1221	10	<2.0	<2.0
Aroclor 1232	10	<1.0	<1.0
Aroclor 1242	10	<1.0	<1.0
Aroclor 1248	10	<1.0	<1.0
Aroclor 1254	10	<1.0	<1.0
Aroclor 1260	10	<1.0	<1.0
beta-BHC	0.2	<0.050	<0.050
delta-BHC	0.3	<0.050	<0.050
Dieldrin	0.044	<0.10	<0.10
Endosulfan I	0.9	<0.050	<0.050
Endosulfan II	0.9	<0.10	<0.10
Endosulfan sulfate	1	<0.10	<0.10
Endrin	0.1	<0.10	<0.10
Endrin aldehyde	NS	<0.10	<0.10
Endrin ketone	NS	<0.10	<0.10
gamma-BHC	0.06	<0.050	<0.050
gamma-Chlordane	0.05	<0.050	<0.050
Heptachlor	0.1	<0.050	<0.050
Heptachlor epoxide	0.02	<0.050	<0.050
Methoxychlor	NS	<0.50	<0.50
Toxaphene	0.06	<5.0	<5.0

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance

NS = No Standard

**Table 8**  
**Total and Dissolved Metals in Groundwater (ug/l)**  
**EPA Method 6010 and 7471**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID Sample Date	Standard <sup>1</sup>	MW-1 11/3/14	MW-3 11/3/14
<b>Total</b>			
Aluminum	100	<b>3,490</b>	<b>137,000</b>
Antimony	3	<5	<5
Arsenic	50	<4	<6
Barium	1,000	<b>186</b>	<b>1,710</b>
Beryllium	3	<1	<1
Cadmium	5	<3	<3
Calcium	NS	<b>98,900</b>	<b>55,600</b>
Chromium	50	<b>12</b>	<b>624</b>
Cobalt	5	<5	<b>196</b>
Copper	200	<b>66</b>	<b>473</b>
Iron	300	<b>14,100</b>	<b>318,000</b>
Lead	50	<b>54</b>	<b>208</b>
Magnesium	35,000	<b>136,000</b>	<b>103,000</b>
Manganese	300	<b>816</b>	<b>49,500</b>
Mercury	0.7	<.2	<.2
Nickel	100	<b>10</b>	<b>439</b>
Potassium	NS	<b>82,800</b>	<b>63,100</b>
Selenium	10	<b>50</b>	<b>67</b>
Silver	NS	<5	<5
Sodium	20,000	<b>775,000</b>	<b>108,000</b>
Thallium	8	<5	<5
Vanadium	14	<b>13</b>	<b>349</b>
Zinc	66	<b>144</b>	<b>801</b>
<b>Dissolved</b>			
Aluminum	100	<10	<10
Antimony	3	<5	<5
Arsenic	50	<4	<4
Barium	1,000	<b>150</b>	<b>47</b>
Beryllium	3	<1	<1
Cadmium	5	<3	<3
Calcium	NS	<b>92,400</b>	<b>27,900</b>
Chromium	50	<5	<5
Cobalt	5	<5	<5
Copper	200	<3	<3
Iron	300	<b>6,460</b>	<20
Lead	50	<3	<3
Magnesium	35,000	<b>121,000</b>	<b>38,800</b>
Manganese	300	<b>777</b>	<5
Mercury	0.7	<.2	<.2
Nickel	100	<5	<5
Potassium	NS	<b>72,200</b>	<b>10,700</b>
Selenium	10	<b>58</b>	<b>27</b>
Silver	NS	<5	<5
Sodium	20,000	<b>756,000</b>	<b>99,200</b>
Thallium	8	<5	<5
Vanadium	14	<10	<10
Zinc	66	<b>14</b>	<b>11</b>

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998  
 Bolded values signify detection above method detection limit  
 Highlighted values signify exceedance of regulatory guidance in dissolved samples  
 NS = No Standard

Table 8 continued.

Dissolved Metals in Groundwater (ug/l)  
 EPA Method 6010 and 7471  
 109-09 15th Avenue  
 College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	Standard <sup>1</sup>	TW-4 5/29/13	TW-5 5/29/13
<b>Total</b>			
Aluminum	100	<0.20	<0.20
Antimony	3	<60.0	<60.0
Arsenic	50	<10.0	<10.0
Barium	1,000	<0.20	<0.20
Beryllium	3	<5.00	<5.00
Cadmium	5	<5.00	<5.00
Calcium	NS	<b>151,000</b>	<b>77,300</b>
Chromium	50	<0.01	<0.01
Cobalt	5	<0.05	<0.05
Copper	200	<0.02	<0.02
Iron	300	<b>90</b>	<b>60</b>
Lead	50	<b>707</b>	<b>650</b>
Magnesium	35,000	<b>131,000</b>	<b>66,800</b>
Manganese	300	<b>2,020</b>	<b>1,880</b>
Nickel	100	<0.04	<0.04
Potassium	NS	<b>53,200</b>	<b>67,800</b>
Selenium	10	<5.00	<5.00
Silver	NS	<0.01	<0.01
Sodium	20,000	<b>743,000</b>	<b>709,000</b>
Thallium	8	<10.0	<10.0
Vanadium	14	<0.05	<0.05
Zinc	66	<0.02	<0.02

<sup>1</sup> NYS DEC TOGS 1.1.1, June, 1998

Bolded values signify detection above method detection limit

Highlighted values signify exceedance of regulatory guidance in dissolved samples

NS = No Standard

**Table 9**  
**Volatile Organic Compounds in Soil Vapor (ug/m3)**  
**EPA Method TO-15**  
**109-09 15th Avenue**  
**College Point, NY**  
**ACT Project No.: 7233-CPNY**

Sample ID	NYSDOH Indoor	SV-1A	SV-2A
Sample Date	Air Guideline <sup>1</sup>	11/13/14	11/13/14
Vinyl chloride	NA	<1.4	<0.25
Vinyl acetate	NA	<7.7	<1.4
Trichloroethene	5	<2.9	<0.53
1,3-Dichloropropene (trans)	NA	<9.9	<1.8
1,2-Dichloroethene (trans)	NA	<8.7	<1.6
Toluene	NA	<b>70</b>	<b>31</b>
Tetrahydrofuran	NA	<b>21</b>	<1.2
Tetrachloroethene	30	<3.7	<b>7.5</b>
Styrene	NA	<9.3	<1.7
Propylene	NA	<3.8	<0.68
4-Ethyltoluene	NA	<11	<b>6.8</b>
Xylenes (m&p)	NA	<b>49</b>	<b>30</b>
Xylenes (o)	NA	<b>14</b>	<b>17</b>
n-Hexane	NA	<b>49</b>	<b>29</b>
n-Heptane	NA	<b>120</b>	<b>66</b>
Methylene chloride	60	<15	<2.7
Methyl tert-butyl ether	NA	<7.9	<1.4
4-Methyl-2-pentanone	NA	<9.0	<1.6
Isopropanol	NA	<11	<1.9
1,3-Hexachlorobutadiene	NA	<23	<4.2
Ethylbenzene	NA	<b>20</b>	<b>11</b>
Ethyl acetate	NA	<16	<2.8
Cyclohexane	NA	<7.5	<b>1.6</b>
1,3-Dichloropropene (cis)	NA	<9.9	<1.8
1,2-Dichloroethene (cis)	NA	<8.7	<1.6
Chloromethane	NA	<4.5	<b>1.3</b>
Chloroform	NA	<11	<b>5.6</b>
Chloroethane	NA	<5.8	<1.0
Carbon tetrachloride	NA	<3.4	<0.62
Carbon disulfide	NA	<b>29</b>	<b>6.3</b>
Bromomethane	NA	<8.5	<1.5
Bromoform	NA	<23	<4.1
Bromodichloromethane	NA	<14	<2.5
Benzyl Chloride	NA	<11	<2.0
Benzene	NA	<b>13</b>	<b>10</b>
Acetone	NA	<b>130</b>	<b>68</b>
2-Hexanone	NA	<b>22</b>	<b>10</b>
2-Butanone	NA	<b>360</b>	<b>100</b>
1,4-Dioxane	NA	<7.9	<1.4
1,4-Dichlorobenzene	NA	<13	<2.4
1,3-Dichlorobenzene	NA	<13	<2.4
1,3-Butadiene	NA	<9.5	<b>23</b>
1,3,5-Trimethylbenzene	NA	<11	<1.9
1,2-Dichlorotetrafluoroethane	NA	<15	<2.8
1,2-Dichloropropane	NA	<10	<1.8
1,2-Dichloroethane	NA	<8.9	<1.6
1,2-Dichlorobenzene	NA	<13	<2.4
1,2,4-Trimethylbenzene	NA	<11	<b>6.2</b>
1,2,4-Trichlorobenzene	NA	<16	<2.9
1,1-Dichloroethene	NA	<8.7	<1.6
1,1-Dichloroethane	NA	<8.9	<1.6
Trichlorofluoromethane	NA	<12	<b>6.2</b>
1,1,2-Trichloroethane	NA	<12	<2.2
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	<17	<b>3.9</b>
1,1,2,2-Tetrachloroethane	NA	<15	<2.7
1,1,1-Trichloroethane	30	<12	<2.2
Dichlorodifluoromethane	NA	<11	<b>2.3</b>
1,2-Dibromoethane	NA	<17	<3.0
Dibromochloromethane	NA	<18	<3.2
Methyl Methacrylate	NA	<9.0	<1.6
Chlorobenzene	NA	<10	<1.8

<sup>1</sup> Table 3.1, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

<sup>3</sup> Matrix 1, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

<sup>4</sup> Matrix 2, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

Bolded values signify detection above method detection limit

Highlighted values signify detection above guidance value

NA = Guidance Value Not Available

Table 9 continued.

Volatile Organic Compounds in Sub-Slab Vapor (ug/m3)  
EPA Method TO-15  
109-09 15th Avenue  
College Point, NY

ACT Project No.: 7233-CPNY

Sample ID Sample Date	NYSDOH Guideline <sup>1</sup>	SV-1 5/30/13	SV-2 5/30/13	SV-3 5/30/13
1,1,1-Trichloroethane	NA	<1.09	<b>3.9</b>	<b>1.2</b>
1,1,2,2-Tetrachloroethane	NA	<1.37	<1.37	<1.37
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	<0.77	<0.77	<0.77
1,1,2-Trichloroethane	NA	<1.09	<1.09	<1.09
1,1-Dichloroethane	NA	<0.81	<0.81	<0.81
1,1-Dichloroethene	NA	<0.79	<0.79	<0.79
1,2,4-Trichlorobenzene	NA	<1.48	<1.48	<1.48
1,2,4-Trimethylbenzene	NA	<b>3.5</b>	<b>4.8</b>	<b>3.3</b>
1,2-Dibromoethane	NA	<1.54	<1.54	<1.54
1,2-Dichlorobenzene	NA	<1.20	<1.20	<1.20
1,2-Dichloroethane	NA	<0.81	<0.81	<0.81
1,2-Dichloroethene (cis)	NA	<0.79	<0.79	<0.79
1,2-Dichloroethene (trans)	NA	<0.79	<0.79	<0.79
1,2-Dichloropropane	NA	<0.92	<0.92	<0.92
1,2-Dichlorotetrafluoroethane	NA	<1.40	<1.40	<1.40
1,3,5-Trimethylbenzene	NA	<b>1.2</b>	<b>1.6</b>	<b>1.2</b>
1,3-Butadiene	NA	<0.44	<0.44	<0.44
1,3-Dichlorobenzene	NA	<1.20	<1.20	<1.20
1,3-Dichloropropene (cis)	NA	<0.91	<0.91	<0.91
1,3-Dichloropropene (trans)	NA	<0.91	<0.91	<0.91
1,3-Hexachlorobutadiene	NA	<2.13	<2.13	<2.13
1,4-Dichlorobenzene	NA	<1.20	<1.20	<1.20
1,4-Dioxane	NA	<0.72	<0.72	<0.72
2,2,4-Trimethylpentane	NA	<0.93	<0.93	<0.93
4-Ethyltoluene	NA	<b>1.6</b>	<b>2.2</b>	<b>1.5</b>
Acetone	NA	3.7	<b>6.7</b>	55.9
Acrylonitrile	NA	<0.43	<0.43	<0.43
Benzene	NA	<b>1.6</b>	<b>1.3</b>	<b>1.6</b>
Bromodichloromethane	NA	<1.34	<1.34	<1.3
Bromoform	NA	<2.07	<2.07	<2.07
Bromomethane	NA	<0.78	<0.78	<0.78
Carbon disulfide	NA	<b>1.0</b>	<0.62	<b>1.1</b>
Carbon tetrachloride	NA	<1.26	<1.26	<b>12.3</b>
Chlorobenzene	NA	<0.92	<0.92	<0.92
Chloroethane	NA	<0.53	<0.53	<0.53
Chloroform	NA	<0.98	<b>2.8</b>	<b>1.3</b>
Chloromethane	NA	<b>2.9</b>	<b>3.2</b>	<0.41
Cyclohexane	NA	<0.69	<b>0.8</b>	<b>1.3</b>
Dibromochloromethane	NA	<1.70	<1.70	<1.70
Dichlorodifluoromethane	NA	<b>1.8</b>	<b>1.8</b>	<b>2.0</b>
Ethanol	NA	<b>13.1</b>	<b>5.5</b>	<b>30.1</b>
Ethyl acetate	NA	<0.72	<0.72	<0.72
Ethylbenzene	NA	<b>6.1</b>	<b>7.7</b>	<b>5.8</b>
Isopropanol	NA	<b>1.2</b>	<b>0.9</b>	<b>17.0</b>
Methyl butyl ketone	NA	<0.82	<0.82	<0.82
Methyl ethyl ketone	NA	<b>1.0</b>	<b>1.3</b>	<b>3.8</b>
Methyl isobutyl ketone	NA	<0.82	<0.82	<0.82
Methyl tert-butyl ether	NA	<0.72	<0.72	<0.72
Methylene chloride	60	<b>1.6</b>	<b>4.4</b>	<b>3.6</b>
n-Heptane	NA	<b>2.5</b>	<b>3.2</b>	<b>3.3</b>
n-Hexane	NA	<b>2.2</b>	<b>2.8</b>	<b>3.8</b>
Propylene	NA	<b>1.4</b>	<b>3.2</b>	<b>1.0</b>
Styrene	NA	<b>1.6</b>	<b>1.7</b>	<b>1.7</b>
tert-Butyl Alcohol	NA	<b>3.5</b>	<b>3.8</b>	<b>7.2</b>
Tetrachloroethene	100	<1.36	<b>5.0</b>	<b>5.8</b>
Tetrahydrofuran	NA	<0.59	<b>1.5</b>	<b>1.2</b>
Toluene	NA	<b>24.0</b>	<b>28.8</b>	<b>28.7</b>
Trichloroethene	5	<1.07	<b>36.3</b>	<b>9.0</b>
Trichlorofluoromethane	NA	<b>1.6</b>	<b>1.9</b>	<b>2.5</b>
Vinyl acetate	NA	<0.70	<0.70	<0.70
Vinyl bromide	NA	<0.87	<0.87	<0.87
Vinyl chloride	NA	<0.51	<0.51	<0.51
Xylenes (m&p)	NA	<b>18.1</b>	<b>25.8</b>	<b>18.3</b>
Xylenes (o)	NA	<b>5.7</b>	<b>8.0</b>	<b>5.5</b>

<sup>1</sup> Table 3.1, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

<sup>2</sup> Matrix 1, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

<sup>3</sup> Matrix 2, NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006)

Bolded values signify detection above method detection limit

Highlighted values signify detection above guidance value

NA = Guidance Value Not Available

**Table 10**

**Depth to Groundwater**

**4118/30 24th Street  
Long Island City, NY**

**ACT Project No.: 7233-CPNY**

<b>Date Sampled</b>	<b>Monitoring Well ID</b>	<b>Depth to water</b>
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8/7/14	MW-1	4.89
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8/7/14	MW-3	6.17
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# **APPENDIX 1**

## **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and Kings USA Group Inc. 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, Kings USA Group Inc. 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, Rebecca Bub, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841

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

manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at [brownfields@cityhall.nyc.gov](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. Kings USA Group Inc. will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Poppenhusen Public Library

121-23 14<sup>th</sup> Avenue, College Point, NY 11356

718-369-1102

Monday: 12:00 pm – 8:00 pm

Tuesday: 1:00 pm – 6:00 pm

Wednesday: 10:00 am – 6:00 am

Thursday: 12:00 pm – 8:00 pm

Friday: 10:00 am – 6:00 am

Saturday and Sunday: 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.

**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 Kings USA Group Inc., reviewed and approved by OER prior to distribution and mailed by

Kings USA Group Inc.. 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 2**

### **SUSTAINABILITY STATEMENT**

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

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

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

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

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

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

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

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

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

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

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

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

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

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

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

**Paperless Brownfield Cleanup Program.** Kings USA Group Inc. is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

**Low-Energy Project Management Program.** Kings USA Group Inc. is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and

teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

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

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

## **APPENDIX 3**

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

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

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

#### **1.2 STOCKPILE METHODS**

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

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

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

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

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

The PE/QEP overseeing the remedial action will:

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

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

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

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

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

Outbound truck transport routes are shown in Figure 11. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

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

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

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

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

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization

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

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 is not anticipated to be reused on-Site. ‘Reuse on-Site’ means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed.

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

### **1.8 DEMARCATION**

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer.

A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

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

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

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. No backfill of soil is projected with the exception of landscaped areas.

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 4**

**HEALTH AND SAFETY PLAN**



**CONSTRUCTION  
HEALTH AND SAFETY PLAN**

**10-09 15<sup>th</sup> Avenue  
College Point, New York 11356  
Block 4044, Lot 60  
OER Project Number 13RHAZ374Q**

**ACT File #: 7723-CPNY**

**January 13<sup>th</sup>, 2014**

**Prepared for:**

**Mr. Ben Lam  
King's USA Group Inc.  
37-11 Prince Street, Suite 2C  
Flushing, New York 11543**

**Prepared by:**

**Advanced Cleanup Technologies, Inc.  
110 Main Street, Suite 103  
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<u>TABLE OF CONTENTS</u>		<u>Page No.</u>
<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>1.1</b>	<b>Purpose</b>	<b>1</b>
<b>1.2</b>	<b>Site Description</b>	<b>1</b>
<b>1.3</b>	<b>Environmental Concerns</b>	<b>2</b>
<b>2.0</b>	<b>SITE PERSONNEL</b>	<b>2</b>
<b>3.0</b>	<b>PROTECTIVE EQUIPMENT</b>	<b>4</b>
<b>4.0</b>	<b>HAZARD EVALUATION</b>	<b>5</b>
<b>4.1</b>	<b>Chemical Exposure</b>	<b>5</b>
<b>4.2</b>	<b>Temperature Hazards</b>	<b>6</b>
<b>4.2.1</b>	<i>Heat Exposure Hazards</i>	<b>6</b>
<b>4.2.2</b>	<i>Cold Exposure Hazards</i>	<b>7</b>
<b>4.3</b>	<b>Fire Prevention</b>	<b>8</b>
<b>4.4</b>	<b>Operation of Heavy Equipment</b>	<b>8</b>
<b>5.0</b>	<b>MANAGEMENT AND PLANNING</b>	<b>9</b>
<b>5.1</b>	<b>General Site Control</b>	<b>9</b>
<b>5.2</b>	<b>Health and Safety Communication</b>	<b>9</b>
<b>5.3</b>	<b>Air Monitoring</b>	<b>10</b>
<b>5.3.1</b>	<i>Community Air Monitoring</i>	<b>10</b>
<b>5.3.2</b>	<i>Activity-Specific Air Monitoring</i>	<b>11</b>
<b>5.4</b>	<b>Dust Control</b>	<b>12</b>
<b>5.5</b>	<b>Spill Control and Prevention</b>	<b>12</b>
<b>5.6</b>	<b>Decontamination Procedures</b>	<b>13</b>
<b>5.7</b>	<b>Soil Disposal</b>	<b>13</b>
<b>6.0</b>	<b>EMERGENCY MEDICAL CARE AND PROCEDURES</b>	<b>14</b>



**TABLE OF CONTENTS (Continued)**

**FIGURES**

**NUMBER**

**TITLE**

**1**

**Hospital Route**

**TABLES**

**NUMBER**

**TITLE**

**1**

**NIOSH Exposure Limits**

**APPENDICES**

**SECTION**

**TITLE**

**A**

**Chemical Safety Cards**

**B**

**Respirator Fit Test Procedures**



## 1.0 INTRODUCTION

The re-development of a three story existing building into 6-story residential building is being proposed at the property located at 109-09 15<sup>th</sup> Avenue, College Point, New York (“the Site”). This Construction Health and Safety Plan (CHASP) has been prepared to identify site-specific health and safety procedures to be followed by on-site contractors during remedial activities at the site. All activities performed under this CHASP are targeted to comply with Occupational Safety and Health Administration (OSHA) Regulations 29 CFR Part 1910, *et seq.*

### **1.1 Purpose**

The purpose of this CHASP is to provide the contractors’ field personnel, and other visitors with an understanding of the potential chemical and physical hazards that exist or may arise while portions of this project are being performed. The primary objective is to ensure the well being of all field personnel and the community surrounding this site. A copy of this CHASP will be available to anyone that requests it. Visiting personnel (e.g. government officials, administrators, bank inspectors, assessors, etc.) that will have limited exposure to the site native soil/fill material during construction activities will be instructed on how to reduce the probability of exposure to site contaminants, but will not be required read the CHASP.

All on-site personnel shall familiarize themselves with the contents of this CHASP and the remedial activities planned for the site. Personnel choosing not to comply with this CHASP will be removed from the worksite.

### **1.2 Site Description**

A diagram of the vicinity of the Site is provided as Figure 2 of the accompanying Remedial Action Work Plan. The most recent use of the site was as three consecutive warehouses. The site is currently vacant.

The site is bounded by a residential building to the north, a vacant building to the south, a multi-use building to the east, and Flushing Bay to the west.



### **1.3 Environmental Concerns**

A Remedial Investigation Report dated December 2014, was prepared by ACT. The purpose of the report was to delineate the extent for contamination at the site related to the E-designation that had been assigned to the site. The scope of work included the installation of 4 test pits, sampling of two existing groundwater monitoring wells, and 2 soil vapor probes and the analysis of eight soil samples, two groundwater samples and 2 soil vapor samples. The report concluded the following:

- Shallow soil at the Site contained exceedances of semi-volatile organic compounds above regulatory criteria and metals.
- Groundwater samples showed exceedances of semi-volatile organic compounds.
- Soil vapor contained exceedances of chlorinated solvents above NYSDOH Indoor air guidelines. The highest concentrations were detected on the north eastern side of the site.

### **2.0 SITE PERSONNEL**

All on-site personnel shall have training in accordance with the regulations codified at 29 CFR 1910.20. Proof that the qualifications of the on-site personnel comply with these regulations will be maintained by the Site Supervisor prior to their being allowed to be included in the on-Site workforce.

All on-site personnel shall familiarize themselves with the contents of the CHASP, the scope of the Remedial Action Work Plan (RAWP) for the Site and attend a daily site-specific health and safety briefing prior to the commencement of work activities. Personnel choosing not to comply with this CHASP will be removed from the worksite.

ACT's Site Supervisor will have oversight responsibility over the project to ensure that this CHASP is properly implemented and that ACT and its subcontractors adhere to all OSHA regulations and other established industry health and safety practices.

Each contractor will designate an on-site individual responsible for health and safety issues relating to excavation and construction activities. Each contractor will communicate to the Site Supervisor the name of this individual and what specific actions are to be taken by each contractor



during that work day that will be required to comply with the CHASP.

The Site Supervisor will coordinate the activities of all other contractors on-site so as not to jeopardize the health and safety of any personnel on-site. In addition, the Site Supervisor will continually monitor and inspect personnel and equipment for compliance with established safe work practices.

A list of the pertinent personnel authorized to supervise site health and safety operations is presented below:

Title	Name	Telephone Number
Site Supervisor ACT	Timothy Young	516-640-2947
Project Manager ACT	Theresa Burkard	516-441-5800, Ext. 105
Health and Safety Officer ACT	Yisong Yang	516-441-5800, Ext. 108

### **3.0 PROTECTIVE EQUIPMENT**

Personal Protective Equipment (PPE) is divided into the following four categories based on the degree of protection afforded:

- Level A: This PPE level will be selected when the greatest level of skin, respiratory, and eye protection is required. It includes positive pressure, full face-piece self-contained breathing apparatus (SCBA), or NIOSH-approved positive pressure supplied air respirator with escape SCBA and a totally-encapsulating chemical-protective suit.
- Level B: This PPE level will be selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is needed. It includes positive



pressure, full face-piece SCBA, or NIOSH-approved positive pressure supplied air respirator with escape SCBA and hooded chemical-resistant clothing such as overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit or disposable chemical-resistant overalls.

Level C: This PPE level will be selected when the concentration(s) and type(s) of airborne substance(s) present in the work area is known and the criteria for using air purifying respirators are met. It includes full-face or half-mask, NIOSH-approved air purifying respirators and hooded chemical-resistant clothing such as overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit or disposable chemical-resistant overalls.

Level D: This PPE level will be selected for nuisance contamination only. It includes coveralls, gloves, chemical-resistant steel toe and shank boots, safety glasses or chemical splash goggles, hard hat, escape mask and face shield.

PPE shall be selected in accordance with the site air monitoring program (Section 5.3), 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.

Before site personnel are required to use any respirator with a negative or positive pressure tight-fitting face-piece, the personnel will be fit tested with the same make, model, style, and size of respirator that will be used. The fit test shall be administered using only an OSHA-accepted fit test protocol. The OSHA-accepted fit test protocols and procedures provided for in 29 CFR 1910.120 are contained in Appendix B of this CHASP.

All Site workers will be required to participate in a comprehensive PPE program. The PPE program will consist of daily “Tailgate” Health and Safety meetings, proper inspection, donning, use, maintenance, storage and decontamination of protective clothing and equipment, use of protective



equipment in temperature extremes and monitoring of co-workers and the work environment.

The Site Supervisor will determine the level of protection required for all field activities and whether the level of protection should be upgraded. It is anticipated that all on-site activities will be conducted in Level D PPE, unless otherwise upgraded by the Site Supervisor. Changes in the level of protection will be recorded in the dedicated site logbook along with the rationale for the changes.

## **4.0 HAZARD EVALUATION**

### **4.1 Chemical Exposure**

A list of chemicals including VOCs, SVOCs, metals, pesticides and PCBs that are present in subsurface soil at the Site is provided in Table 1. These types of contaminants at the detected concentrations represent a low to moderate potential for exposure. The standards listed in the table represent Immediate Danger to Life and Health (IDLH), Time-Weighted Average (TWA) and Short-Term Exposure Limit (STEL).

The primary routes of exposure for these chemicals are inhalation, ingestion and absorption through the skin and mucous membranes. The health risks associated with the exposure to these substances during construction activities will be minimized through a combination of education, personal protection equipment (PPE) and dust control measures.

### **4.2 Temperature Hazards**

#### **4.2.1 Heat Exposure Hazards**

Heat stress may occur even in moderate temperature areas and may present any or all of the following:

#### **Heat Rash**

Heat rash results from continuous exposure to heat, humid air, and chafing clothes. Heat rash is uncomfortable and decreases the ability to tolerate heat.

#### **Heat Cramps**

Cramps result from the inadequate replacement of body electrolytes lost through perspiration.



Signs include severe spasms and pain in the extremities and abdomen.

### Heat Exhaustion

Exhaustion results from increased stress on the vital organs of the body in the effort to meet the body's cooling demands. Signs include shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness.

### Heat Stroke

Heat stroke results from an overworked cooling system. Heat stroke is the most serious form of heat stress. Body surfaces must be cooled and medical help must be obtained immediately to prevent severe injury and/or death. Signs include red, hot, dry skin, absence of perspiration, nausea, dizziness and confusion, strong, rapid pulse, coma, and death.

The following procedures should be followed to prevent or control heat stroke:

- A. Replace body fluids (water and electrolytes) lost through perspiration. Solutions may include a 0.1% salt and water solution or commercial mixes such as "Gatorade". Employees must be encouraged to drink more than the amount required in order to satisfy thirst.
- B. Use cooling devices to aid the natural body ventilation. Cooling occurs through evaporation of perspiration and limited body contact with heat-absorbing protective clothing. Utilize fans and air conditioners to assist in evaporation. Long, cotton underwear is suggested to absorb perspiration and limit any contact with heat-absorbing protective clothing (i.e., coated Tyvek suits).
- C. Provide shelter against heat and direct sunlight to protect personnel. Take breaks in shaded areas.
- D. Rotate workers utilizing protective clothing during hot weather.
- E. Establish a work regime that will provide adequate rest periods, with personnel working in shifts.

### 4.2.2 Cold Exposure Hazards

Work schedules will be adjusted to provide sufficient rest periods in a heated area for warming



up during operations conducted in cold weather. Also, thermal protective clothing such as wind and/or moisture resistant outerwear is recommended to be worn.

If work is performed continuously in the cold at or below  $-7^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ), including wind chill factor, heated warming shelters (company vehicles, rest rooms, etc.) shall be made available nearby and the worker should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria, are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing shall be removed and the remainder of the clothing loosened to permit sweat evaporation.

A change of dry work clothing shall be provided as necessary to prevent workers from returning to their work with wet clothing. Dehydration, or the loss of body fluids, occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of a diuretic and circulatory effect (adapted from TLV's and Biological Exposure Indices 1988-1989, ACGIH).

### **4.3 Fire Prevention**

One portable fire extinguisher with a rating (ratio) of 20 pound A/B/C will be conspicuously and centrally located at the site. Portable extinguishers will be properly tagged with inspection dates and maintained in accordance with standard maintenance procedures for portable fire extinguishers. The following fire prevention guidelines are to be followed:

- Only approved safety cans will be used to transport and store flammable liquids.
- All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool prior to filling.
- Smoking is not allowed during any operations within the work area in which petroleum products or solvents in free-floating, dissolved, or vapor forms, or other flammable liquids may be present.



- No open flame or spark is allowed in any area containing petroleum products or other flammable liquids.

#### **4.4 Operation of Heavy Equipment**

When operating or working around heavy equipment, the Site Supervisor will ensure that site personnel conform to this CHASP to include the wearing of proper clothing such as hard hats and safety glasses. Any specific health and safety issues relating to the equipment to be used on-site that work day will be covered in the daily health and safety briefing.

### **5.0 MANAGEMENT AND PLANNING**

#### **5.1 General Site Control**

The Site Supervisor will establish a command post within the Site. A perimeter site fence, as required by the New York City Department of Buildings, will be erected to define the limits of the Site. All work must be performed within the site fence. Flagmen and traffic control will be provided as required at all times.

The Site will be left hazard-free at the end of each work day. In addition, all fence gates will be operable and locked in a closed position, all site fencing will be properly standing or braced and site lighting will be operational. The property owner will provide site security during off-work hours.

During site excavation, worker exposure to potential hazardous substances will be minimized through Health and Safety Communication (Section 5.2), Decontamination Procedures (Section 5.3) and Dust Control Methods (Section 5.3).

#### **5.2 Health and Safety Communication**

The relatively small size of the work area makes normal verbal communication the primary mode of communication for the project. In the event that verbal communication is impossible the following hand signals will be used.



Gripping a partners wrist = “Leave area immediately”

Hands on top of head = “ I need assistance”

Thumbs up = “OK; I’m alright; I understand”

Thumbs down = “No; Negative”

Daily Health and Safety Meetings will address a list of tasks to be performed that day, the equipment and machinery involved, and any hazards identified with this type of activity. Workers will be given the opportunity to list out additional perceived hazards, and discuss safe work practices while in these operations. The daily safety meeting will also be an opportunity to review the work performed the previous day, any hazards encountered, mitigating actions taken, and suggestions for future improvement.

### **5.3 Air Monitoring**

This section of the CHASP discusses air monitoring that will be performed to address community and site personnel concerns of possible exposures due to airborne migration of suspected contaminants that may be encountered during on-site field activities.

Periodic air monitoring will be performed for VOCs at the perimeter of the work area once every two hours during field activities. Continuous air monitoring will be performed for VOCs during all ground intrusive activities such as soil excavation, loading and offsite transport. All ambient air readings will be recorded and provided as an appendix in the P.E.-certified Remedial Closure Report.

#### **5.3.1 Community Air Monitoring**

Periodic air monitoring for VOCs at the perimeter of the work area will be accomplished as follows:

- VOCs will be monitored at the upwind perimeter of the work area at the start of each work day and periodically thereafter to establish background conditions. The monitoring will be performed utilizing a Photovac 2020 portable Photoionization Detector (PID) equipped with a 10.6 eV lamp capable of detecting the types of

contaminants known or suspected to be present.

- VOCs will be monitored at the downwind perimeter of the work area daily at 2 hour intervals. If ambient air concentrations of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background, work activities will be 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 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 work area 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.

### ***5.3.2 Activity-Specific Air Monitoring***

Continuous air monitoring will be conducted inside the work area for VOC levels during all ground-intrusive activities, such as soil excavation, loading and offsite transport in accordance with 29 CFR 1910.120(h). Continuous air monitoring will also be performed utilizing a Photovac 2020 PID. Continuous air monitoring will be performed in the following manner:

- Volatile organic compounds will be monitored inside the work area of construction and health and safety personnel on a continuous basis. The PID will be programmed to calculate 15-minute running average concentrations. If ambient air concentrations of total organic vapors inside the work area exceed 5 ppm above background, work activities will be 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 inside the work area 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 inside the work area 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.

#### **5.4 Dust Control**

Each contractor shall control any dust generated on-site that may be produced during work activities. Dust control measures will be employed to ensure that there is no off-site migration of dust into the community by use of a stream of water applied through a fine spray nozzle. The NYC hydrant used for a water source will be fitted with a RPZ control device to prevent inadvertent contamination of the public water supply. In addition, a solid barrier fence will be installed around the perimeter of the property to control any fugitive migration of dust.

#### **5.5 Spill Control and Prevention**

Spills associated with site activities may be attributed to project specific heavy 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.

#### **5.6 Decontamination Procedures**

Contaminants will be removed from personnel and equipment through a decontamination



regiment. Workers will be required to remove any contaminated PPE before leaving the Site. Work boots, safety glasses, hard hats and work gloves will be washed in a two percent Alconox Solution, followed by three consecutive clean water rinses. All wash and rinse water will be containerized into a DOT drum. Gross contaminants will be brushed from worker's clothing before leaving the Site. A station for hand washing will also be set up.

Decontamination of heavy equipment will also be required before leaving the Site. Excavator buckets and vehicle wheels or tracks will be brushed clean with a broom, before being moved off-site. Reusable hand tools will be washed in a two percent Alconox solution, followed by a series of clean water rinses. All wash and rinse water will be containerized in appropriate steel drums for proper disposal.

### **5.7 Soil Disposal**

Any contaminated soil (organic or inorganic constituents) encountered during the remedial activities will be segregated, stockpiled on-site onto polyethylene sheeting, and covered with polyethylene sheeting to prevent exposure to workers and the community until proper transportation and disposal in accordance with all NYSDEC Regulations is arranged.

## **6.0 EMERGENCY MEDICAL CARE AND PROCEDURES**

If a personnel accident occurs on-site requiring emergency care, immediate care will be administered appropriate to the injury in accordance with established Red Cross procedures and practices. In the event of serious injury to on-site personnel, the Emergency Medical Service of the City of New York (EMS) will be summoned to remove the injured individual to the nearest medical facility for treatment as follows.

<b>Ambulance:</b>	<b>911</b>
<b>Fire Department:</b>	<b>911</b>
<b>Flushing Hospital Medical Center:</b>	<b>(718) 670-5000</b>
<b>Police:</b>	<b>911</b>



**Poison Control Center:**

**(516) 542-2323**

The nearest emergency medical facility is the Flushing Hospital Medical Center, 4500 Parsons Boulevard, Flushing, New York, which is located 3.7 miles from the Site. Transport will be by on-site vehicle or by calling NYC EMS personnel. A map of the route to this hospital is attached. Directions to the hospital from the site are provided below.

- **Head east on 15<sup>th</sup> Avenue towards 110<sup>th</sup> Street;**
- **Take 2<sup>nd</sup> right onto 119<sup>th</sup> Street;**
- **Turn left onto 23<sup>rd</sup> Avenue;**
- **Turn left toward Northern Boulevard;**
- **Slight right onto Northern Boulevard**
- **Turn right onto Parsons Boulevard;**
- **Flushing Hospital Medical Center is located on the right.**

OSHA approved First Aid Kits will be maintained on-Site along with a First Aid blanket for treating shock, and will be readily accessible to all workers if an emergency occurs. The emergency signal for evacuation of personnel from the Site will be three (3) long blasts of a vehicle horn with the off-site rallying point designated as the corner of 35th Street and 8th Avenue. If in the event of a fire, explosion or other life-threatening incident on-site, the emergency signal above will be sounded and all personnel will evacuate the Site. The appropriate New York City emergency personnel (fire, police, etc.) will be immediately notified.

All injuries, no matter how slight, will be reported to the site safety supervisor immediately. The Site Supervisor will complete an accident report for all incidents. Some injuries, such as severe lacerations or burns, may require immediate treatment. Unless required due to immediate danger, seriously injured persons should not be moved without direction from attending medical personnel. The Site Supervisor will record occupational injuries and illnesses within 48 hours of occurrence, as required by statute.

**Table 1**  
**NIOSH Exposure Limits**

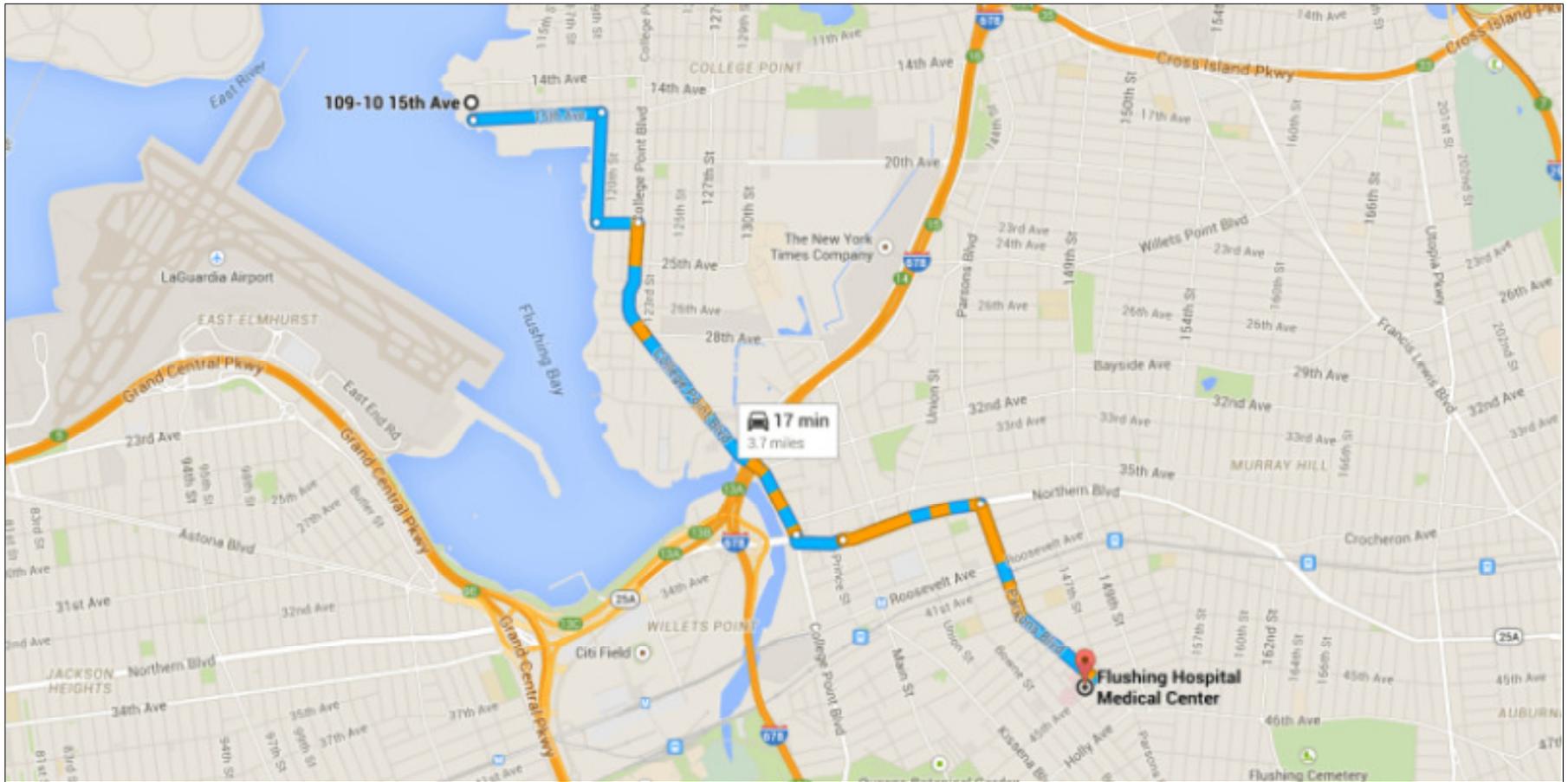
**TABLE 1**  
**NIOSH Exposure Limits (mg/m<sup>3</sup>)<sup>1</sup>**

Chemical	IDLH	TWA	STEL
Benzene	1625	1.63	8.13
Toluene	1900	375	560
Ethylbenzene	3530	435	545
Xylenes	3970	435	655
Naphthalene	1250	50	75
Acenaphthene	N.L.	N.L.	N.L.
Anthracene	N.L.	N.L.	N.L.
Pyrene	N.L.	N.L.	N.L.
Chrysene	N.L.	N.L.	N.L.
Benzo(b)Fluoranthene	N.L.	N.L.	N.L.
Benzo(a)Pyrene	N.L.	N.L.	N.L.
Benzo(ghi)Perylene	N.L.	N.L.	N.L.
Polychlorinated Biphenyl	5.0	0.5	N.L.
Aldrin	25	0.25	N.L.
Endrin	2	0.1	N.L.
Chlordane	100	0.5	N.L.
Toxaphene	200	0.5	N.L.
DDT	500	1	N.L.
Silver	10	0.01	N.L.
Barium	1100	0.5	N.L.
Cadmium	9	0.05	N.L.
Selenium	1	0.2	N.L.
Lead	100	0.05	N.L.
Mercury	10	0.05	N.L.
Arsenic	5	0.01	N.L.
Chromium	250	0.5	N.L.

<sup>1</sup> All values taken from NIOSH International Chemical Safety Cards  
([Http://www.cdc.gov/niosh/ipcsneng/nengname.html](http://www.cdc.gov/niosh/ipcsneng/nengname.html))  
N.L..... None Listed

**Figure 1**

**Hospital Route**



Source Google Maps



<b>Hospital Route</b>	
110 Main Street, Suite 103, Port Washington, New York 11050 Tel: 516-441-5800 Fax: 516-441-5511	
Project No.: 7233-CPNY	Figure No.: 1
Date: 01/13/2015	Scale: Not To Scale

**Appendix A**  
**Chemical Safety Cards**

# International Chemical Safety Cards

**BENZENE**

ICSC: 0015



Cyclohexatriene  
Benzol  
C<sub>6</sub>H<sub>6</sub>  
Molecular mass: 78.1

ICSC # 0015  
CAS # 71-43-2  
RTECS # CY1400000  
UN # 1114  
EC # 601-020-00-8  
June 05, 2003 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive. Risk of fire and explosion: see Chemical Dangers.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	<b>MAY BE ABSORBED!</b> Dry skin. Redness. Pain. (Further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
<b>•EYES</b>	Redness. Pain.	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>	Abdominal pain. Sore throat. Vomiting. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>

Remove all ignition sources. 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. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Fireproof. Separated from food and feedstuffs oxidants halogens	Do not transport with food and feedstuffs. Note: E F symbol T symbol R: 45-46-11-36/38-48/23/24/25-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: II
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**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0015**

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

## BENZENE

**ICSC: 0015**

<b>I M P O R T A N T I N F O R M A T I O N</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</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>PHYSICAL DANGERS:</b> The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with oxidants, nitric acid, sulfuric acid and halogens causing fire and explosion hazard. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 ppm as TWA 2.5 ppm as STEL (skin) A1 BEI (ACGIH 2004). MAK: H Carcinogen category: 1 Germ cell mutagen group: 3A (DFG 2004). OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm See <u>Appendix F</u> NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See <u>Appendix A</u> NIOSH IDLH: Ca 500 ppm See: <u>71432</u></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 eyes the skin and the respiratory tract Swallowing the liquid may cause aspirati on into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system, resulting in lowering of consciousness Exposure far above the occupational exposure limit value may result in unconsciousness death</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the bone marrow immune system, resulting in a decrease of blood cells. This substance is carcinogenic to humans.</p>
<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 80°C Melting point: 6°C Relative density (water = 1): 0.88 Solubility in water, g/100 ml at 25°C: 0.18 Vapour pressure, kPa at 20°C: 10 Relative vapour density (air = 1): 2.7</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: -11°C c.c. Auto-ignition temperature: 498°C Explosive limits, vol% in air: 1.2-8.0 Octanol/water partition coefficient as log Pow:</p>

	2.13
<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. 
<b>NOTES</b>	
Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II NFPA Code: H2; F3; R0	
<b>ADDITIONAL INFORMATION</b>	
<b>ICSC: 0015</b>	<b>BENZENE</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.

# International Chemical Safety Cards

## TOLUENE

ICSC: 0078



Methylbenzene  
Toluol  
Phenylmethane  
C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub> / C<sub>7</sub>H<sub>8</sub>  
Molecular mass: 92.1

ICSC # 0078  
CAS # 108-88-3  
RTECS # XS5250000  
UN # 1294  
EC # 601-021-00-3  
October 10, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Cough. Sore throat. Dizziness. Drowsiness. Headache. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<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>	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II
<b>SEE IMPORTANT INFORMATION ON BACK</b>		
<p><b>ICSC: 0078</b></p> <p style="text-align: center;">Prepared in the context of cooperation between the International Programme on Chemical Safety &amp; 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</p>		

# International Chemical Safety Cards

## TOLUENE

ICSC: 0078

<b>I M P O R T A N T I N F O R M A T I O N</b>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts violently with strong oxidants causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: Pregnancy risk group: C (DFG 2004). EU OEL: 192 mg/m<sup>3</sup> 50 ppm as TWA 384 mg/m<sup>3</sup> 100 ppm as STEL (skin) (EU 2006). OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak) NIOSH REL: TWA 100 ppm (375 mg/m<sup>3</sup>) ST 150 ppm (560 mg/m<sup>3</sup>) NIOSH IDLH: 500 ppm See: <a href="#">108883</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 can be reached rather quickly on evaporation of this substance at 20°C.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the central nervous system. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmia and unconsciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system. Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 111°C                      Melting point: -95°C                      Relative density (water = 1): 0.87                      Solubility in water: none</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01                      Flash point: 4°C c.c.                      Auto-ignition temperature: 480°C</p>

	Vapour pressure, kPa at 25°C: 3.8 Relative vapour density (air = 1): 3.1	Explosive limits, vol% in air: 1.1-7.1 Octanol/water partition coefficient as log Pow: 2.69
<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms.	

**NOTES**

Depending on the degree of exposure, periodic medical examination is suggested. Use of alcoholic beverages enhances the harmful effect. Card has been partly updated in October 2004: see sections Occupational Exposure Limits, EU classification, Emergency Response. Card has been partly updated in October 2006: see section Occupational Exposure Limits.

Transport Emergency Card: TEC (R)-30S1294  
NFPA Code: H 2; F 3; R 0;

**ADDITIONAL INFORMATION**

**ICSC: 0078**

**TOLUENE**

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# International Chemical Safety Cards

## ETHYLBENZENE

ICSC: 0268



Ethylbenzol  
Phenylethane  
EB  
C<sub>8</sub>H<sub>10</sub>/C<sub>6</sub>H<sub>5</sub>C<sub>2</sub>H<sub>5</sub>  
Molecular mass: 106.2

ICSC # 0268  
CAS # 100-41-4  
RTECS # DA0700000  
UN # 1175  
EC # 601-023-00-4  
November 23, 2007 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Dry powder. Foam. Carbon dioxide.
<b>EXPLOSION</b>	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging or handling.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS!	
<b>•INHALATION</b>	Cough. Sore throat. Dizziness. Drowsiness. Headache.	Ventilation, 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. crimation; deleted at update Nov 07 - only at very high levels.	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>	Burning sensation in the throat and chest. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Collect leaking	Fireproof. Separated from strong oxidants. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	F symbol Xn symbol R: 11-20

liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer Do NOT let this chemical enter the environment.

S: 2-16-24/25-29  
 UN Hazard Class: 3  
 UN Packing Group: II  
 Signal: Danger  
 Flame-Excl mark-Health haz  
 Highly flammable liquid and vapour  
 May be harmful if swallowed  
 Harmful if inhaled vapour  
 Causes mild skin irritation  
 Causes eye irritation  
 Suspected of causing cancer  
 May cause respiratory irritation  
 May cause drowsiness or dizziness  
 May be harmful if swallowed and enters airways  
 Toxic to aquatic life

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0268**

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: 0268**

## ETHYLBENZENE

<p>I M P O R T A N T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b>                  COLOURLESS LIQUID , WITH AROMATIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b>                  The vapour mixes well with air, explosive mixtures are easily formed.</p> <p><b>CHEMICAL DANGERS:</b>                  Reacts with strong oxidants. Attacks plastic and rubber.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b>                  TLV: 100 ppm as TWA 125 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2007).                  EU OEL: 442 mg/m<sup>3</sup> 100 ppm as TWA 884 mg/m<sup>3</sup> 200 ppm as STEL (skin) (EU 2006).                  OSHA PEL: TWA 100 ppm (435 mg/m<sup>3</sup>)                  NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 125 ppm (545 mg/m<sup>3</sup>)                  NIOSH IDLH: 800 ppm 10%LEL See: <u>100414</u></p>	<p><b>ROUTES OF EXPOSURE:</b>                  The substance can be absorbed into the body by inhalation of its vapour, 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.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b>                  The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure above the OEL could cause lowering of consciousness.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b>                  This substance is possibly carcinogenic to humans. The substance may have effects on the kidneys and liver , resulting in impaired functions Repeated contact with skin may cause dryness and cracking.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 136°C                  Melting point: -95°C                  Relative density (water = 1): 0.9</p>	<p>Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02                  Flash point: 18°C e.e.</p>

	Solubility in water, g/100 ml at 20°C: 0.015 Vapour pressure, kPa at 20°C: 0.9 Relative vapour density (air = 1): 3.7	Auto-ignition temperature: 432°C Explosive limits, vol% in air: 1.0-6.7 Octanol/water partition coefficient as log Pow: 3.1 Viscosity, mm <sup>2</sup> /s at 25 °C: 0.6
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<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.	
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**NOTES**

The odour warning when the exposure limit value is exceeded is insufficient.  
 Transport Emergency Card: TEC (R)-305 1135 or 30GF1- I+II  
 NFPA Code: H2; F3; R0

**ADDITIONAL INFORMATION**

<b>ICSC: 0268</b>	(C) IPCS, CEC, 1994	<b>ETHYLBENZENE</b>
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# International Chemical Safety Cards

ICSC: 0086

## p-XYLENE



para-Xylene  
 1,4-Dimethylbenzene  
 p-Xylol  
 $C_6H_4(CH_3)_2 / C_8H_{10}$   
 Molecular mass: 106.2

ICSC # 0086  
 CAS # 106-42-3  
 RTECS # ZE2625000  
 UN # 1307  
 EC # 601-022-00-9  
 August 03, 2002 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Above 27°C explosive vapour/air mixtures may be formed.	Above 27°C use a closed system, ventilation, and explosion-proof electrical equipment. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
<b>•INHALATION</b>	Dizziness. Drowsiness. Headache. Nausea.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	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>	Burning sensation. Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as	Fireproof. Separated from strong oxidants and strong acids	Note:  Xn symbol

possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)

R: 10-20/21-38  
S: 2-25  
UN Hazard Class: 3  
UN Packing Group: III

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0086**

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-XYLENE

**ICSC: 0086**

<p>I M P O R T A N T A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.</p> <p><b>PHYSICAL DANGERS:</b> As a result of flow, agitation, etc., electrostatic charges can be generated.</p> <p><b>CHEMICAL DANGERS:</b> Reacts with strong acids strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 100 ppm as TWA 150 ppm as STEL A4 (ACGIH 2001). BEI (ACGIH 2001). EU OEL: 50 ppm as TWA 100 ppm as STEL (skin) (EU 2000). OSHA PEL†: TWA 100 ppm (435 mg/m<sup>3</sup>) NIOSH REL: TWA 100 ppm (435 mg/m<sup>3</sup>) ST 150 ppm (655 mg/m<sup>3</sup>) NIOSH IDLH: 900 ppm See: <a href="#">95476</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.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance is irritating to the eyes and the skin. The substance may cause effects on the central nervous system. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The liquid defats the skin. The substance may have effects on the central nervous system. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 138°C Melting point: 13°C Relative density (water = 1): 0.86 Solubility in water: none Vapour pressure, kPa at 20°C: 0.9</p>	<p>Relative vapour density (air = 1): 3.7 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 27°C c.c. Auto-ignition temperature: 528°C Explosive limits, vol% in air: 1.1-7.0 Octanol/water partition coefficient as log Pow: 3.15</p>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is toxic to aquatic organisms.</p> 	
<p><b>NOTES</b></p>		

Depending on the degree of exposure, periodic medical examination is indicated. The recommendations on this Card also apply to technical xylene. See ICSC 0084 o-Xylene and 0085 m-Xylene.

Transport Emergency Card: TEC (R)-30S1307-III  
 NFPA Code: H 2; F 3; R 0;

Card has been partially updated in January 2008: see Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

ICSC: 0086

**p-XYLENE**

(C) IPCS, CEC, 1994

**IMPORTANT  
 LEGAL  
 NOTICE:**

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# International Chemical Safety Cards

## NAPHTHALENE

ICSC: 0667



Naphthene  
 $C_{10}H_8$   
 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 Validated



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>		<b>PREVENT DISPERSION OF DUST!</b>	
<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>	<b>MAY BE ABSORBED!</b> (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.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
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

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# International Chemical Safety Cards

ICSC: 0667

## NAPHTHALENE

<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> 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: <u>91203</u></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>
<p><b>PHYSICAL PROPERTIES</b></p>	<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>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.</p> 	
<p><b>NOTES</b></p>		
<p>Some individuals may be more sensitive to the effect of naphthalene on blood cells. Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF 1 -II+III (solid); 4 I S2304 (molten) NFPA Code: H2; F2; R0;</p>		

**ADDITIONAL INFORMATION****ICSC: 0667****NAPHTHALENE**

(C) IPCS, CEC, 1994

**IMPORTANT  
LEGAL  
NOTICE:**

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# International Chemical Safety Cards

## ACENAPHTHENE

ICSC: 1674



1,2-Dihydroacenaphthylene  
 1,8-Ethylenenaphthalene  
 $C_{12}H_{10}$   
 Molecular mass: 154.2

ICSC # 1674  
 CAS # 83-32-9  
 RTECS # AB1000000  
 UN # 3077

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 NOTES.	PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P2 filter respirator for harmful particles. 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 Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	UN Hazard Class: 9 UN Packing Group: III Signal: Warning Enviro Very toxic to aquatic life with long lasting effects

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1674

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

**ACENAPHTHENE**

ICSC: 1674

<p>I M P O R T A N T  D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> WHITE TO BEIGE CRYSTALS</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 toxic gases including carbon monoxide. Reacts with strong oxidants</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. 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> See Notes.</p>
<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 279°C Melting point: 95°C Density: 1.2 g/cm<sup>3</sup> Solubility in water, g/100 ml at 25°C: 0.0004</p>	<p>Vapour pressure, Pa at 25°C: 0.3 Relative vapour density (air = 1): 5.3 Flash point: 135°C o.c. Auto-ignition temperature: &gt;450 °C Octanol/water partition coefficient as log Pow: 3.9 - 4.5</p>
<b>ENVIRONMENTAL DATA</b>	<p>The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.</p>	
<b>NOTES</b>		
<p>Acenaphthene occurs as a pure substance and also as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-90GM7-III</p>		
<b>ADDITIONAL INFORMATION</b>		



**ICSC: 1674****ACENAPHTHENE**

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# International Chemical Safety Cards

## ANTHRACENE

ICSC: 0825



Anthracin  
 Paranaphthalene  
 $C_{14}H_{10} / (C_6H_4CH)_2$   
 Molecular mass: 178.2

ICSC # 0825  
 CAS # 120-12-7  
 RTECS # CA9350000  
 March 24, 1999 Validated

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>	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	In case of fire: keep drums, etc., cool by spraying with water.
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
<b>•INHALATION</b>	Cough. Sore throat.	Ventilation (not if powder), 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 spectacles, face shield, 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>	Abdominal pain.	Do not eat, drink, or smoke during work.	Rinse mouth. Rest. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles).		Separated from strong oxidants. Well closed.	
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 0825</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

## ANTHRACENE

ICSC: 0825

I M P O R T A N T D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> WHITE CRYSTALS OR FLAKES.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation.
	<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> The substance decomposes on heating, under influence of strong oxidants producing acrid, toxic fume, causing fire and explosion hazard.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance slightly irritates the skin and the respiratory tract.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established.	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis under the influence of UV light.

<b>PHYSICAL PROPERTIES</b>	Boiling point: 342°C Melting point: 218°C Density: 1.25-1.28 g/cm <sup>3</sup> Solubility in water, g/100 ml at 20 °C: 0.00013 Vapour pressure, Pa at 25°C: 0.08	Relative vapour density (air = 1): 6.15 Flash point: 121°C Auto-ignition temperature: 538°C Explosive limits, vol% in air: 0.6-? Octanol/water partition coefficient as log Pow: 4.5 (calculated)
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<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.	
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<b>NOTES</b>	
Green oil, Tetra-olive N2G are trade names.	NFPA Code: H0; F1; R;

<b>ADDITIONAL INFORMATION</b>	

<b>ICSC: 0825</b>	<b>ANTHRACENE</b>
(C) IPCS, CEC, 1994	

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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 Validated

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.
<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 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.	
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 1474</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

## PYRENE

ICSC: 1474

<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> YELLOW COLOURLESS SOLID IN VARIOUS FORMS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating producing irritating fumes</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV not established. MAK not established.</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 when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Exposure to sun may provoke an irritating effect of pyrene on skin and lead to chronic skin discoloration.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>
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<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 404°C Melting point: 151°C Density: 1.27 g/cm<sup>3</sup></p>	<p>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</p>
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<b>ENVIRONMENTAL DATA</b>	<p>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.</p>	
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### 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	(C) IPCS, CEC, 1994	PYRENE
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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 Health haz-Enviro Suspected of causing cancer Very toxic to aquatic life Toxic to aquatic life with long lasting effects
<b>SEE IMPORTANT INFORMATION ON BACK</b>		
<b>ICSC: 1672</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

## CHRYSENE

ICSC: 1672

I M P O R T A N T I N F O R M A T I O N	<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: skin absorption (H); Carcinogen category: 2 (DFG 2007).</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>
<b>PHYSICAL PROPERTIES</b>	Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm <sup>3</sup>	Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9
<b>ENVIRONMENTAL DATA</b>	The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.	



### NOTES

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

Transport Emergency Card: TEC (R)-90GM7-III  
 Card has been partially updated in January 2008: see Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 1672**

**CHRYSENE**

(C) IPCS, CEC, 1994

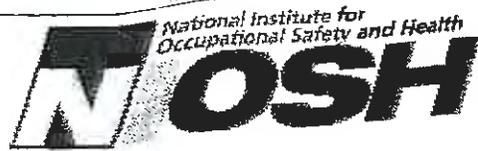
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# International Chemical Safety Cards

ICSC: 0720

## BENZO(b)FLUORANTHENE



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 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Sweep spilled substance into covered containers: if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

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# International Chemical Safety Cards

## BENZO(b)FLUORANTHENE

ICSC: 0720

I M P O R T A N T  D A T A	<b>PHYSICAL STATE; APPEARANCE:</b> COLOURLESS CRYSTALS	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol and through the skin.
	<b>PHYSICAL DANGERS:</b>	<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> Upon heating, toxic fumes are formed.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b>
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: A2 (suspected human carcinogen); (ACGIH 2004). MAK: Carcinogen category: 2; (DFG 2004).	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> This substance is possibly carcinogenic to humans. May cause genetic damage in humans.
<b>PHYSICAL PROPERTIES</b>	Boiling point: 481°C Melting point: 168°C Solubility in water: none	Octanol/water partition coefficient as log Pow: 6.12
<b>ENVIRONMENTAL DATA</b>	This substance may be hazardous to the environment; special attention should be given to air quality and water quality.	
<b>NOTES</b>		
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.		
<b>ADDITIONAL INFORMATION</b>		
<b>ICSC: 0720</b>	<b>BENZO(b)FLUORANTHENE</b>	
(C) IPCS, CEC, 1994		



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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 Validated

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!	
<b>•INHALATION</b>		Local exhaust or breathing protection.	Fresh air, rest.
<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>		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.
<b>•INGESTION</b>		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,	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

then remove to safe place.

**SEE IMPORTANT INFORMATION ON BACK**

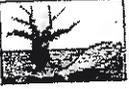
**ICSC: 0104**

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**

<p>I M P O R T A N T D A T A</p>	<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>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm<sup>3</sup></p>	<p>Solubility in water: none (&lt;0.1 g/100 ml) Vapour pressure: negligible Octanol/water partition coefficient as log Pow: 6.04</p>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>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.</p> 	
<p><b>NOTES</b></p>		
<p>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.</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		

**ICSC: 0104****BENZO(a)PYRENE**

(C) IPCS, CEC, 1994

**IMPORTANT  
LEGAL  
NOTICE:**

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# International Chemical Safety Cards

## BENZO(ghi)PERYLENE

ICSC: 0739



1,12-Benzoperylene  
 1,12-Benzperylene  
 $C_{22}H_{12}$   
 Molecular mass: 276.3

ICSC # 0739  
 CAS # 191-24-2  
 RTECS # DI6200500  
 October 18, 1999 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions.	NO open flames.	In case of fire in the surroundings: all extinguishing agents allowed.
<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. 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. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Well closed.	

**SEE IMPORTANT INFORMATION ON BACK**

ICSC: 0739

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(ghi)PERYLENE

ICSC: 0739

<p style="text-align: center;">I M P O R T A N T D A T A</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> PALE YELLOW-GREEN CRYSTALS.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed.</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 of its aerosol and through the skin.</p> <p><b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful 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></p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 550°C Melting point: 278°C Density: 1.3 g/cm<sup>3</sup></p>	<p>Solubility in water: none Octanol/water partition coefficient as log Pow: 6.58</p>
<p><b>ENVIRONMENTAL DATA</b></p>	<p>This substance may be hazardous to the environment; special attention should be given to air and water.</p>	
<p><b>NOTES</b></p>		
<p>Benzo(ghi)perylene 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. Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken.</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		
<p><b>ICSC: 0739</b></p>	<p>(C) IPCS, CEC, 1994</p>	<p><b>BENZO(ghi)PERYLENE</b></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>	



# International Chemical Safety Cards

## POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939



Chlorobiphenyl (54% chlorine)  
 Chlorodiphenyl (54% chlorine)  
 PCB  
 Molecular mass: 327 (average)

ICSC # 0939  
 CAS # 11097-69-1  
 RTECS # TQ1360000  
 UN # 2315  
 EC # 602-039-00-4  
 October 20, 1999 Validated



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: powder, carbon dioxide.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
<b>•INHALATION</b>		Ventilation.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	MAY BE ABSORBED! Dry skin. Redness.	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, 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>	Headache, Numbness.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.		Separated from food and feedstuffs. Cool. Dry. Keep in a well-ventilated room.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Severe marine pollutant. Note: C Xn symbol N symbol R: 33-50/53 S: 2-35-60-61 UN Hazard Class: 9 UN Packing Group: II
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
ICSC: 0939		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

## POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939

I  M	<b>PHYSICAL STATE; APPEARANCE:</b> LIGHT YELLOW VISCOUS LIQUID.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.
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P O R T A N T D A T A	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.
	<b>CHEMICAL DANGERS:</b> The substance decomposes in a fire producing irritating and toxic gases	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b>
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m <sup>3</sup> as TWA (skin) A3 (ACGIH 2004). MAK: 0.05 ppm 0.70 mg/m <sup>3</sup> H Peak Irritation category: II(8) Carcinogen category: 3B Pregnancy risk group: B (DFG 2004).	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver. Animal tests show that this substance possibly causes toxic effects upon human reproduction.
	OSHA PEL: TWA 0.5 mg/m <sup>3</sup> skin	
	NIOSH REL*: Ca TWA 0.001 mg/m <sup>3</sup> See Appendix A *Note: The REL also applies to other PCBs.	
	NIOSH IDLH: Ca 5 mg/m <sup>3</sup> See: IDLH INDEX	
<b>PHYSICAL PROPERTIES</b>	Relative density (water = 1): 1.5 Solubility in water: none	Vapour pressure, Pa at 25°C: 0.01 Octanol/water partition coefficient as log Pow: 6.30 (estimated)
<b>ENVIRONMENTAL DATA</b>	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.	
<b>NOTES</b>		
Changes into a resinous state (pour point) at 10°C. Distillation range: 365°-390°C.		
Transport Emergency Card: TEC (R)-90GM2-II-L		
<b>ADDITIONAL INFORMATION</b>		
<b>ICSC: 0939</b>	<b>POLYCHLORINATED BIPHENYL (AROCLOR 1254)</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	

# International Chemical Safety Cards

**ALDRIN**

ICSC: 0774



1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-exo-1,4-endo-5,8-dimethanonaphthalene  
 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-,  
 (1alpha,4alpha,4aβ,5alpha,8alpha,8aβ)  
 HHDN  
 $C_{12}H_8Cl_6$   
 Molecular mass: 364.9

ICSC # 0774

CAS # 309-00-2

RTECS # IO2100000

UN # 2761

EC # 602-048-00-3

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: 24/25-40-48/24/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II
<b>SEE IMPORTANT INFORMATION ON BACK</b>		
<p><b>ICSC: 0774</b></p> <p>Prepared in the context of cooperation between the International Programme on Chemical Safety &amp; 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.</p>		

## International Chemical Safety Cards

### ALDRIN

ICSC: 0774

<p>I M P O R T A N T D A T A</p>	<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 and corrosive fumes including hydrogen chloride. Reacts with acids and oxidants. Attacks many metals in presence of water.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.25 mg/m<sup>3</sup> (as TWA), A3 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m<sup>3</sup> skin absorption (H); Peak limitation category: II(8) (DFG 2006). OSHA PEL: TWA 0.25 mg/m<sup>3</sup> skin NIOSH REL: Ca TWA 0.25 mg/m<sup>3</sup> skin <u>See Appendix A</u> NIOSH IDLH: Ca 25 mg/m<sup>3</sup> <u>See: 309002</u></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. The effects may be delayed. 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>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point at 0.27kPa: 145°C Melting point: 104-105°C Density: 1.6 g/cm<sup>3</sup></p>	<p>Solubility in water: none Vapour pressure, Pa at 20°C: 0.009 Octanol/water partition coefficient as log Pow: 7.4</p>
<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, honey bees. 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</p> 	

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.

**NOTES**

Other melting points: 49-60°C (technical grade). 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. The recommendations on this Card also apply to ICSC 0787 (dieldrin). Aldrec, Aldrex, Aldrite, Aldron, Aldrosol, Algran, Alttox, Drinox, Octalene, Seedrin, and Toxadrin are trade names.

Transport Emergency Card: TEC (R)-61G41b.  
 NFPA Code: H2; F0; R0;

Card has been partially updated in August 2007: see Storage, Occupational Exposure Limits.

**ADDITIONAL INFORMATION**

**ICSC: 0774**

**ALDRIN**

(C) IPCS, CEC, 1994

**IMPORTANT  
 LEGAL  
 NOTICE:**

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# International Chemical Safety Cards

**ENDRIN**

ICSC: 1023



$C_{12}H_8Cl_6O$   
Molecular mass: 380.9

ICSC # 1023  
CAS # 72-20-8  
RTECS # 101575000  
UN # 2761  
EC # 602-051-00-X  
March 10, 2000 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!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	(See Ingestion).	Local exhaust or 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. Refer for medical attention.
<b>•EYES</b>		Face shield 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>	Dizziness. Weakness. Headache. Nausea. Vomiting. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. 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. Do NOT let this chemical enter the environment. (Extra personal protection:	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 24-28-50/53

chemical protection suit including self-contained breathing apparatus).

S: 1/2-22-36/37-45-60-61  
UN Hazard Class: 6.1  
UN Packing Group: I

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1023**

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# International Chemical Safety Cards

**ICSC: 1023**

## ENDRIN

<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> WHITE CRYSTALS</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> The substance decomposes on heating above 245°C, producing hydrogen chloride phosgene</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.1 mg/m<sup>3</sup> (skin) (ACGIH 2000). OSHA PEL: TWA 0.1 mg/m<sup>3</sup> skin NIOSH REL: TWA 0.1 mg/m<sup>3</sup> skin NIOSH IDLH: 2 mg/m<sup>3</sup> See: <u>72208</u></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 or when dispersed, especially if powdered.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance may cause effects on the central nervous system, resulting in convulsions and death. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>
<b>PHYSICAL PROPERTIES</b>	<p>Decomposes below boiling point at 245°C Melting point: 200°C Density: 1.7 g/cm<sup>3</sup></p>	<p>Solubility in water, g/100 ml at 25°C: none Vapour pressure, Pa at 25°C: negligible Octanol/water partition coefficient as log Pow: 5.34</p>
<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 mammals It is strongly advised not to let the chemical enter into the environment because it persists in the environment. In the food chain important to humans, bioaccumulation takes place, specifically in fish seafood Avoid release to the environment in circumstances different to normal use.</p>	
<b>NOTES</b>		
<p>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.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61G41a</p>		



NFPA Code: H3; F0; R; 0

**ADDITIONAL INFORMATION**

**ICSC: 1023**

**ENDRIN**

(C) IPCS, CEC, 1994

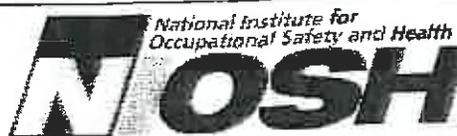
**IMPORTANT  
LEGAL  
NOTICE:**

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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  
 $C_{10}H_6Cl_8$   
 Molecular mass: 409.8

ICSC # 0740  
 CAS # 57-74-9  
 UN # 2996  
 EC # 602-047-00-8  
 March 26, 1998 Validated



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.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
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		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 feeds stuffs. Severe marine pollutant. Xn symbol N symbol

including self-contained breathing apparatus.

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 D A T A</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 See <u>Appendix A</u>                  NIOSH IDLH: Ca 100 mg/m<sup>3</sup> See: <u>57749</u></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>
<b>PHYSICAL PROPERTIES</b>	<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>
<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 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>	
<b>NOTES</b>		
<p>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,</p>		



Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclor, and Toxichlor are trade names. Also consult ICSC 0743 Heptachlor.

Transport Emergency Card: TEC (R)-61GT6-III

**ADDITIONAL INFORMATION**

**ICSC: 0740**

**CHLORDANE (TECHNICAL PRODUCT)**

(C) IPCS, CEC, 1994

**IMPORTANT  
LEGAL  
NOTICE:**

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Occupational Safety and Health

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September 2005

# NIOSH Pocket Guide to Chemical Hazards

[NPG Home](#) | [Introduction](#) | [Synonyms & Trade Names](#) | [Chemical Names](#) | [CAS Numbers](#) | [RTECS Numbers](#) | [Appendices](#) | [Search](#)

## Chlorinated camphene

CAS 8001-35-2

C<sub>10</sub>H<sub>10</sub>Cl<sub>8</sub>RTECS [XW5250000](#)

### Synonyms & Trade Names

Chlorocamphene, Octachlorocamphene, Polychlorocamphene, Toxaphene

DOT ID &amp; Guide

2761 [151](#)

### Exposure

NIOSH REL: Ca [skin] [See Appendix A](#)

### Limits

OSHA PEL†: TWA 0.5 mg/m<sup>3</sup> [skin]IDLH Ca [200 mg/m<sup>3</sup>] See:  
[8001352](#)[Conversion](#)

### Physical Description

Amber, waxy solid with a mild, piney, chloro- and camphor-like odor. [insecticide]

MW: 413.8

BP: Decomposes

MLT: 149-194°F

Sol: 0.0003%

VP(77°F): 0.4 mmHg

IP: ?

Sp.Gr. 1.65

F.P.: NA

UEL: NA

LEL: NA

Noncombustible Solid, but may be dissolved in flammable liquids.

### Incompatibilities & Reactivities

Strong oxidizers [Note: Slightly corrosive to metals under moist conditions.]

### Measurement Methods

NIOSH [5039](#)See: [NMAM](#) or [OSHA Methods](#)

### Personal Protection & Sanitation (See [protection codes](#))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated/Daily

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

### First Aid (See [procedures](#))

Eye: Irrigate immediately

Skin: Soap wash promptly

Breathing: Respiratory support

Swallow: Medical attention immediately

### Respirator Recommendations NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus[Important additional information about respirator selection](#)

### Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Nausea, confusion, agitation, tremor, convulsions, unconsciousness; dry, red skin; [potential occupational carcinogen]

Target Organs central nervous system, skin

Cancer Site [in animals: liver cancer]

See also: [INTRODUCTION](#) See [ICSC CARD: 0843](#)

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# International Chemical Safety Cards

DDT

ICSC: 0034

National Institute for  
Occupational Safety and Health

**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<sub>14</sub>H<sub>9</sub>Cl<sub>5</sub>  
 Molecular mass: 354.5

ICSC # 0034  
 CAS # 50-29-3  
 RTECS # KJ3325000  
 UN # 2761  
 EC # 602-045-00-7  
 April 20, 2004 Validated

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!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	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.
•INGESTION	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.
<b>SPILLAGE DISPOSAL</b>	<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>	
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.	
<b>SEE IMPORTANT INFORMATION ON BACK</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

DDT

ICSC: 0034

<p>I M P O R T A N T A D D A</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> <u>See Appendix A</u> NIOSH IDLH: Ca 500 mg/m<sup>3</sup> <u>See: 50293</u></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>
<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>
<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>	
<p><b>NOTES</b></p>		
<p>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.</p> <p style="text-align: right;">Transport Emergency Card: TEC (R)-61GT7-III</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		
<p>ICSC: 0034</p>	<p>DDT</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>	

# International Chemical Safety Cards

**SILVER**

ICSC: 0810



Argentum  
C.I. 77820  
Ag

ICSC # 0810  
CAS # 7440-22-4  
IRTECS # VW3500000  
September 10, 1997 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Not combustible, except as powder.		
<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.	Rinse skin with plenty of water or shower.
• <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.	
SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING	
Sweep spilled substance into containers: if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Separated from ammonia, strong hydrogen peroxide solutions, strong acids.		
<b>SEE IMPORTANT INFORMATION ON BACK</b>			
<b>ICSC: 0810</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

# SILVER

ICSC: 0810

I M P O R T A N T A C T I V E I N F O R M A T I O N	<b>PHYSICAL STATE; APPEARANCE:</b> WHITE METAL, TURNS DARK ON EXPOSURE TO OZONE, HYDROGEN SULFIDE OR SULFUR.	<b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.
	<b>PHYSICAL DANGERS:</b>	<b>INHALATION RISK:</b> Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
	<b>CHEMICAL DANGERS:</b> Shock-sensitive compounds are formed with acetylene. Reacts with acids causing fire hazard. Contact with strong hydrogen peroxide solution will cause violent decomposition to oxygen gas. Contact with ammonia may cause formation of compounds that are explosive when dry.	<b>EFFECTS OF SHORT-TERM EXPOSURE:</b> Inhalation of high amounts of metallic silver vapours may cause lung damage with pulmonary oedema.
	<b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV (metal): 0.1 mg/m <sup>3</sup> (ACGIH 1997). EU OEL: 0.1 mg/m <sup>3</sup> as TWA (EU 2000). OSHA PEL: TWA 0.01 mg/m <sup>3</sup> NIOSH REL: TWA 0.01 mg/m <sup>3</sup> NIOSH IDLH: 10 mg/m <sup>3</sup> (as Ag) See: <u>IDLH INDEX</u>	<b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> The substance may cause a grey-blue discoloration of the eyes, nose, throat and skin (argyria/argyrosis).
<b>PHYSICAL PROPERTIES</b>	Boiling point: 2212°C Melting point: 962°C	Relative density (water = 1): 10.5 Solubility in water: none
<b>ENVIRONMENTAL DATA</b>	This substance may be hazardous to the environment; special attention should be given to aquatic organisms.	
<b>NOTES</b>		
Card has been partially updated in March 2008: see Occupational Exposure Limits.		
<b>ADDITIONAL INFORMATION</b>		
ICSC: 0810		SILVER
(C) IPCS, CEC, 1994		



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# International Chemical Safety Cards

**BARIUM**

ICSC: 1052



Ba  
Atomic mass: 137.3

ICSC # 1052  
CAS # 7440-39-3  
RTECS # CQ8370000  
UN # 1400  
October 20, 1999 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable. Many reactions may cause fire or explosion.	NO open flames, NO sparks, and NO smoking. NO contact with water.	Special powder, dry sand, NO hydrous agents, 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! STRICT HYGIENE!	
<b>•INHALATION</b>	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
<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>		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT wash away into sewer.		Separated from halogenated solvents, strong oxidants, acids. Dry. Keep under inert gas, oil or oxygen-free liquid.	UN Hazard Class: 4.3 UN Packing Group: II

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 1052**

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# International Chemical Safety Cards

**BARIUM**

**ICSC: 1052**

<p>I M P O R T A N T A I N F O R M A T I O N</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> YELLOWISH TO WHITE LUSTROUS SOLID IN VARIOUS FORMS.</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by ingestion.</p>	
	<p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p>	<p><b>INHALATION RISK:</b></p>	
	<p><b>CHEMICAL DANGERS:</b> The substance may spontaneously ignite on contact with air (if in powder form). The substance is a strong reducing agent and reacts violently with oxidants and acids. Reacts violently with halogenated solvents. Reacts with water, forming flammable/explosive gas (hydrogen - see ICSC0001), causing fire and explosion hazard.</p>	<p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b> The substance irritates the eyes, the skin and the respiratory tract.</p>	
	<p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.5 mg/m<sup>3</sup> (as TWA) (ACGIH 1999).</p>	<p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>	
	<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 1640°C Melting point: 725°C Density: 3.6 g/cm<sup>3</sup></p>	<p>Solubility in water: reaction</p>
	<p><b>ENVIRONMENTAL DATA</b></p>		
	<p><b>NOTES</b></p>		
	<p>Reacts violently with fire extinguishing agents such as water, bicarbonate, powder, foam, and carbon dioxide. Rinse contaminated clothes (fire hazard) with plenty of water.</p>		
	<p>Transport Emergency Card: TEC (R)-43G12</p>		
	<p><b>ADDITIONAL INFORMATION</b></p>		
<p><b>ICSC: 1052</b></p>		<p><b>BARIUM</b></p>	
<p>(C) IPCS, CEC, 1994</p>			

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**NOTICE:**

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# International Chemical Safety Cards

ICSC: 0020

## CADMIUM



Cd  
Atomic mass: 112.4

ICSC # 0020  
CAS # 7440-43-9  
RTECS # EU9800000  
UN # 2570  
EC # 048-002-00-0  
April 22, 2005 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
<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>IN ALL CASES CONSULT A DOCTOR!</b>
<b>•INHALATION</b>	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>•EYES</b>	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>•INGESTION</b>	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.		Fireproof. Dry. Keep under inert gas. Separated from ignition sources, oxidants acids, food and feedstuffs	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T- symbol N symbol

R: 45-26-48/23/25-62-63-68-50/53  
 S: 53-45-60-61  
 UN Hazard Class: 6.1

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0020**

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# International Chemical Safety Cards

## CADMIUM

**ICSC: 0020**

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

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

**ADDITIONAL INFORMATION**

**ICSC: 0020**

**CADMIUM**

(C) IPCS, CEC, 1994

**IMPORTANT  
LEGAL  
NOTICE:**

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# International Chemical Safety Cards

## SELENIUM

ICSC: 0072



Se  
(powder)

ICSC # 0072  
CAS # 7782-49-2  
RTECS # VS7700000  
EC # 034-001-00-2  
April 26, 1993 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide. NO water
<b>EXPLOSION</b>	Risk of fire and explosion on contact with oxidants.		
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
<b>•INHALATION</b>	Irritation of nose. Cough. Dizziness. Headache. Laboured breathing. Nausea. Sore throat. Vomiting. Weakness. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>•SKIN</b>	Redness. Skin burns. Pain. Discolouration.	Protective gloves. Protective clothing.	Rinse skin with plenty of water or shower. Refer for medical attention. Remove and isolate contaminated clothes.
<b>•EYES</b>	Redness. Pain. Blurred vision.	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>	Metallic taste. Diarrhoea. Chills. Fever. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.		Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs Dry.	Airtight. Do not transport with food and feedstuffs. T symbol R: 23/25-33-53 S: 1/2-20/21-28-45-61

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0072**

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

**SELENIUM**

**ICSC: 0072**

I M P O R T A N T I N F O R M A T I O N	<p><b>PHYSICAL STATE; APPEARANCE:</b>                  ODOURLESS SOLID IN VARIOUS FORMS.                  DARK RED-BROWN TO BLUISH-BLACK                  AMORPHOUS SOLID OR RED                  TRANSPARENT CRYSTALS OR METALLIC                  GREY TO BLACK CRYSTALS.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b>                  Upon heating, toxic fumes are formed. Reacts violently with oxidants strong acids Reacts with water at 50°C forming flammable/explosive gas (hydrogen - see ICSC0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorous and metals such as nickel, zinc, sodium, potassium, platinum.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b>                  TLV: 0.2 mg/m<sup>3</sup> as TWA (ACGIH 2004).                  MAK: (Inhalable fraction) 0.05 mg/m<sup>3</sup>                  Peak limitation category: II(4); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).                  OSHA PEL*: TWA 0.2 mg/m<sup>3</sup> *Note: The PEL also applies to other selenium compounds (as Se) except Selenium hexafluoride.                  NIOSH REL*: TWA 0.2 mg/m<sup>3</sup> *Note: The REL also applies to other selenium compounds (as Se) except Selenium hexafluoride.                  NIOSH IDLH: 1 mg/m<sup>3</sup> (as Se) See: 7782492</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 when dispersed.</p> <p><b>EFFECTS OF SHORT-TERM EXPOSURE:</b>                  The substance is irritating to the eyes and the respiratory tract. Inhalation of dust may cause lung oedema (see Notes). Inhalation of fume may cause symptoms of asphyxiation, chills and fever and bronchitis. 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. The substance may have effects on the respiratory tract, gastrointestinal tract, and skin, resulting in nausea, vomiting, cough, yellowish skin discoloration, loss of nails, garlic breath and bad teeth.</p>
	<p><b>PHYSICAL PROPERTIES</b></p> <p>Boiling point: 685°C                  Melting point: 170-217°C                  Relative density (water = 1): 4.8</p> <p>Solubility in water:                  none                  Vapour pressure, Pa at 20°C: 0.1</p>	
<p><b>ENVIRONMENTAL DATA</b></p>		
<p><b>NOTES</b></p> <p>Do NOT take working clothes home.</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		

**ICSC: 0072****SELENIUM**

(C) IPCS, CEC, 1994

**IMPORTANT  
LEGAL  
NOTICE:**

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# International Chemical Safety Cards

**LEAD**

ICSC: 0052



Lead metal  
Plumbum  
Pb  
(powder)

ICSC # 0052  
CAS # 7439-92-1  
RTECS # OF7525000  
August 10, 2002 Validated

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

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0052**

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

# International Chemical Safety Cards

**LEAD**

**ICSC: 0052**

<p>I M P O R T A N T I N F O R M A T I O N</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>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation and by ingestion.</p>
	<p><b>PHYSICAL DANGERS:</b> Dust explosion possible if in powder or granular form, mixed with air.</p>	<p><b>INHALATION RISK:</b> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.</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>EFFECTS OF SHORT-TERM EXPOSURE:</b></p>
	<p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: 0.05 mg/m<sup>3</sup> as TWA A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004). MAK: Carcinogen category: 2; Germ cell mutagen group: 3A; (DFG 2006). 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> See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C. NIOSH REL*: TWA 0.050 mg/m<sup>3</sup> See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C. NIOSH IDLH: 100 mg/m<sup>3</sup> (as Pb) See: 7439921</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. This substance is probably carcinogenic to humans. fast track change Oct 06 - IARC 2A.</p>
<b>PHYSICAL PROPERTIES</b>	<p>Boiling point: 1740°C Melting point: 327.5°C</p>	<p>Density: 11.34 g/cm<sup>3</sup> Solubility in water: none</p>
<b>ENVIRONMENTAL DATA</b>	<p>Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.</p>	
<b>NOTES</b>		
<p>Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Card has been partly updated in April 2005. See section Occupational Exposure Limits. Card has been partly updated in October 2006: see section Occupational Exposure Limits, Effects Long Tem Exposure.</p>		



ADDITIONAL INFORMATION	
ICSC: 0052	LEAD
(C) IPCS, CEC, 1994	
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# International Chemical Safety Cards

## MERCURY

ICSC: 0056



Quicksilver  
Liquid silver  
Hg

ICSC # 0056  
CAS # 7439-97-6  
RTECS # OY4550000  
UN # 2809  
EC # 080-001-00-0  
April 22, 2004 Validated



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.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in		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

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.

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

**ICSC: 0056**

## MERCURY

<p>I M P O R T A N T D A T A</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<sup>†</sup>: 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: <u>7439976</u></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>
<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>
<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> 	
<p><b>NOTES</b></p>		

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**

**ICSC: 0056**

**MERCURY**

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**IMPORTANT  
LEGAL  
NOTICE:**

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# International Chemical Safety Cards

ICSC: 0013

## ARSENIC



Grey arsenic  
As  
Atomic mass: 74.9

ICSC # 0013  
CAS # 7440-38-2  
RTECS # CG0525000  
UN # 1558  
EC # 033-001-00-X  
October 18, 1999 Validated



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
<b>EXPLOSION</b>	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust, closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
<b>•INHALATION</b>	Cough. Sore throat. Shortness of breath. Weakness. See Ingestion.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
<b>•SKIN</b>	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
<b>•EYES</b>	Redness.	Face shield 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>	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and chest. Shock or collapse. Unconsciousness.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

**SPILLAGE DISPOSAL**      **STORAGE**      **PACKAGING & LABELLING**

Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol N symbol R: 23/25-50/53 S: 1/2-20/21-28-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II
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**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0013**

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# International Chemical Safety Cards

**ARSENIC**

**ICSC: 0013**

I M P O R T A N T A R T I C L E	<p><b>PHYSICAL STATE; APPEARANCE:</b> ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.</p> <p><b>PHYSICAL DANGERS:</b></p> <p><b>CHEMICAL DANGERS:</b> Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b>                  OSHA PEL: 1910.1018 TWA 0.010 mg/m<sup>3</sup>                  NIOSH REL: Ca C 0.002 mg/m<sup>3</sup> 15-minute <u>See Appendix A</u>                  NIOSH IDLH: Ca 5 mg/m<sup>3</sup> (as As) See: <u>7440382</u>                  TLV: 0.01 mg/m<sup>3</sup> as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004).                  MAK:                  Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004).</p>	<p><b>ROUTES OF EXPOSURE:</b> The substance can be absorbed into the body by inhalation of its aerosol 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> The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys, resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow, resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.</p>
<b>PHYSICAL PROPERTIES</b>	Sublimation point: 613°C Density: 5.7 g/cm <sup>3</sup>	Solubility in water: none

<b>ENVIRONMENTAL DATA</b>	The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.	
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**NOTES**

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC 0377), Arsenic trichloride (ICSC 0221), Arsenic trioxide (ICSC 0378), Arsine (ICSC 0222).  
 Transport Emergency Card: TEC (R)-61GT5-II

**ADDITIONAL INFORMATION**

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<b>ICSC: 0013</b>	(C) IPCS, CEC, 1994	<b>ARSENIC</b>
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<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

**CHROMIUM**

ICSC: 0029



Chrome  
Cr  
Atomic mass: 52.0  
(powder)

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
<b>FIRE</b>	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
<b>EXPOSURE</b>		PREVENT DISPERSION OF DUST!	
• <b>INHALATION</b>	Cough.	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>	Redness.	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.
<b>SPILLAGE DISPOSAL</b>		<b>STORAGE</b>	<b>PACKAGING &amp; LABELLING</b>
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.			

**SEE IMPORTANT INFORMATION ON BACK**

**ICSC: 0029**

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

# International Chemical Safety Cards

ICSC: 0029

## CHROMIUM

<p>I M P O R T A N T A T T R I B U T I O N</p>	<p><b>PHYSICAL STATE; APPEARANCE:</b> GREY 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> Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances, causing fire and explosion hazard.</p> <p><b>OCCUPATIONAL EXPOSURE LIMITS:</b> TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m<sup>3</sup> as TWA A4 (ACGIH 2004). MAK not established. OSHA PEL*: TWA 1 mg/m<sup>3</sup> See Appendix C *Note: The PEL also applies to insoluble chromium salts. NIOSH REL: TWA 0.5 mg/m<sup>3</sup> See Appendix C NIOSH IDLH: 250 mg/m<sup>3</sup> (as Cr) See: 7440473</p>	<p><b>ROUTES OF EXPOSURE:</b></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> May cause mechanical irritation to the eyes and the respiratory tract.</p> <p><b>EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:</b></p>
<p><b>PHYSICAL PROPERTIES</b></p>	<p>Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm<sup>3</sup></p>	<p>Solubility in water: none</p>
<p><b>ENVIRONMENTAL DATA</b></p>		
<p><b>NOTES</b></p>		
<p>The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.</p>		
<p><b>ADDITIONAL INFORMATION</b></p>		
<p>ICSC: 0029</p> <p style="text-align: center;">(C) IPCS, CEC, 1994</p>		<p><b>CHROMIUM</b></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>	