

**69-28 QUEENS BLVD  
WOODSIDE, NY**

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**Remedial Action Work Plan  
& STIP List (5/26/2015)**

**NYC VCP Number: 15CVCP146Q  
E-Designation OER Site Number: 15EHAN415Q**

**Prepared for:**

JJ Queens Development, LLC  
25 W 29<sup>th</sup> St  
New York, NY 10001

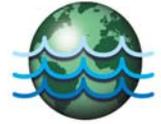
**Prepared by:**

P.W. Grosser Consulting  
630 Johnson Ave, Suite 7  
Bohemia, NY 11716

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**MAY 2015**

# P.W. GROSSER CONSULTING



May 26, 2015

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

**Re: VCP # 15CVCP146Q  
E-Designation # 15EHAN415Q  
69-28 Queens Boulevard, Queens, New York 11377  
Remedial Action Work Plan (RAWP) Stipulation List**

Dear Mr. Chawla:

P.W. Grosser Consulting hereby submits a Remedial Action Plan (RAWP) Stipulation List for the Site to the New York City Office of Environmental Remediation (OER) on behalf of JJ Queens Development, LLC. This letter serves as an addendum to the RAWP to stipulate additional content, requirements, and procedures that will be followed during the site remediation. The contents of this list are added to the RAWP and will supersede the content in the RAWP where there is a conflict in purpose or intent. The additional requirements/procedures include the following Stipulation List below:

1. The criterion attached in **Appendix 1** will be utilized if additional petroleum containing tank or vessel is identified during the remedial action or subsequent redevelopment excavation activities. All petroleum spills will be reported to the NYSDEC hotline as required by applicable laws and regulations. This contingency plan is designed for heating oil tanks and other small or moderately sized storage vessels. If larger tanks, such as gasoline storage tanks are identified, OER will be notified before this criterion is utilized.
2. A pre-construction meeting is required prior to start of remedial excavation work at the site. A pre-construction meeting will be held at the site and will be attended by OER, the developer or developer representative, the consultant, excavation/general contractor, and if applicable, the soil broker.
3. A pre-approval letter from all disposal facilities will be provided to OER prior to any soil/fill material removal from the site. Documentation specified in the RAWP - Appendix 3 - Section 1.6 "Materials Disposal Off-Site" will be provided to OER. If a different disposal facility for the soil/fill material is selected, OER will be notified immediately.
4. Signage for the project will include a sturdy placard mounted in a publically accessible right of way to building and other permits signage will consist of the NYC VCP Information Sheet (attached **Appendix 2**) announcing the remedial action. The Information sheet will be laminated and permanently affixed to the placard.

5. If your site contains hazardous waste that will be excavated and disposed of offsite, OER can work with your development team to seek an exemption for your property from the \$130/ton state Hazardous Waste Program Fee. To qualify for an exemption, your site must be enrolled in the city Voluntary Cleanup Program; hazardous waste must result from remedial action set forth in a cleanup plan approved by OER; and OER must oversee the cleanup. It is the applicant's responsibility to notify your OER Project Manager, copying supervising Project Manager and Shaminder Chawla, before hazardous waste is shipped from your site. Unless the Department of Environmental Conservation is notified before waste is shipped from your site, you may not receive an exemption from the fee. The exemption does not cover, and you remain liable for, the Special Assessment on Hazardous Waste (established by ECL§ 27-0923) which charges a fee of up to \$27 per ton for hazardous waste generated that is due at the State Department of Taxation and Finance 30 days after the end of the quarter in which the waste was generated. **Appendix 3** includes additional information about the Exemption for Hazardous Waste Program Fee.
6. OER requires parties seeking City Brownfield Incentive Grants to carry insurance. For a cleanup grant, both the excavator and the trucking firm(s) that handle removal of soil must carry or be covered under a commercial general liability (CGL) policy that provides \$1 million per claim in coverage. OER recommends that excavators and truckers also carry contractors pollution liability (CPL) coverage, also providing \$1 million per claim in coverage. The CGL policy, and the CPL policy if obtained, must name the City of New York, the NYC Economic Development Corporation, and Brownfield Redevelopment Solutions as additional insured. For an investigation grant, an environmental consultant must be a qualified vendor in the BIG program and carry \$1 million of professional liability (PL) coverage. A fact sheet regarding insurance is attached as **Appendix 4**.
7. Daily reports will be provided during active excavation work. If no work is performed for extended time period, daily report frequency will be reduced to weekly basis. Daily report template is attached in **Appendix 5**.
8. The signed RIR certification page is attached in **Appendix 6**.

Sincerely,  
P.W. Grosser Consulting, Inc.



Jennifer Lewis  
Project Manager

Cc: Sarah Pong, NYCOER

## **Appendix 1**

### Generic Procedures for Management of Underground Storage Tanks Identified under the NYC VCP

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

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

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

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

#### Impacted Soil Excavation Methods

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

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

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

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

- Wear appropriate health and safety equipment as outlined in the Health and Safety Plan.

- Prior to excavation, ensure that the area is clear of utility lines or other obstructions. Lay plastic sheeting on the ground next to the area to be excavated.
- Using a rubber-tired backhoe or track mounted excavator, remove overburden soils and stockpile, or dispose of, separate from the impacted soil.
- If additional UST's are discovered, the NYSDEC will be notified and the best course of action to remove the structure should be determined in the field. This may involve the continued trenching around the perimeter to minimize its disturbance.
- If physically contaminated soil is present (e.g., staining, odors, sheen, PID response, etc.) an attempt will be made to remove it, to the extent not limited by the site boundaries or the bedrock surface. If possible, physically impacted soil will be removed using the backhoe or excavator, segregated from clean soils and overburden, and staged on separated dedicated plastic sheeting or live loaded into trucks from the disposal facility. Removal of the impacted soils will continue until visibly clean material is encountered and monitoring instruments indicate that no contaminants are present.
- Excavated soils which are temporarily stockpiled on-site will be covered with tarp material while disposal options are determined. Tarp will be checked on a daily basis and replaced, repaired or adjusted as needed to provide full coverage. The sheeting will be shaped and secured in such a manner as to drain runoff and direct it toward the interior of the property.

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

**Appendix 2**  
NYC VCP Signage



## **NYC Voluntary Cleanup Program**

**69-28 Queens Boulevard  
Site #: 15CVCP146Q**

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

For more information,  
log on to: [www.nyc.gov/oer](http://www.nyc.gov/oer)

Or scan with smart phone:



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

Shaminder Chawla at (212) 442-3007  
or email us at [brownfields@cityhall.nyc.gov](mailto:brownfields@cityhall.nyc.gov)

## Appendix 3 Hazardous Waste Fee Exemption Fact Sheet



### Exemption from the Hazardous Waste Program Fee

If your site is enrolled in the city Voluntary Cleanup Program and contains hazardous waste that will be excavated and disposed of offsite, OER can work with your development team to exempt your property from the \$130/ton state Hazardous Waste Program fee. This exemption does not cover, and you remain liable for, the Special Assessment on Hazardous Waste (established by ECL§ 27-0923).

To qualify for an exemption from the Hazardous Waste Program Fee:

1. A site must be enrolled in the city Voluntary Cleanup Program;
2. Hazardous waste must result from remedial action set forth in a cleanup plan approved by OER; and
3. OER must oversee the cleanup.

#### Process for obtaining a Hazardous Waste Program Fee exemption:

For each VCP site, OER will submit three certifications to the New York State Department of Environmental Conservation (DEC):

1. OER will prepare a Notice of Potential Generation after a soil test shows a site contains hazardous waste. To prepare this Notice, you must provide your OER project manager with:
  - the site's EPA generator ID number;
  - the date of the soil test confirming hazardous waste;
  - the amount of hazardous waste in tons that you anticipate shipping offsite; and
  - the anticipated dates for the start and completion of remediation.

DEC must receive this form **before** hazardous waste is shipped from your site. Otherwise your claim for an exemption may be denied.

2. After hazardous waste has been removed from the site, OER will distribute a Certification of Hazardous Waste Generation to your project team which when filled out documents how the hazardous waste was managed. Once completed, it must be signed by the generator (or site owner) and the site's Qualified Environmental Professional and returned to your OER project manager with a copy to Shana Holberston [sholbertson@dep.nyc.gov](mailto:sholbertson@dep.nyc.gov) and Mark McIntyre [mmcintyre@cityhall.nyc.gov](mailto:mmcintyre@cityhall.nyc.gov).

3. OER will then issue a Certification of Remedial Action that Generated Hazardous Waste to DEC representing OER's approval of how a site managed its hazardous waste.

Upon OER's submission of the last two certifications to DEC, the agency will issue a written statement exempting an individual site from the Hazardous Waste Program Fee. OER will then notify the project of the exemption.

#### For further information, please contact:

Shana Holberton  
Program Manager  
(212) 788-3220

[SHolberton@dep.nyc.gov](mailto:SHolberton@dep.nyc.gov)

or

Mark McIntyre  
General Counsel  
(212) 788-3015

[MMcintyre@cityhall.nyc.gov](mailto:MMcintyre@cityhall.nyc.gov)

Contact OER to confirm that you are using the most updated version of this guidance.



**NYC** Office of Environmental  
Remediation

**Exemption from the  
Hazardous Waste Program  
Fee**

Ongoing Obligations:

Regardless of the Hazardous Waste Program Fee exemption, parties must:

- File a Hazardous Waste Annual Report with DEC by March 1 of each year if your site generated 15 tons of hazardous waste or more in the relevant calendar year. For details, see <http://www.dec.ny.gov/chemical/8770.html> To set forth the basis for an exemption from the Hazardous Waste Program Fee, put an X in the Exempt Remedial box in Box H of Section 1 of the Waste Generation and Management (GM) form and in the Comments Box (at the bottom of the form) include "New York City Voluntary Cleanup Program, VCP Site Number \_\_\_\_\_"; and
- Make quarterly payments of the Special Assessment on Hazardous Waste to the state Department of Taxation and Finance. For details see: <http://www.tax.ny.gov/bus/haz/hzrdwste.htm>

**Appendix 4**  
BIG Program Insurance Fact Sheet



**FACT SHEET – BIG PROGRAM INSURANCE REQUIREMENTS**

**Investigation Grants** – for a developer or site owner to be eligible for a BIG investigation grant, its environmental consultant(s) must be:

- a Qualified Vendor in the BIG Program; and
- maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

**Cleanup Grants** – for a developer or site owner to be eligible for a BIG cleanup grant:

- Its general contractor or excavation/foundation contractor hired to perform remedial work must maintain Commercial General Liability (CGL) insurance of at least \$1M per occurrence and \$2M in the general aggregate. It is recommended that the general contractor or excavation/foundation contractor also maintain a Contractors Pollution Liability policy (CPL) of at least \$1M per occurrence.
- Its subcontractors who are hired by the general contractor etc. to perform remedial work at a site, including soil brokers and truckers, must also maintain a CGL policy in the amount and with the terms set forth above. It is recommended that subcontractors also maintain a CPL policy in the amount and with the terms set forth above.

The CGL policy, and the CPL policy if in force, must list the city, EDC and BRS as additional insureds, include completed operations coverage and be primary and non-contributory to any other insurance the additional insureds may have.

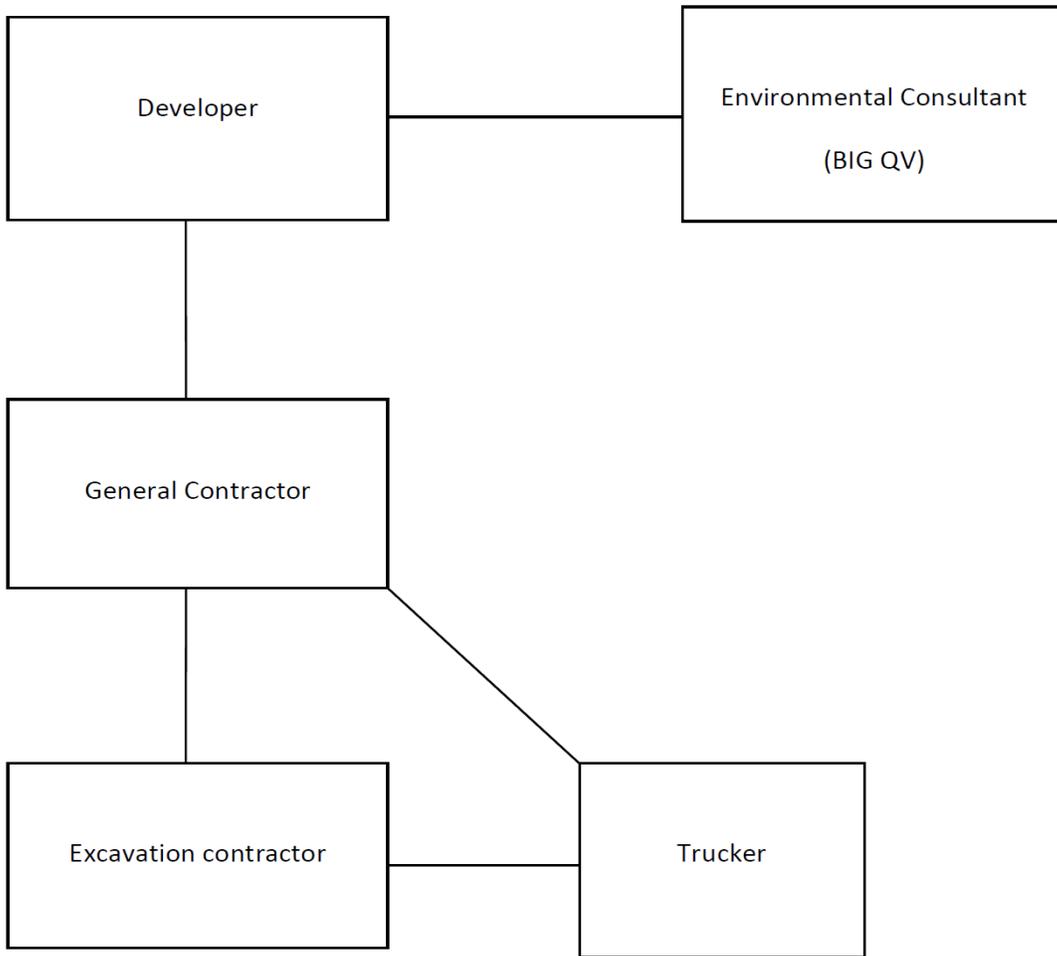
- Its environmental consultant(s) hired to oversee the cleanup must be:
  - a. a BIG Qualified Vendor; and
  - b. maintain Professional Liability (PL) insurance of \$1M per claim and annual aggregate.

If, in the alternative, the developer hires its environmental consultant to perform the cleanup, the environmental consultant must maintain CGL insurance in the amount and with the terms set forth above. It is recommended that the environmental consultant also maintain CPL coverage in the amount and with the terms set forth in the first two bulleted items listed above.

A schematic presenting the contractual relationships described above appears on page 2. Parties who must be named as Additional Insureds on Cleanup Grant insurance policies (CGL and CPL) are presented on page 3.

**Example of Contractual Relationships for Cleanup Work**

The Office of Environmental Remediation’s Voluntary Cleanup Plan program requires applicants to identify the parties who are engaged in active remediation of their sites including: the General Contractor hired to remediate and/or the excavation contractor hired to excavate soil from the site and the trucking firm(s) that remove soil from the site for disposal at approved facilit(ies).



The chart above shows contractual relationships that typically exist for projects that are enrolled in the Voluntary Cleanup Program.

**BIG Program Additional Insureds**

The full names and addresses of the additional insureds required under the Required CGL Policy and recommended CPL Policy are as follows:

“City and its officials and employees”

New York City Mayor’s Office of Environmental Remediation  
253 Broadway, 14th Floor  
New York, NY 10007

“NYC EDC and its officials and employees”

New York City Economic Development Corporation  
110 William Street  
New York, NY 10038

“BIG Grant Administrator and its officials and employees”

Brownfield Redevelopment Solutions, Inc.  
739 Stokes Road, Units A & B  
Medford, NJ 08055

**Appendix 5**  
Daily Report Template

## Generic Template for Daily Status Report

### Instructions

The Daily Status Report submitted to OER should adhere to the following conventions:

- Remove this cover sheet prior to editing.
- Remove all the **red text** and replace with site-specific information.
- Submit the final version as a Word or PDF file.

### Daily Status Reports

Daily status 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.

# DAILY STATUS REPORT

Prepared By: Enter Your Name Here

WEATHER	Snow		Rain		Overcast		Partly Cloudy	X	Bright Sun	
TEMP.	< 32		32-50		50-70	X	70-85		>85	

VCP Project No.:	14CVCP000M	E-Number Project No.:	14EHAN000M	Date:	01/01/2014
Project Name:	Name or Address				

Consultant: Person(s) Name and Company Name	Safety Officer: Person(s) Name and Company Name
General Contractor: Person(s) Name and Company Name	Site Manager/ Supervisor: Person(s) Name and Company Name

Work Activities Performed (Since Last Report):  
 Provide details about the work activities performed.

Working In Grid #: A1, B1, C1

Samples Collected (Since Last Report):  
 No samples collected or provide details

Air Monitoring (Since Last Report):  
 No air monitoring performed or provide details  
 Prestart Conditions – PID = 0.0 ppm, Dust = 0.000  
 High Conditions – PID = 0.0 ppm, Dust = 0.000

Problems Encountered:  
 No problems encountered or provide details

Planned Activities for the Next Day/ Week:  
 Provide details about the work activities planned for the next day/ week.

									Example:	
Facility # Name/ Location Type of Waste Solid <u>Or</u> Liquid	Facility # Name Location Type of Waste Solid <u>Or</u> Liquid		##### Clean Earth Carteret, NJ petroleum soils Solid							
(Trucks, Cu.Yds. <u>Or</u> Gallons)	Trucks	Cu. Yds. <u>Or</u> Gallons	Trucks	Cu. Yds.						
Today									5	120
Total									25	600

NYC Clean Soil Bank		Receiving Facility: Name/ Address (Approved by OER)			
Tracking No.:	13CCSB000				
Today	Trucks 5	Cu. Yds. 25	Total	Trucks 120	Cu. Yds. 600

Site Grid Map  
 Insert the site grid map here

## Photo Log

Photo 1 – provide a caption	Insert Photo Here – Photo of the entire site
Photo 2 – provide a caption	Insert Photo Here – Photo of the work activities performed
Photo 3 – provide a caption	Insert Photo Here – Photo of the work activities performed

**Appendix 6**  
Signed RIR Certification Page

# CERTIFICATION

I, Kris Almskog, am a Qualified Environmental Professional, as defined in RCNY § 43-1402(ar). I have primary direct responsibility for implementation of the Remedial Investigation for the 69-28 Queens Blvd, Woodside, NY Site (OER Project No. 15EHAN415Q). I am responsible for the content of this Remedial Investigation Report (RIR), have reviewed its contents and certify that this RIR is accurate to the best of my knowledge and contains all available environmental information and data regarding the property.

<u>Kris Almskog</u>	<u>4-22-15</u>	<u></u>
Qualified Environmental Professional	Date	Signature

**69-28 QUEENS BLVD  
WOODSIDE, NY**

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# **Remedial Action Work Plan**

**NYC VCP Number: 15CVCP146Q  
E-Designation OER Site Number: 15EHAN415Q**

**Prepared for:**

JJ Queens Development, LLC  
25 W 29<sup>th</sup> St  
New York, NY 10001

**Prepared by:**

P.W. Grosser Consulting  
630 Johnson Ave, Suite 7  
Bohemia, NY 11716

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**MAY 2015**

# **REMEDIAL ACTION WORK PLAN**

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Figure 4	Surrounding Land Usage
Figure 5	Excavation and Capping Plan
Figure 6	Endpoint Sampling Plan
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Figure 8	Alpha-Numeric Grid Map
Figure 9	Truck Route Map

## ***ATTACHMENTS***

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

## LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CSOP	Contractors Site Operation Plan
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
VCA	Voluntary Cleanup Agreement
NOC	Notice of Completion
NYC VCP	New York City Voluntary Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

# CERTIFICATION

I, Paul Boyce, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the 69-28 Queens Boulevard site, site number 15CVCP146Q. I certify to the following:

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

PAUL K. BOYCE

Name

074604

PE License Number

Paul Boyce

Signature

05.18.15

Date



I, Kris Almskog, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 69-28 Queens Blvd site, site number 15CVCP146Q. I certify to the following:

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

Kris Almskog

QEP Name

[Handwritten Signature]

QEP Signature

05-18-15

Date

## **EXECUTIVE SUMMARY**

JJ Queens Development has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 13,773 ft<sup>2</sup> Site located at 69-28 and 69-30 Queens Blvd and 46-02 and 46-04 70<sup>th</sup> Street in the Woodside section of Queens, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). 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 69-28 and 69-30 Queens Blvd and 46-02 and 46-04 70<sup>th</sup> Street in the Woodside section of Queens, New York, and is currently identified as Block 2432, Lots 23, 26, 34, and 37 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 13,773-square feet and is bounded by Queens Blvd to the north, residential buildings, a day school, and warehouses to the south, 70<sup>th</sup> Street to the east, and a restaurant and gasoline service station with a car wash and auto repair center to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is vacant, but was most recently used for sign fabrication, a liquor store, an automotive detailing and modification service, and residential apartments and contains four buildings, three of which contain basements, and a small parking area.

### **Summary of Proposed Redevelopment Plan**

The development project consists of redeveloping the lot with a new nine-story mixed-use commercial residential building. The cellar level will consist of commercial units with high ceilings that extend into the first floor, the first floor will contain two lobbies, and the second floor will contain a parking garage. The third through ninth floors will contain 76 residential apartments. The cellar and first two floors will be a full build-out to the property boundaries and the residential units will be constructed across approximately 2/3 of the site closest to Queens Blvd. There will be no landscaped areas. The depth of the construction excavation will be approximately 10 feet from the Queens Blvd sidewalk grade with excavation to 14 feet below sidewalk grade for the western elevator pit. Approximately 3,000 tons of soil will be excavated

during the redevelopment. Groundwater is not anticipated to be encountered during the redevelopment.

Layout of the redevelopment plans for the cellar level is presented in Figure 3 and architectural design plans are included as Appendix A. The current zoning designation is R7X with a C2-3 commercial overlay. The proposed use is consistent with existing zoning for the property.

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

### **Summary of Environmental Findings**

1. The elevation of the Site is approximately 39 to 43 feet.
2. Depth to groundwater is estimated to be approximately 21 feet below sidewalk grade along Queens Blvd.
3. Groundwater flow is generally towards the southeast.
4. Depth to bedrock is at the Site is greater than 100 feet.
5. The stratigraphy of the Site from the surface down consists of a layer of historic fill material from 0 to 3 feet underlain by native brown, silty sands. The historic urban fill thickness is approximately 9 feet thick in the area of Lot 23.
6. Soil/fill samples results were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill results showed trace concentrations of several VOCs and two PCBs, but none above Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benz(a)anthracene (max. of 3,600 µg/kg), benzo(a)pyrene (max. of 3,600 µg/kg), benzo(b)fluoranthene (max. of 4,900 µg/kg), chrysene (max. of 3,400 µg/kg), dibenz(a,h)anthracene (max. of 570 µg/kg), and indeno(1,2,3-cd)pyrene (max. of 2,300 µg/kg) exceeding Restricted Residential Use SCOs within two soil borings in Lot 23. The Pesticides 4,4'-DDT (max. of 0.165 mg/kg), chlordane (max. of 10.6 mg/kg), cis-chlordane (max. of 2.2 mg/kg), and heptachlor (max.

of 0.0912 mg/kg) were detected above Unrestricted Use SCOs with chlordane also exceeding Restricted Residential Use SCOs in one shallow sample. Several metals including arsenic (max of 19 mg/kg), copper (max. of 170 mg/kg), lead (max. of 1,000 mg/kg), mercury (max. of 31 mg/kg), and zinc (max. of 790 mg/kg) exceeded Unrestricted Use SCOs. Of these metals, arsenic, lead, and mercury also exceeded Restricted Residential Use SCOs in four of the eighteen soil samples. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.

7. Groundwater sample results from the RI were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater results showed no PCB in any sample. Trace concentrations of several VOCs and SVOCs were detected, but none exceeded their GQS. Four pesticides were detected in groundwater, but only chlordane (max. of 1.12 µg/L) exceeded its GQS. Several dissolved metals were identified in groundwater, but only manganese (0.989 mg/L), and sodium (max. of 138 mg/L) exceeded their respective GQS.
8. Soil vapor samples collected during the RI were compared to the compounds listed in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples collected during the RI showed low levels of petroleum-related VOCs and low levels of chlorinated VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from non-detectable concentrations to 68.62 µg/m<sup>3</sup>. Highest concentrations were detected for acetone (max. of 118 µg/m<sup>3</sup>). The chlorinated VOCs, 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), and carbon tetrachloride were not detected in any of the soil gas samples. Tetrachloroethylene (PCE) was detected in three of the seven soil gas samples with a maximum concentration of 18.4 µg/m<sup>3</sup>. Concentrations of the chlorinated VOCs were below the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

## Summary of the Remedy

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action

objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to start of remedial action.
6. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. For development purposes, the entire site will be excavated to a depth of 10 feet below the sidewalk grade along Queens Boulevard. Additional excavation will be required in the rear of Lot 23 to remove a mercury hot-spot in order to achieve Track 4 Site-Specific SCOs. Approximately 3,000 tons of soil will be removed;
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
8. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.

10. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of seven end-point samples to determine the performance of the remedy with respect to attainment of SCOs. Additional end points will be obtained around mercury hotspot area.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations, if necessary.
13. Installation of a vapor barrier system below the concrete slab of the building as well as behind foundation walls of the proposed building. The vapor barrier will consist of Grace Construction Products Preprufe 300R for horizontal applications and 160R for vertical applications.
14. Construction and maintenance of an engineered composite cover consisting of the 6 inch thick concrete building slab to prevent human exposure to residual soil/fill remaining under the Site.
15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
16. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
17. Placement of demarcation layer in the mercury hot-spot area. The building slab will act as a demarcation layer for the rest of the property
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.
19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and

reporting at a specified frequency.

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

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## COMMUNITY PROTECTION STATEMENT

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

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

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

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

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

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

**Site Safety Coordinator.** This project has a designated Site Safety Coordinator to implement the CHASP. The Site Safety Coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site Safety Coordinator is Mr. John Danko of P.W. Grosser Consulting. Mr. Danko can be reached at (631) 404-0725.

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

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

**Odor, Dust and Noise Control.** This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the on-Site Project Manager, Mr. Danko at (631) 404-0725 or NYC Office of Environmental Remediation Project Manager, Sarah Pong (212) 442-8342.

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

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

**Hours of Operation.** The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation are 7:00AM to 6:00PM Monday through Friday.

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

**Complaint Management.** The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager, Miss Jennifer Lewis at (631) 589-6353, the NYC Office of Environmental Remediation Project Manager, Sarah Pong at (212) 442-8342, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

Federal regulations and required permits will be obtained.

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

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

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

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

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

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

**Truck Routing.** Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

**Final Report.** The results of all cleanup work will be fully documented in a final report (called a Remedial Action Report) that will be available for you to review in the public document repositories located at the Queens Public Library – Elmhurst Branch (8508 51<sup>st</sup> Avenue).

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

# REMEDIAL ACTION WORK PLAN

## 1.0 SITE BACKGROUND

JJ Queens Development, LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 69-28 Queens Blvd in the Woodside 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 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 69-28 Queens Blvd in the Woodside section of Queens, New York, and is currently identified as Block 2432, Lots 23, 26, 34, and 37 on the New York City Tax Map. Figure 1 shows the Site location. The total size of the four lots is 13, 772 square feet. The Site is located on the south side of Queens Blvd between 69<sup>th</sup> Street and 70<sup>th</sup> Street and is bordered by Queens Blvd to the north, a gasoline station with a car wash and service station (closed in April 2015) and a restaurant to the west, 70<sup>th</sup> Street to the east, and residential buildings, a day school, and warehouses to the south. A map of the site boundary is shown on Figure 2.

The site is currently developed with a residential building (lot 37), an automotive detail and modification shop (lot 34), a liquor store (lot 26), and a sign fabrication store (lot 23). All of the buildings are currently vacant. Lots 26 and 37 contain some landscaped areas and lots 23 and 34 are a full build-out across the lots. In addition, each of the buildings has a basement except for lot 23.

## **1.2 Proposed Redevelopment Plan**

The development project consists of redeveloping the property with a nine story mixed use commercial residential building. The cellar level will consist of commercial units with high ceilings that extend into the first floor, the first floor will contain two lobbies, and the second floor will contain a parking garage. The third through ninth floors will contain 76 residential apartments. The cellar and first two floors will be a full build-out to the property boundaries and the residential units will be constructed across approximately 2/3 of the site closest to Queens Blvd. There will be no landscaped areas. The depth of the construction excavation will be approximately 10 feet from the Queens Blvd sidewalk grade with excavation to 14 feet below sidewalk grade for the western elevator pit. Approximately 3,000 tons of soil will be excavated during the redevelopment. Groundwater is not anticipated to be encountered during the redevelopment.

Layout of the redevelopment plans for the cellar level site development is presented in Figure 3 and architectural design plans are included as Appendix A. The current zoning designation is R7X with a C2-3 commercial overlay. The proposed use is consistent with existing zoning for the property.

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

## **1.3 Description of Surrounding Property**

The adjoining properties consist of a restaurant and a gasoline service station with a car wash and service center (closed as of April 2015) to the west, Queens Blvd to the north 70<sup>th</sup> Street to the east, and residential buildings, a day school, and warehouses to the south. The general zoning and character of the neighborhood consists of mixed use commercial and residential buildings.

Sensitive receptors located within a 500 foot radius of the site include the St. Illuminator's Armenian Day School which is adjacent to the southern side of the property and Blessed Virgin Mary Help of Christians School, which is located approximately 300 feet southeast of the Site. No hospitals, other schools or daycare facilities are located within a 500 foot radius of the Site.

The gasoline station west of the site is listed as a New York State Department of Environmental Conservation (NYSDEC) open spill site (#93-04343) that is actively being investigated and remediated. Remediation has included light non-aqueous phase liquid recovery, air sparging and soil vapor extraction, surfactant flooding, chemical injections, and other remedial techniques. 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, 69-28 Queens Blvd, Woodside, NY*”, dated March 2015 (RIR).

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

A Phase I ESA was completed by PWGC in 2015. The following Site history was established based on historic Sanborn maps:

The Site has been developed since at least 1902 with residential and commercial properties. Lots 23, 26, and 34 appear to have been demolished during the widening of Queens Blvd between 1914 and 1932. From 1932-1939 the Site was developed with auto painting and service, wood working, and commercial and residential buildings. From 1951-1980, Lot 23 was utilized for sheet metal manufacturing, Lot 26 for automotive purposes, Lot 34 for dining, and Lot 37 for upholstery and auto parts. Between 1981 and 1993, Lot 23 is identified as motorcycle sales and service while the remaining three lots were utilized for commercial purposes. From 1994-2011, the Site was identified as an auto wash, motorcycle repair shop, sign fabrication, carpet, liquor store, and residential buildings. This remains the current configuration of the vacant Site. JJ Queens Development purchased Lots 23, 26, and 34 in 2007 and Lot 37 in 2014.

The AOCs identified for this Site include:

1. Historic uses at the site included sheet metal manufacturing and automotive repairs. Improper handling of automotive chemicals could impact subsurface soils, groundwater, or soil vapor.
2. A floor drain and a sanitary sump were identified in lots 37 and 26, respectively. Floor

drains not connected to the municipal sewer system can act as a conduit to the subsurface. Improper discharges to such floor drains could impact subsurface soils, groundwater, or soil vapor.

3. An FDNY permit listing two tanks in lot 26 did not identify the location of the tanks (ASTs or USTs) and there is no further documentation indicating the removal of these tanks. There was no other evidence of ASTs or USTs at the site.
4. A gasoline filling station with an open spill is located adjacent to the subject property in the down-gradient direction. Contamination in the form of groundwater or soil vapor could migrate onto the subject property. The gasoline filling station was closed in April 2015.
5. Up-gradient sites have reportedly been utilized for drycleaning and automotive repairs. Drycleaners use various solvents, including tetrachloroethene, and automotive repair shops use degreasers and petroleum based products. Improper handling or disposal of these products can impact soils, groundwater, and soil vapor beneath the site. As these sites are up-gradient of the subject site, groundwater or soil vapor beneath the subject property may be impacted if there are spills at the up-gradient sites.

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

PWGC performed the following scope of work at the Site in March 2015:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Performed a geophysical investigation to identify the potential presence of USTs or other anomalies;
3. Installed nine soil borings across the Site, and collected eighteen soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed four monitoring wells across the Site to establish groundwater flow and collected four groundwater samples for chemical analysis to evaluate groundwater quality; and
5. Installed seven soil vapor implants and collected seven soil vapor samples for chemical analysis.

## Summary of Environmental Findings

1. The elevation of the Site ranges from 39 to 43 feet.
2. Depth to groundwater ranges from 20.59 to 21.13 feet below sidewalk grade along Queens Blvd.
3. Groundwater flow is generally from the northwest to the southeast.
4. Depth to bedrock is at the Site is greater than 100 feet.
5. The stratigraphy of the Site from the surface down consists of 0 to 3 feet of historic urban fill underlain by native brown, silty sands. The historic urban fill thickness is approximately 9 feet thick in the area of Lot 23.
6. Soil/fill samples results were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill results showed trace concentrations of several VOCs and two PCBs, but none above Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benz(a)anthracene (max. of 3,600  $\mu\text{g}/\text{kg}$ ), benzo(a)pyrene (max. of 3,600  $\mu\text{g}/\text{kg}$ ), benzo(b)fluoranthene (max. of 4,900  $\mu\text{g}/\text{kg}$ ), chrysene (max. of 3,400  $\mu\text{g}/\text{kg}$ ), dibenz(a,h)anthracene (max. of 570  $\mu\text{g}/\text{kg}$ ), and indeno(1,2,3-cd)pyrene (max. of 2,300  $\mu\text{g}/\text{kg}$ ) exceeding Restricted Residential Use SCOs within two soil borings in Lot 23. The Pesticides 4,4'-DDT (max. of 0.165 mg/kg), chlordane (max. of 10.6 mg/kg), cis-chlordane (max. of 2.2 mg/kg), and heptachlor (max. of 0.0912 mg/kg) were detected above Unrestricted Use SCOs with chlordane also exceeding Restricted Residential Use SCOs in one shallow sample. Several metals including arsenic (max of 19 mg/kg), copper (max. of 170 mg/kg), lead (max. of 1,000 mg/kg), mercury (max. of 31 mg/kg), and zinc (max. of 790 mg/kg) exceeded Unrestricted Use SCOs. Of these metals, arsenic, lead, and mercury also exceeded Restricted Residential Use SCOs in four of the eighteen soil samples. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.
7. Groundwater sample results from the RI were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater results

- showed no PCB in any sample. Trace concentrations of several VOCs and SVOCs were detected, but none exceeded their GQS. Four pesticides were detected in groundwater, but only chlordane (max. of 1.12 µg/L) exceeded its GQS. Several dissolved metals were identified in groundwater, but only manganese (0.989 mg/L), and sodium (max. of 138 mg/L) exceeded their respective GQS.
8. Soil vapor samples collected during the RI were compared to the compounds listed in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples collected during the RI showed low levels of petroleum-related VOCs and low levels of chlorinated VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from non-detectable concentrations to 68.62 µg/m<sup>3</sup>. Highest concentrations were detected for acetone (max. of 118 µg/m<sup>3</sup>). The chlorinated VOCs, 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), and carbon tetrachloride were not detected in any of the soil gas samples. Tetrachloroethylene (PCE) was detected in three of the seven soil gas samples with a maximum concentration of 18.4 µg/m<sup>3</sup>. Concentrations of the chlorinated VOCs were below the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

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

## **2.0 REMEDIAL ACTION OBJECTIVES**

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

### **Soil**

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

### **Groundwater**

- Prevent exposure to contaminants in groundwater.

### **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 impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance;
- Land use; and
- Sustainability.

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

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

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. If soil/fill containing analytes at concentrations above Track 1 Unrestricted Use SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building's cellar is complete, additional

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

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

**Alternative 2 involves:**

- Establishment of Site-Specific (Track 4) SCOs.
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-Specific SCOs have been achieved with post-excavation endpoint sampling. Excavation for construction of the new building's cellar level would take place to a depth of approximately 10 feet below the Queens Boulevard sidewalk grade for much of the Site. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building's cellar, additional excavation will be performed to ensure complete removal of soil that does not meet Track 4 Site-Specific SCOs;
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a soil vapor barrier system beneath the buildings slab, and along foundation side walls to prevent any potential future exposures from off-Site soil vapor;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of sensitive Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. The SMP will note that the property owner and property owner's successors and assignees must comply with the approved SMP; and

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

### **3.1 Threshold Criteria**

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

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

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

**Alternative 2** would achieve comparable protections of human health and the environment by excavating the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCOs, as well as by placement of Institutional and Engineering Controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. The vapor barrier would mitigate any vapor issues. Implementing Institutional Controls including a Site Management Plan would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site-Specific SCOs would minimize the risk of contamination leaching into groundwater.

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

continuing the vapor barrier around foundation walls.

### **3.2. Balancing Criteria**

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

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

**Alternative 1** would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and Groundwater Protection Standards. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system below the new building's cellar slab and continuing the vapor barrier around foundation walls, as part of development.

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

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

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

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

remedial actions.

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

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Approximately 120, 25-ton capacity truck trips would be necessary to transport fill and soil excavated during Site development. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits.

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

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

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response

objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

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

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; establishing Engineering Controls including a composite cover system across the Site; establishing Institutional Controls to ensure long-term management including use restrictions, a Site Management Plan and maintaining continued registration as an E-designation property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy will provide a continued high level of protection in perpetuity.

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

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

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

and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

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

Alternative 2 would remove most of the historic fill at the Site thus would permanently eliminate the toxicity, mobility, and volume of contaminants, and any remaining on-Site soil beneath the new building would meet Track 4 Site-Specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on-Site.

### **Implementability**

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

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

### **Cost effectiveness**

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

the continued effectiveness of a remedial action.

The costs associated with Alternative 1 would be higher due to the cost of the installation of shoring and additional soil excavation and off-Site disposal of additional historic fill that otherwise would not be removed as part of the redevelopment of the property. However, if additional soil/fill with analytes above Track 1 Unrestricted Use SCOs remains after excavation for the new building, long-term costs for Alternative 2 may be higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

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

### **Community Acceptance**

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

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

### **Land use**

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the

general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the Site.

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

### **Sustainability of the Remedial Action**

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

The remedial plan would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. New York City Clean Soil Bank program may be utilized for reuse of native soils. To the extent practicable, energy efficient building materials, appliances, and equipment will be utilized to complete the development. While Alternative 2

would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. A complete list of green remedial activities considered as part of the NYC VCP is included in the Sustainability Statement, included as Appendix C.

## **4.0 REMEDIAL ACTION**

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

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Site-Specific (Track 4) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility. A Waste Characterization Report documenting sample procedures, location, analytical results shall be submitted to NYCOER prior to start of remedial action.
6. Excavation and removal of soil/fill exceeding Track 4 Site-Specific SCOs. For development purposes, the entire site will be excavated to a depth of 10 feet below the sidewalk grade along Queens Boulevard. In addition, a mercury hotspot area in the rear of Lot 23 (Boring SB0006) identified during the investigation will be delineated and excavated to achieve Track 4 Site-Specific SCOs. Approximately 3,000 tons of soil will be removed.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated

media on-Site.

8. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
10. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of seven end-point samples to determine the performance of the remedy with respect to attainment of SCOs. Additional end points will be obtained around mercury hotspot area.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. Installation of a vapor barrier system below the concrete slab of the building as well as behind foundation walls of the proposed building. The vapor barrier will consist of Grace Construction Products Preprufe 300R for horizontal applications and 160R for vertical applications.
14. Construction and maintenance of an engineered composite cover consisting of the 6 inch thick concrete building slab to prevent human exposure to residual soil/fill remaining under the Site.
15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
16. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
17. Placement of demarcation layer in the mercury hot-spot area.
18. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries,

and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.

19. Submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
20. The property will continue to be registered with an E-Designation by the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

#### **4.2 Soil Cleanup Objectives and Soil/Fill Management**

Track 4 Soil Cleanup Objectives (SCOs) are proposed for this project. The SCOs for this Site are:

<u><b>Contaminant</b></u>	<u><b>Track 4 SCOs</b></u>
Arsenic	23 ppm
Lead	1,200 ppm
Mercury	3.5 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 Attachment D. The location of planned excavations is shown in Figure 5.

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

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

### **Estimated Soil/Fill Removal Quantities**

The total quantity of soil/fill expected to be excavated and disposed off-Site is 3,000 tons. Disposal location(s) will be reported promptly to the OER Project Manager prior to the start of the remedial action.

### **End-Point Sampling**

Removal actions under this plan will be performed in conjunction with remedial end-point sampling. Confirmation end-point sampling and testing will be performed following materials removal and completed proper to Site development activities. To evaluate attainment of Track 4 Site-Specific SCOs, seven confirmation end-point samples will be collected and analyzed for the trigger compounds and elements established on the Track 4 Site-Specific SCOs list from within the building footprint. Additional end points will be obtained following excavation around the mercury hotspot area identified at location SB0006. The approximate collection location of the confirmation end-point soil samples is shown on Figure 6; sampling locations have been biased in areas exceeding Restricted Residential SCOs during the RIR and includes five samples in the vicinity of the mercury hot-spot excavation.

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

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
  - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
  - For subsurface removals, one sample from each sidewall for every 30 linear feet of

sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.

3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

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

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

Soil analytical methods will include:

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

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

## **Quality Assurance/Quality Control**

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

One duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters. One trip blank will be submitted to the laboratory with each shipment of soil samples.

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

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

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

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

## **Import and Reuse of Soils**

Import of soils onto the property and reuse of soils already on-Site will be performed in conformance with the Soil/Materials Management Plan in Attachment D. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 0 tons. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is 10 tons to fill in the mercury hot-spot excavation.

### **4.3 Engineering Controls**

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

#### **Composite Cover System**

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of the 6 inch thick concrete building slab.

The composite cover system would serve as a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil / Materials Management Plan (SMMP) will be included in the SMP 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 SMP in the RAR. Figure 5 shows the location of the composite cover system.

#### **Vapor Barrier**

Migration of potential soil vapor from on-Site or off-Site in the future will be mitigated with a combination of the building slab and vapor barrier. The vapor barrier will consist of Grace Construction Products Preprufe 300R for horizontal applications and 160R for vertical

applications. The vapor barrier will be installed prior to pouring the building's concrete slab. The vapor barrier will extend throughout the area occupied by the footprint of the new building and up the foundation sidewalls in accordance with manufacturer specifications. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

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

The Remedial Action Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturer's certificate of warranty.

#### **4.4 Institutional Controls**

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

Institutional Controls for this remedial action are:

- The property will continue to be registered with an E-Designation at the NYC Buildings Department. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and

certification of ECs. The SMP will require that the property owner and property owner's successors and assignees will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted annually and will comply with RCNY §43-1407(1)(3);

- Vegetable gardens and farming on the Site are prohibited;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMMP; and
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

#### **4.5 Site Management Plan**

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

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) reporting.

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

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

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

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

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

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

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

##### Soil

- Metals, including arsenic, lead, and mercury, exceeding Restricted Residential Use SCOs;
- SVOCs (PAH compounds), including benz(a)anthracene, benzo(a)pyrene,

benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, exceeding Restricted Residential Use SCOs; and

- Pesticides, including chlordane and cis-chlordane, were identified at concentrations exceeding Restricted Residential Use SCOs.

#### Groundwater

- Metals including manganese and sodium (dissolved) exceeding their respective Groundwater Quality Standards; and
- One pesticide, chlordane, exceeding GQS.

#### Soil Vapor

- Chlorinated VOCs detected well below NYS DOH monitoring thresholds including PCE;
- Petroleum-related hydrocarbons, including BTEX, were detected at low concentrations.

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

SVOCs, metals, and pesticides are present in the historic fill materials to depths of twelve feet below grade. A mercury hot-spot was identified in the southwestern section of the site. No chlorinated compounds were detected above their respective standards in soil or soil vapor on Site.

### **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 fill/soil;
- Inhalation of vapors and particulates; and

- Dermal contact with water, fill, soil, or building materials.

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

Current Conditions: A potential for exposure to surficial historic fill exists under current conditions but is limited due to all landscaped areas existing in the rear of the property behind locked gates and buildings. The Site is served by the public water supply and groundwater use for potable supply is prohibited; groundwater is not used at the Site and there is no potential for exposure. The on-site buildings are currently pending demolition; therefore, accumulation of soil vapor is not a significant concern.

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

Proposed Future Conditions: Under future remediated conditions, all soils in excess of Track 4 Site-Specific SCOs will be removed. The Site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and a vapor barrier system will prevent any exposure to potential off-site soil vapors in the future. The Site is served by a public water supply, and groundwater is not used at the Site for potable supply. There are no plausible off-site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

### **Receptor Populations**

On-Site Receptors - The Site is currently vacant and contains four buildings and uncapped yards in the rear of two of the buildings. Access to the Site is restricted by locked fences and locked

buildings. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents and visitors.

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

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

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

There are potential complete exposure pathways for the current site condition. There is a potential complete, exposure pathway that requires mitigation during implementation of the remedy. Under current conditions, on-Site exposure pathways exist for site personnel and trespassers. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. There is no complete exposure pathway under future conditions after the Site is developed. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill, as all soil above Track 4 Site Specific SCOs will have been removed and a vapor barrier system will have been installed as part of development. The vapor barrier system will prevent potential vapor intrusion. The composite cover system and use restrictions will prevent contact with residual soil or groundwater and continued protection after the remedial action will be achieved by the implementation of site management including periodic inspection and certification of the performance of remedial controls. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened. This

assessment takes into consideration the reasonably anticipated use of the Site, which includes a mixed-use commercial / residential structure, site-wide impervious surface cover cap, and a subsurface vapor barrier system for the building.

## **5.0 REMEDIAL ACTION MANAGEMENT**

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

Principal personnel who will participate in the remedial action include Jennifer Lewis, Project Manager of PWGC and John Danko, Field Hydrogeologist of PWGC. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Paul Boyce, P.E., Senior Vice President of PWGC and Kris Almskog, Vice President of PWGC, respectively.

### **5.2 Site Security**

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

### **5.3 Work Hours**

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

### **5.4 Construction Health and Safety Plan**

The Health and Safety Plan is included in Appendix E. The Site Safety Coordinator will be Miss Jennifer Lewis. 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. Exceedances of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

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

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 is present at approximately 18 feet below grade and dewatering is not expected. In the event that dewatering of groundwater during construction will be necessary, the water will be disposed of into the New York City combined sanitary/storm sewer system. A permit to discharge will be obtained from the New York City Department of Environmental Protection (NYCDEP). As part of the permit to discharge, the location of discharge will be based on the

Site-Specific requirements of the DEP. The need for pretreatment will be determined by DEP's requirements for the discharge permit. If pretreatment is required by the DEP, it will be performed in accordance with the requirements of the DEP.

### **Equipment and Material Staging**

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

### **Stabilized Construction Entrance**

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

### **Truck Inspection Station**

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

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

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

## **Storm Preparedness**

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

## **Storm Response**

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Storm-water control systems

and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off-Site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If on-Site petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped 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 is shown on Figure 9.

## 5.9 Demobilization

Demobilization will include:

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

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

## 5.10 Reporting and Record Keeping

### Daily Reports

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

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

- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

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

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

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

### **5.11 Complaint Management**

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

### **5.12 Deviations from the Remedial Action Work Plan**

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

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

## 6.0 REMEDIAL ACTION REPORT

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

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan;
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site, if necessary.
- Continue registration of the property with an E-Designation by the NYC Department of Buildings.
- Reports and supporting material will be submitted in digital form.

## **Remedial Action Report Certification**

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

*I, \_\_\_\_\_, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the project at 69-28 Queens Blvd in Woodside, NY, NYC VCP Site number 15CVCP146Q and OER Project Number 15EHAN415Q.*

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

## 7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 2 month remediation period is anticipated.

<b>Schedule Milestone</b>	<b>Weeks from Remedial Action Start</b>	<b>Duration (weeks)</b>
OER Approval of RAWP	0	-
Mobilization	1	1
Remedial Excavation	2	6
Demobilization	8	1
Submit Remedial Action Report	15	-

## TABLE

Table 1

Soil Cleanup Objectives for Imported Fill Material  
69-28 Queens Blvd, Woodside, New York

	NYSDEC <sup>(2)</sup> SCOs Restricted Residential
<b>Volatile Organic Compounds in µg/kg</b>	
1,1,1,2-Tetrachloroethane	NS
1,1,1-Trichloroethane	100,000 <sup>a</sup>
1,1,2,2-Tetrachloroethane	NS
1,1,2 Trichloroethane	NS
1,1 Dichloroethane	26,000
1,1 Dichloroethene	100,000 <sup>a</sup>
1,1-Dichloropropene	NS
1,2,3-Trichlorobenzene	NS
1,2,3-Trichloropropane	NS
1,2,4,5-Tetramethylbenzene	NS
1,2,4-Trichlorobenzene	NS
1,2,4-Trimethylbenzene	52,000
1,2 Dibromo 3 chloropropane	NS
1,2 Dibromoethane	NS
1,2 Dichlorobenzene	100,000 <sup>a</sup>
1,2 Dichloroethane	3,100
1,2 Dichloropropane	NS
1,3,5-Trimethylbenzene	52,000
1,3 Dichlorobenzene	49,000
1,3-Dichloropropane	NS
1,4 Dichlorobenzene	13,000
1,4-Diethylbenzene	NS
2,2-Dichloropropane	NS
2-Butanone / Methyl Ethyl Ketone	100,000 <sup>a</sup>
2-Hexanone	NS
4-Ethyltoluene	NS
4-Methyl-2-pentanone	NS
Acetone	100,000 <sup>a</sup>
Acrylonitrile	NS
Benzene	4,800
Bromobenzene	NS
Bromochloromethane	NS
Bromodichloromethane	NS
Bromoform	NS
Bromomethane	NS
Carbon Disulfide	NS
Carbon Tetrachloride	2,400
Chlorobenzene	100,000 <sup>a</sup>
Chloroethane	NS
Chloroform	49,000
Chloromethane	NS
c-1,2-Dichloroethene	100,000 <sup>a</sup>
c-1,3-Dichloropropane	NS
Dibromochloromethane	NS
Dibromoethane	NS
Dichlorodifluoromethane	NS
Diethy ether	NS
Ethyl Benzene	41,000
Hexachlorobutadiene	NS
Isopropylbenzene	NS
Methyl tert butyl ether	100,000 <sup>a</sup>
Methylene Chloride	100,000 <sup>a</sup>
n-Butylbenzene	NS
n-Propylbenzene	100,000 <sup>a</sup>
Naphthalene	NS
o-Chlorotoluene	NS
o Xylene	100,000 <sup>a</sup>
p/m-Xylene	100,000 <sup>a</sup>
p-Chlorotoluene	NS
p-Isopropyltoluene	NS
sec-Butylbenzene	100,000 <sup>a</sup>
Styrene	NS
tert-Butylbenzene	100,000 <sup>a</sup>
Tetrachloroethene	19,000
Toluene	100,000 <sup>a</sup>
t-1,2-Dichloroethene	100,000 <sup>a</sup>
t-1,3-Dichloropropane	NS
trans-1,4-Dichloro-2-butene	NS
Trichloroethene	21,000
Trichlorofluoromethane	NS
Vinyl acetate	NS
Vinyl Chloride	900

	NYSDEC <sup>(2)</sup> SCOs Restricted Residential
<b>Semivolatile Organics in µg/kg by EPA 8270C</b>	
1,2,4,5-Tetrachlorobenzene	NS
1,2,4-Trichlorobenzene	NS
1,2-Dichlorobenzene	NS
1,3-Dichlorobenzene	NS
1,4-Dichlorobenzene	NS
2,4,5-Trichlorophenol	NS
2,4,6-Trichlorophenol	NS
2,4-Dichlorophenol	NS
2,4-Dimethylphenol	NS
2,4-Dinitrophenol	NS
2,4-Dinitrotoluene	NS
2,6-Dinitrotoluene	NS
2-Chlorophenol	NS
2-Methylphenol	NS
2-Nitroaniline	NS
2-Nitrophenol	NS
3,3'-Dichlorobenzidine	NS
3-Methylphenol/4-Methylphenol	NS
3-Nitroaniline	NS
4,6-Dinitro-o-cresol	NS
4-Bromophenyl phenyl ether	NS
4-Chloroaniline	NS
4-Chlorophenyl phenyl ether	NS
4-Nitroaniline	NS
4-Nitrophenol	NS
Acetophenone	NS
Benzoic Acid	NS
Benzyl Alcohol	NS
Biphenyl	NS
Bis(2-chloroethoxy)methane	NS
Bis(2-chloroethyl)ether	NS
Bis(2-chloroisopropyl)ether	NS
Bis(2-Ethylhexyl)phthalate	NS
Butyl benzyl phthalate	NS
Carbazole	NS
Dibenzofuran	NS
Diethyl phthalate	NS
Dimethyl phthalate	NS
Di-n-butylphthalate	NS
Di-n-octylphthalate	NS
Hexachlorocyclopentadiene	NS
Isophorone	NS
Nitrobenzene	15,000
NitrosoDiPhenylAmine(NDPA)/DPA	NS
n-Nitrosodi-n-propylamine	NS
P-Chloro-M-Cresol	NS
Phenol	100000
<b>Semivolatile Organics in µg/kg by EPA 8270C-SIM</b>	
2-Chloronaphthalene	NS
2-Methylnaphthalene	NS
Acenaphthene	100,000
Acenaphthylene	100,000
Anthracene	100,000
Benzo(a)anthracene	1,000
Benzo(a)pyrene	1,000
Benzo(b)fluoranthene	1,000
Benzo(ghi)perylene	100,000
Benzo(k)fluoranthene	3,900
Chrysene	3,900
Dibenzo(a,h)anthracene	330
Fluoranthene	100,000
Fluorene	100,000
Hexachlorobenzene	NS
Hexachlorobutadiene	NS
Hexachloroethane	NS
Indeno(1,2,3-cd)Pyrene	500
Naphthalene	100,000
Pentachlorophenol	6,700
Phenanthrene	100,000
Pyrene	100,000

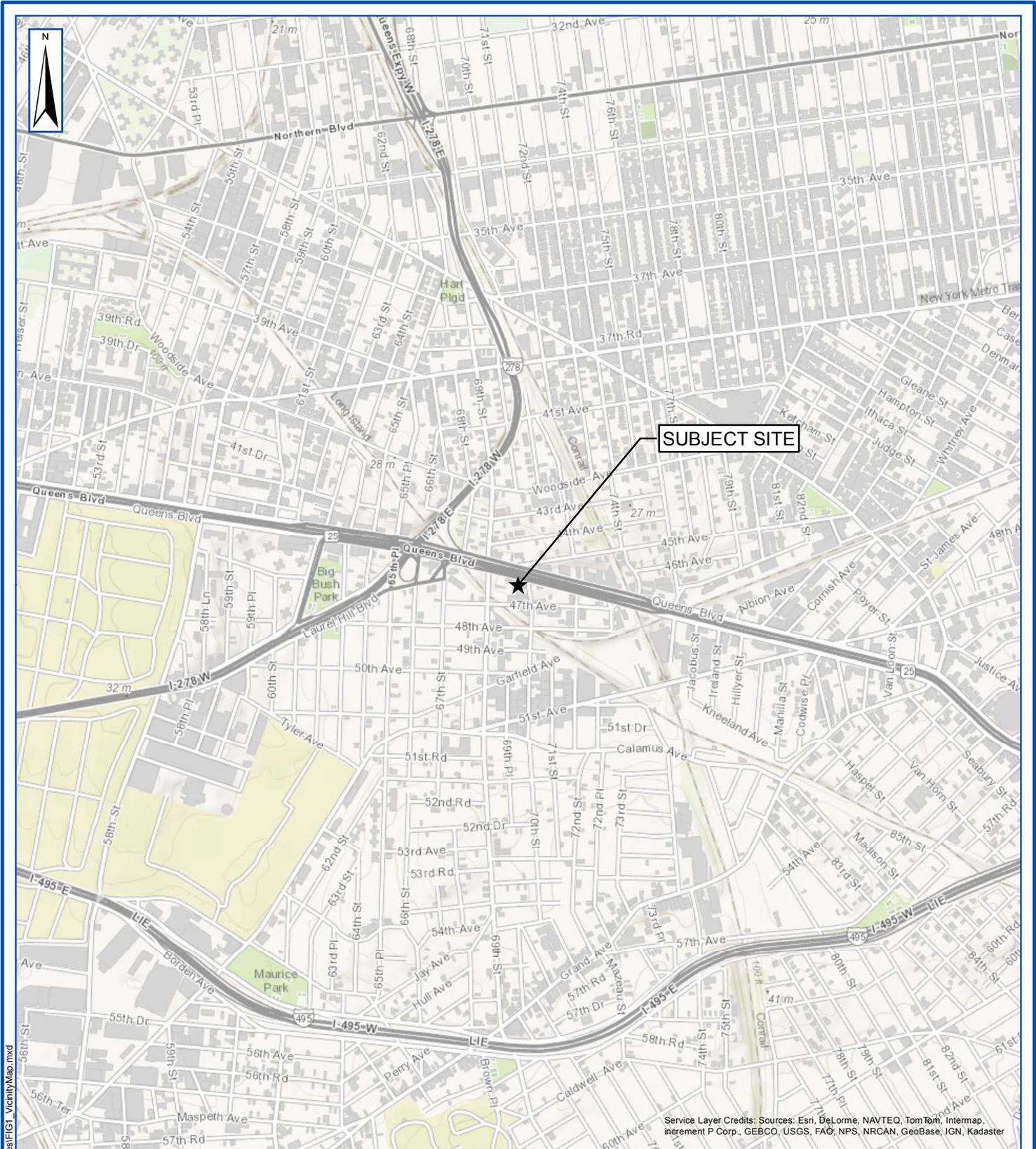
	NYSDEC <sup>(2)</sup> SCOs Restricted Residential
<b>Pesticides in µg/kg by EPA 8081A</b>	
4,4'-DDD	13,000
4,4'-DDE	8,900
4,4'-DDT	7,900
Aldrin	97
Alpha-BHC	480
Beta-BHC	360
Chlordane	4,200
Delta-BHC	100,000
Dieldrin	200
Endosulfan I	24,000
Endosulfan II	24,000
Endosulfan sulfate	24,000
Endrin	11,000
Endrin ketone	NS
Heptachlor	2,100
Heptachlor epoxide	NS
Lindane	1,300
Methoxychlor	NS
trans-Chlordane	NS
<b>PCBs in µg/kg by EPA 8082</b>	
Aroclor 1016	1,000
Aroclor 1221	1,000
Aroclor 1232	1,000
Aroclor 1242	1,000
Aroclor 1248	1,000
Aroclor 1254	1,000
Aroclor 1260	1,000
<b>Total Metals in mg/kg</b>	
Aluminum	NS
Antimony	NS
Arsenic	16
Barium	400
Beryllium	72
Cadmium	4.3
Calcium	NS
Chromium	180
Cobalt	NS
Copper	270
Iron	NS
Lead	400
Magnesium	NS
Manganese	2,000
Mercury	0.81
Nickel	310
Potassium	NS
Selenium	180
Silver	180
Sodium	NS
Thallium	NS
Vanadium	NS
Zinc	10,000

(2) NYSDEC 6 NYCRR Environmental Remediation Programs Part 375 Restricted Use of Soil Cleanup Objective Table 375-6.8b 12/06

NS - No Standard

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

## FIGURES



**SUBJECT SITE**

## SUBJECT SITE VICINITY

69-28 QUEENS BLVD  
QUEENS, NY



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Document Path: Z:\Projects\E-L\JJQ1501\mapfiles\FIG1\_VicinityMap.mxd



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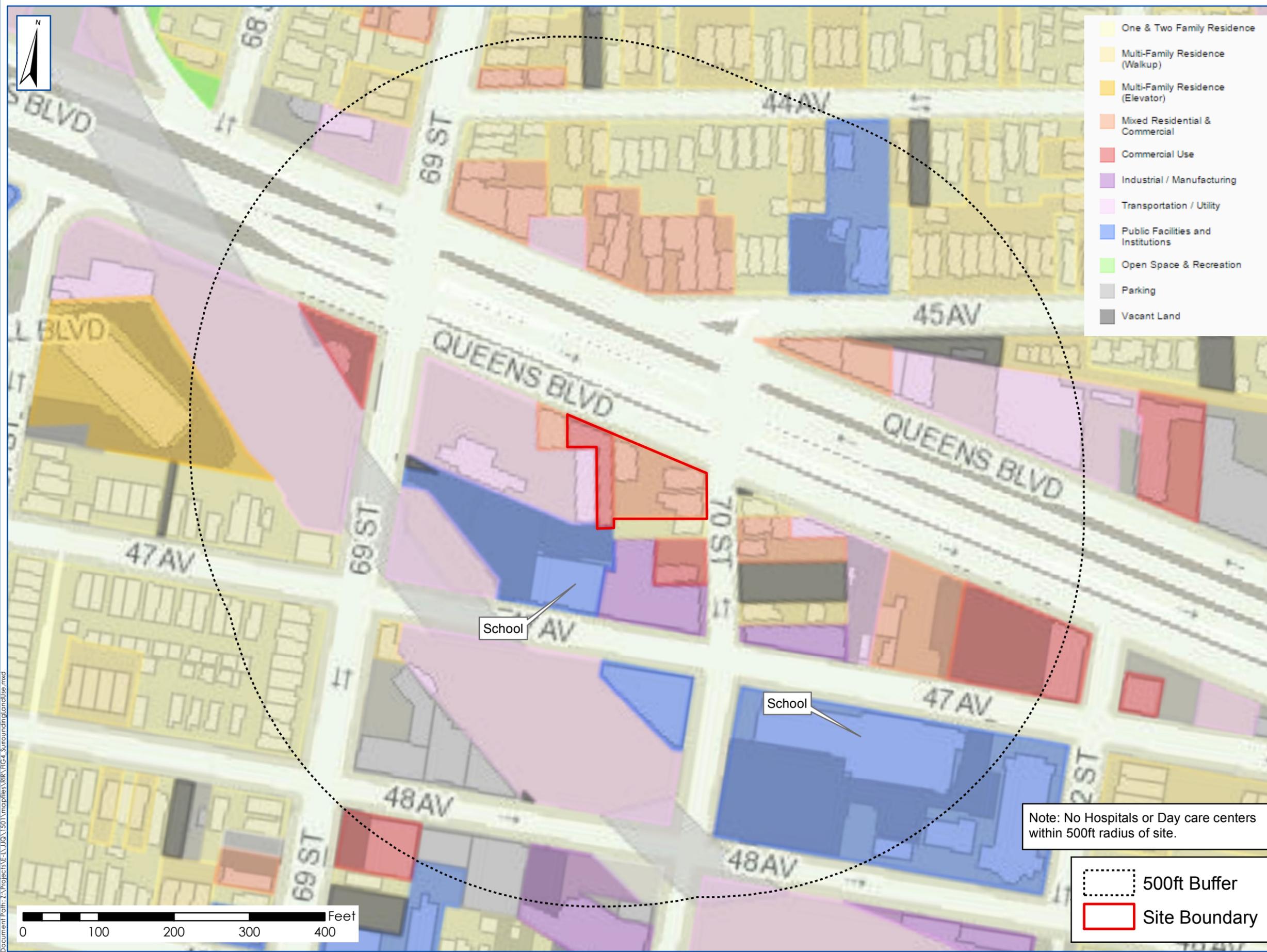
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Project:	JJQ1501
Date:	3/23/2015
Designed by:	JLL
Drawn by:	JCG
Approved by:	JLL
Figure No:	1







- One & Two Family Residence
- Multi-Family Residence (Walkup)
- Multi-Family Residence (Elevator)
- Mixed Residential & Commercial
- Commercial Use
- Industrial / Manufacturing
- Transportation / Utility
- Public Facilities and Institutions
- Open Space & Recreation
- Parking
- Vacant Land



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Source: ZoLa  
(<http://maps.nyc.gov/doitt/nycitymap/template?applicationName=ZOLA>)

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REVISION	DATE	INITIAL	COMMENTS

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Date:	3/23/2015	Drawn by:	JCG
Scale:	AS SHOWN	Approved by:	JLL

**SURROUNDING LAND USE**

69-28 QUEENS BLVD  
QUEENS, NY

Note: No Hospitals or Day care centers within 500ft radius of site.

- 500ft Buffer
- Site Boundary

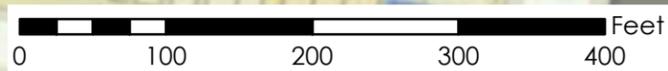
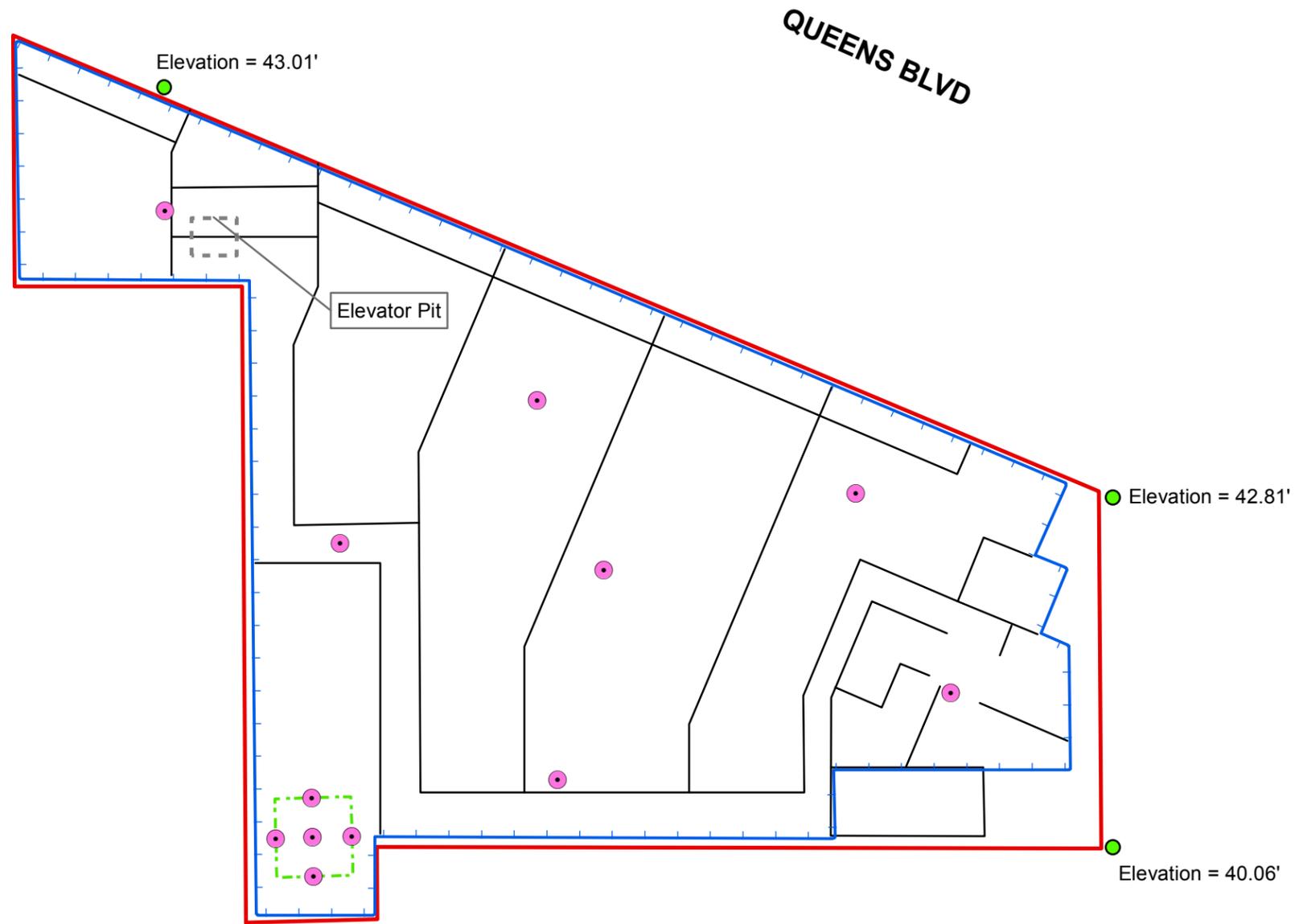


FIGURE NO: 4

SHEET:





- Proposed Endpoint Sample
- Building Footprint
- Proposed Mercury Hotspot Excavation
- Site Boundary
- Elevator Pit



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Date:	4/28/2015	Drawn by:	JCG
Scale:	AS SHOWN	Approved by:	JLL

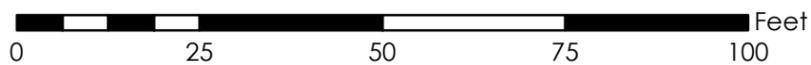
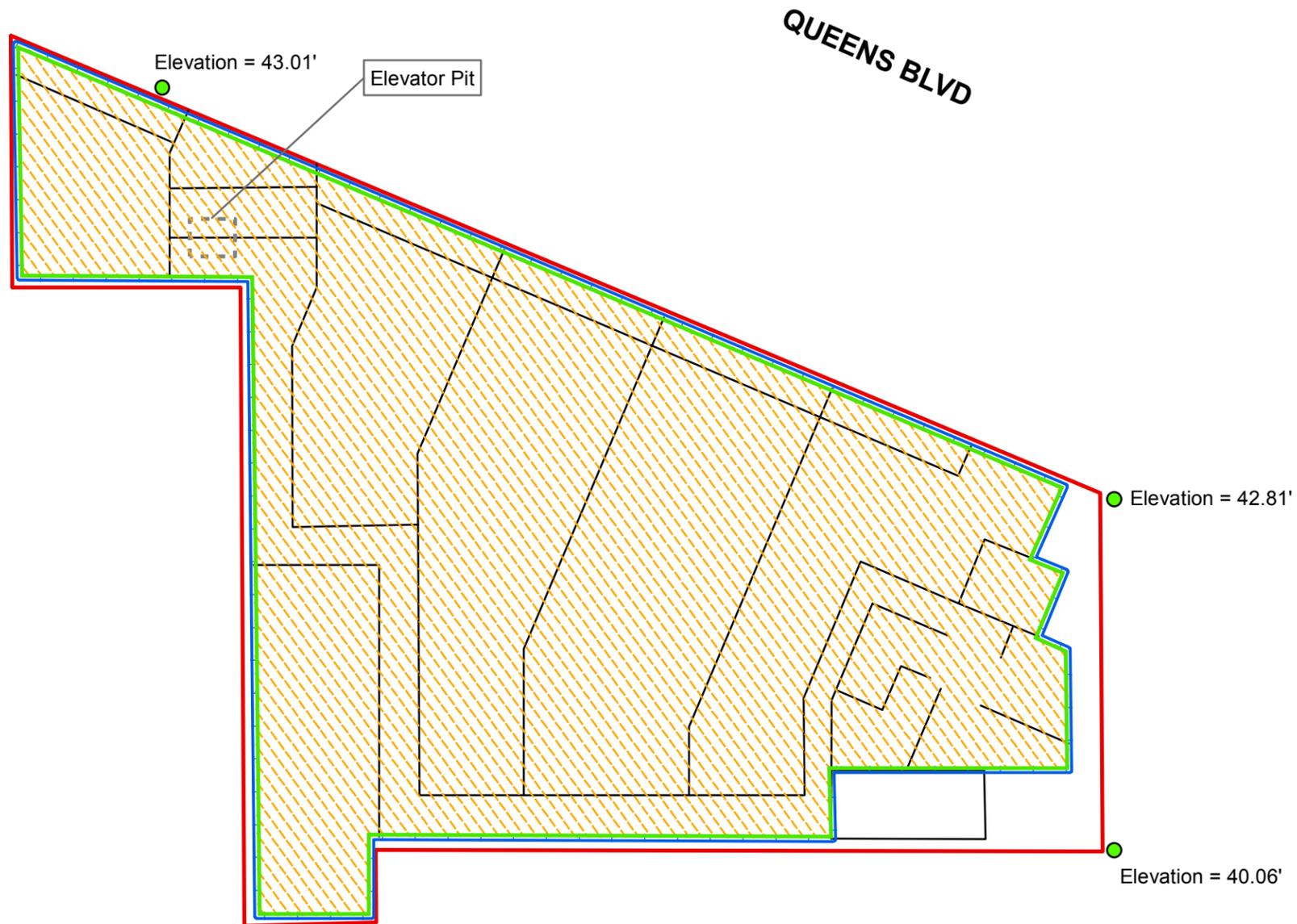
## PROPOSED ENDPOINT SAMPLING PLAN

69-28 QUEENS BLVD  
QUEENS, NY

FIGURE NO:

6

SHEET:



-  Horizontal Extent of Vapor Barrier
-  Vertical Extent of Vapor Barrier
-  Elevator Pit
-  Building Footprint
-  Site Boundary



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Date:	4/28/2015	Drawn by:	JCG
Scale:	AS SHOWN	Approved by:	JLL

**PROPOSED VAPOR BARRIER SITE PLAN**

69-28 QUEENS BLVD  
QUEENS, NY

FIGURE NO:  
7

SHEET:



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Scale:	AS SHOWN	Approved by:	JLL

## GRID MAP

69-28 QUEENS BLVD  
QUEENS, NY

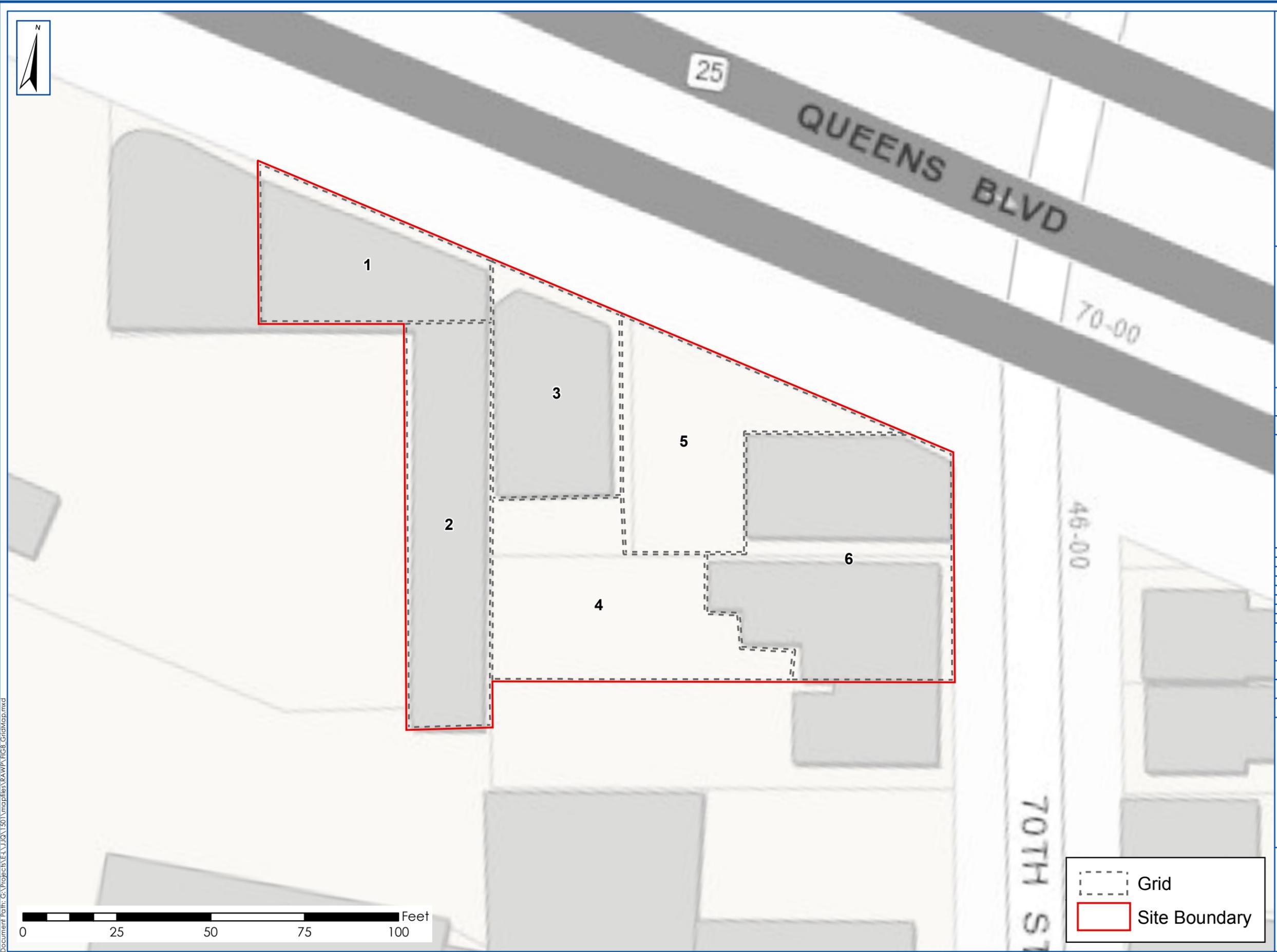
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8

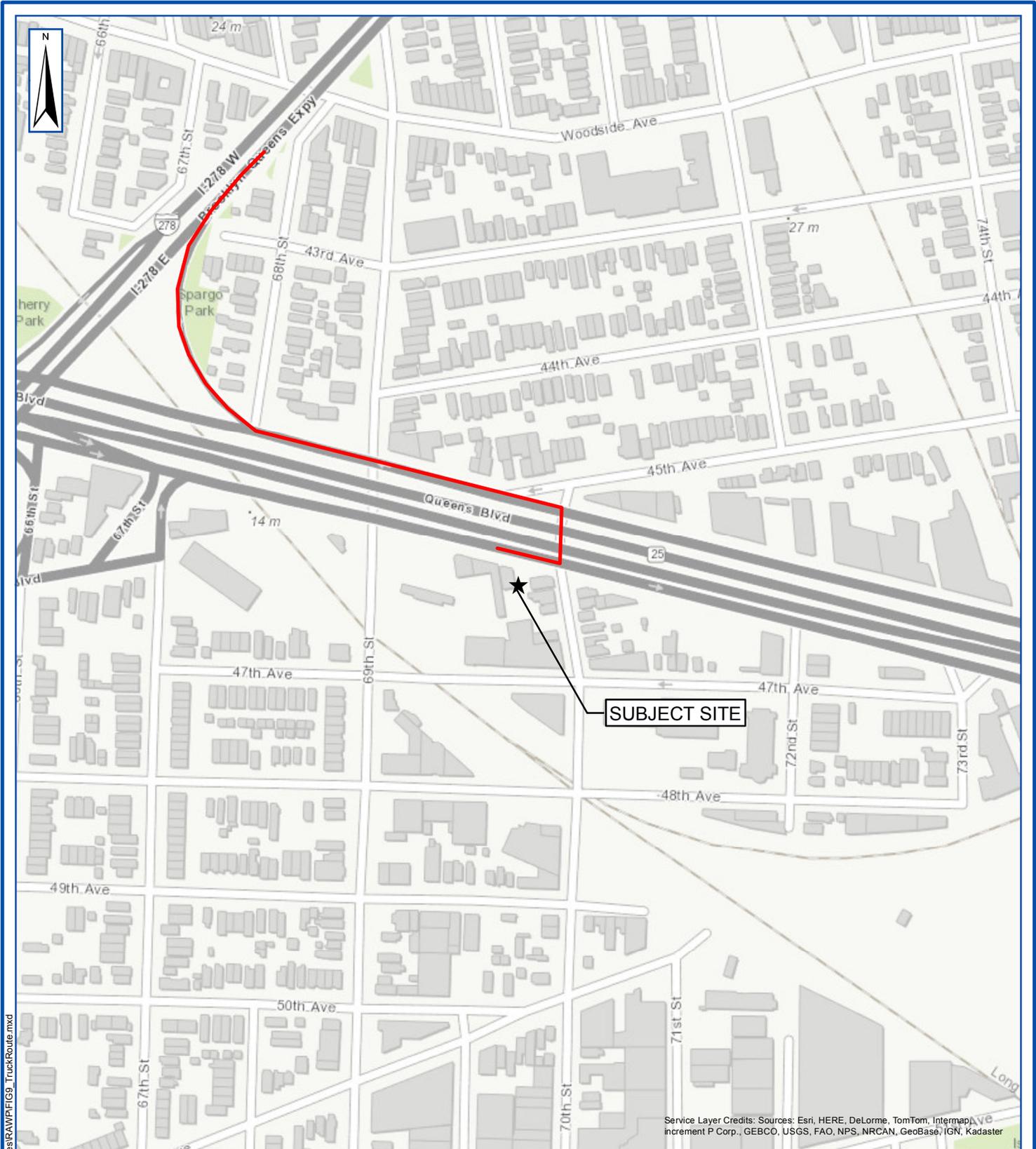
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 Grid  
 Site Boundary





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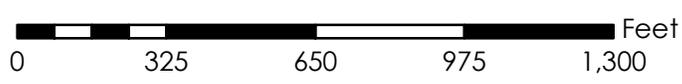
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## TRUCK ROUTE (TO BQE)

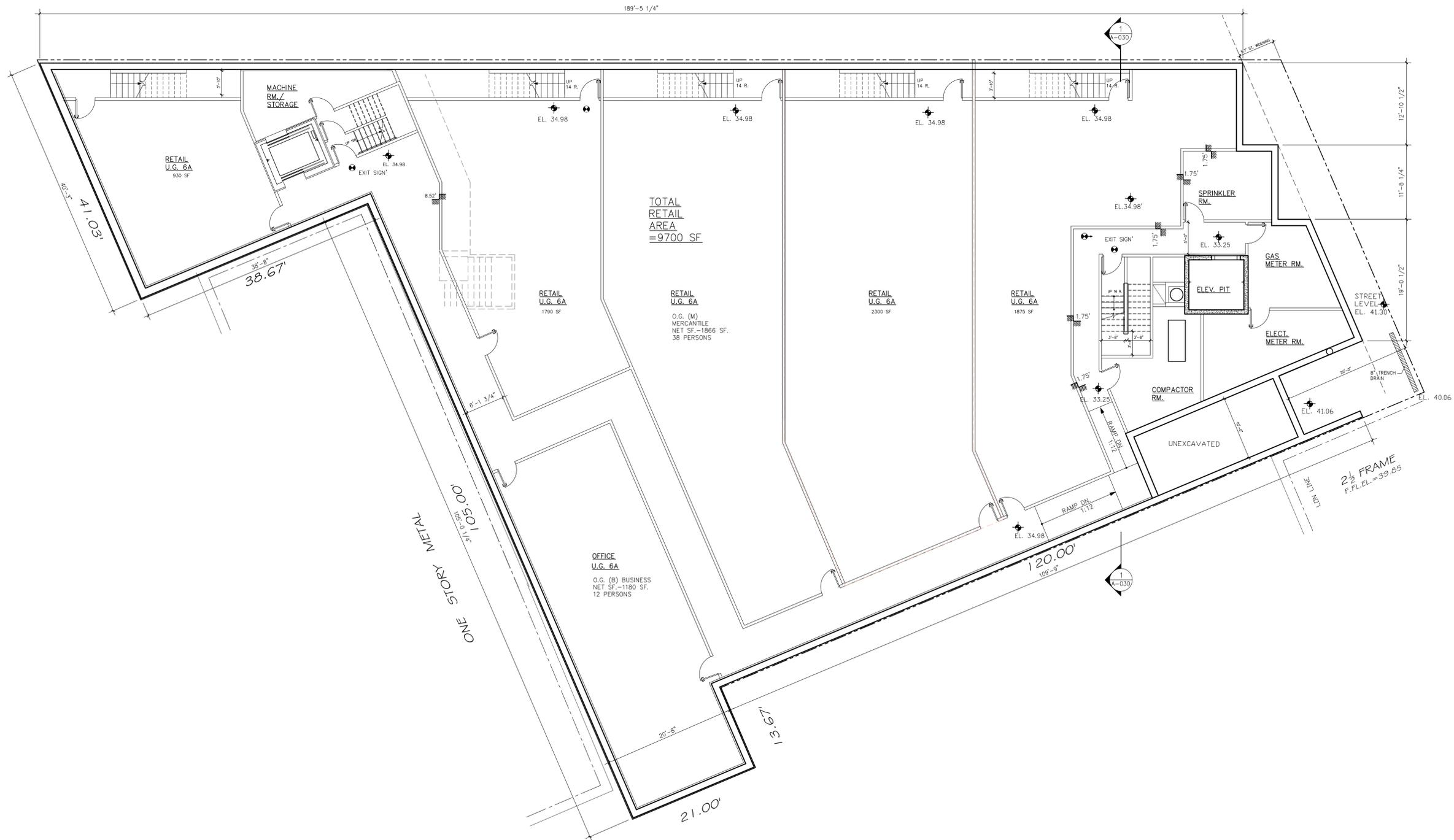
69-28 QUEENS BLVD  
QUEENS, NY



Project:	JQ1501
Date:	4/28/2015
Designed by:	JLL
Drawn by:	JCG
Approved by:	JLL
Figure No:	1

# **ATTACHMENT A**

## **PROPOSED DEVELOPMENT PLANS**



1 CELLAR PLAN  
 A-10 SCALE: 1/8" = 1'-0"

Architect: **ANGELO NG & ANTHONY NG**  
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 66-00 LONG ISLAND EXPRESSWAY  
 MASPETH, NEW YORK 11378  
 TEL: (718) 457-1151  
 FAX: (718) 335-6364

ARCHITECTURE INTERIOR DESIGN CODE CONSULTANT

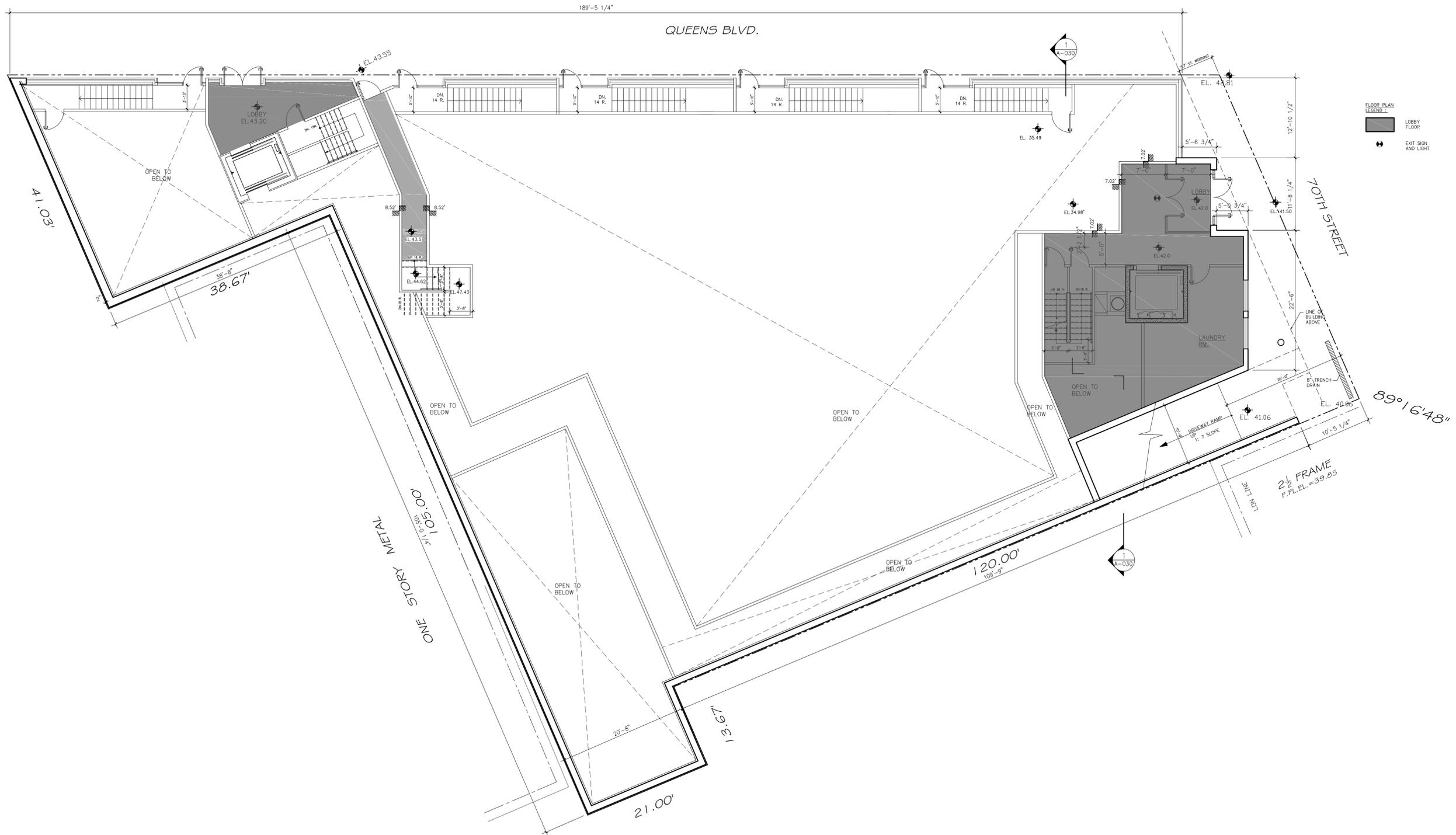
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Project: **JJ QUEENS DEVELOPMENT LLC**  
 8 STORY MIXED USE  
 46-02 70TH STREET,  
 AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.  
 WOODSIDE, NY.

Drawing Title: **CELLAR PLAN**

Sheet No:	AS NOTED
Scale:	3-2-15
Date:	1412
Project No:	
Drawing No.	

**A-010.00**



FLOOR PLAN LEGEND:  
 LOBBY FLOOR  
 EXIT SIGN AND LIGHT

1 LOBBY PLAN  
 A-11 SCALE: 1/8" = 1'-0"

Architect: **ANGELO NG & ANTHONY NG**  
**ARCHITECTS STUDIO, P.C.**  
 66-00 LONG ISLAND EXPRESSWAY  
 MASPETH, NEW YORK 11378  
 TEL: (718) 457-1151  
 FAX: (718) 335-5364

ARCHITECTURE INTERIOR DESIGN CODE CONSULTANT

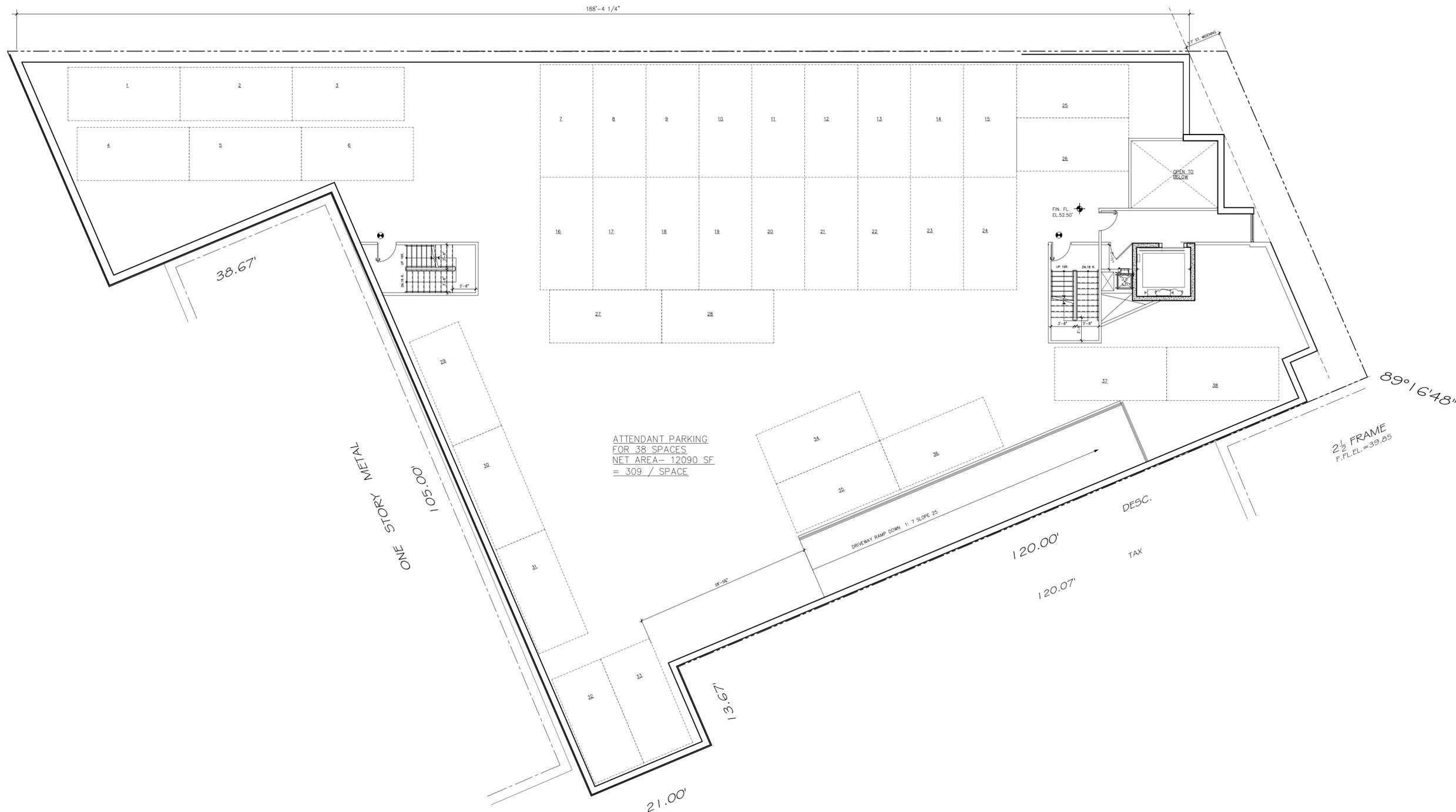
No.	Date	Description

Project: **JJ QUEENS DEVELOPMENT LLC**  
**8 STORY MIXED USE**  
**46-02 70TH STREET,**  
**AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.**  
**WOODSIDE, NY.**

Drawing Title: **LOBBY PLAN**

Sheet No.	AS NOTED
Scale	3-2-15
Date	1412
Project No.	
Drawing No.	

**A-011.00**



ATTENDANT PARKING  
FOR 38 SPACES  
NET AREA- 12090 SF  
= 309 / SPACE

1 1st FLOOR PLAN  
A-12 SCALE: 1/8" = 1'-0"

Architect: **ANGELO NG & ANTHONY NG**  
**ARCHITECTS STUDIO, P.C.**  
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MASPETH, NEW YORK 11378  
TEL: (718) 457-1151  
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ARCHITECTURE INTERIOR DESIGN CODE CONSULTANT

No	Date	Description

Project:  
JJ QUEENS DEVELOPMENT LLC  
8 STORY MIXED USE  
46-02 70TH STREET,  
AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.  
WOODSIDE, NY.

Drawing Title:  
**FIRST FLOOR PLAN**

Sheet No:	AS NOTED
Scale:	3-2-15
Date:	1412
Project No:	
Drawing No:	

**A-012.00**



1 3RD THRU 8TH FLOOR PLAN  
 A-14 SCALE: 1/8" = 1'-0"

89°16'48"

Architect:  
**ANGELO NG & ANTHONY NG**  
**ARCHITECTS STUDIO, P.C.**  
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 MASPETH, NEW YORK 11378  
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ARCHITECTURE INTERIOR DESIGN CODE CONSULTANT

No.	Date	Description

Project:  
 JJ QUEENS DEVELOPMENT LLC  
 8 STORY MIXED USE  
 46-02 70TH STREET,  
 AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.  
 WOODSIDE, NY.

Drawing Title:  
 2ND THRU 8TH FLOOR PLANS

Sheet No.	AS NOTED
Scale	3-2-15
Date	1412
Project No.	
Drawing No.	

**A-013.00**



1 FRONT ELEVATION ( QUEENS BLVD, NORTH SIDE)  
 A-10 SCALE: 1/8" = 1'-0"

Architect: **ANGELO NG & ANTHONY NG**  
**ARCHITECTS STUDIO, P.C.**

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No	Date	Description

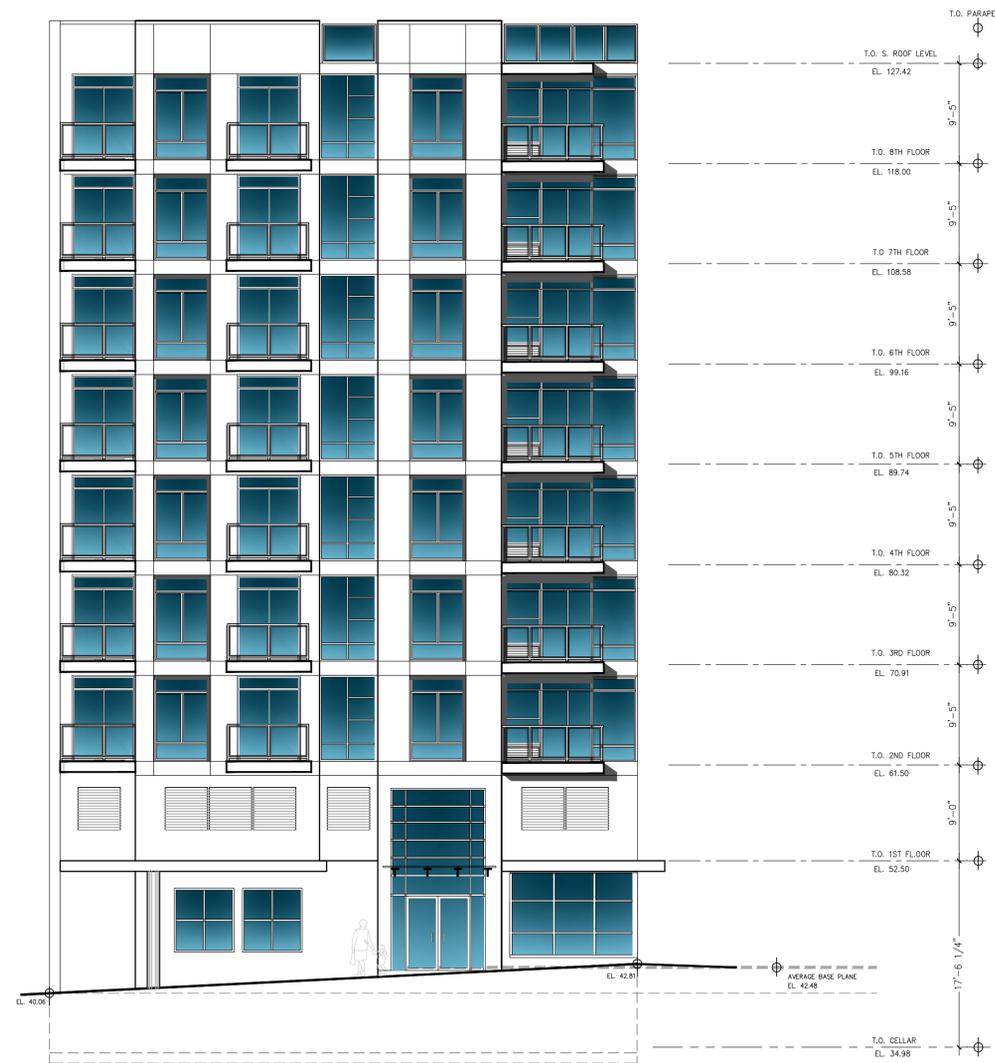
Project: **JJ QUEENS DEVELOPMENT LLC**

**8 STORY MIXED USE**  
**46-02 70TH STREET,**  
**AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.**  
**WOODSIDE, NY.**

Drawing Title:  
**FRONT ELEVATION- QUEENS BLVD.**

Sheet No.	
Scale	AS NOTED
Date	3-2-15
Project No.	1412
Drawing No.	

**A-020.00**



1 FRONT ELEVATION ( 70TH ST, EAST SIDE)  
 A-20 SCALE: 1/8" = 1'-0"

Architect: **ANGELO NG & ANTHONY NG**  
**ARCHITECTS STUDIO, P.C.**  
 66-00 LONG ISLAND EXPRESSWAY  
 MASPETH, NEW YORK 11378  
 TEL: (718) 457-1151  
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ARCHITECTURE INTERIOR DESIGN CODE CONSULTANT

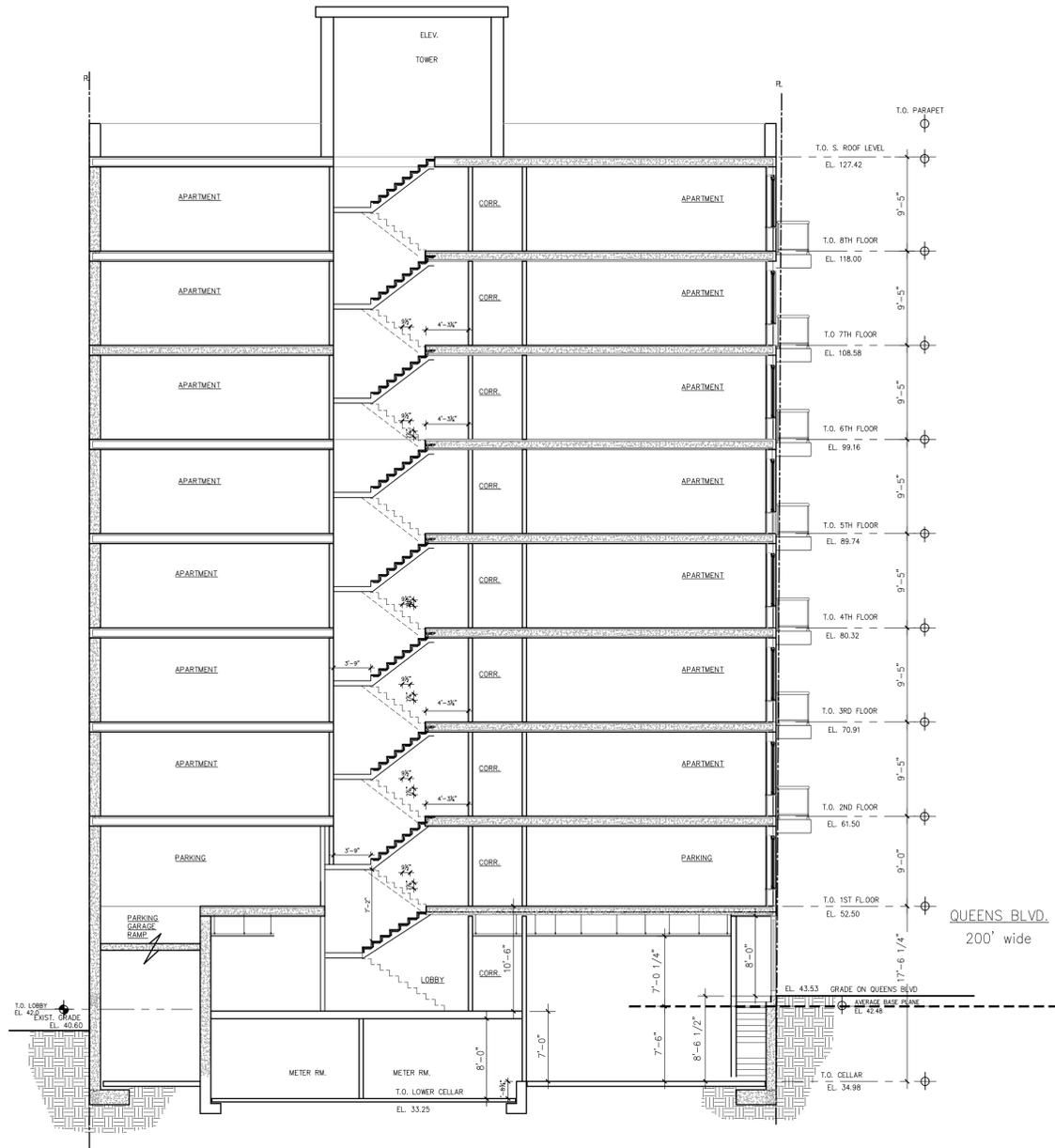
No	Date	Description

Project: **JJ QUEENS DEVELOPMENT LLC**  
**8 STORY MIXED USE**  
**46-02 70TH STREET,**  
**AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.**  
**WOODSIDE, NY.**

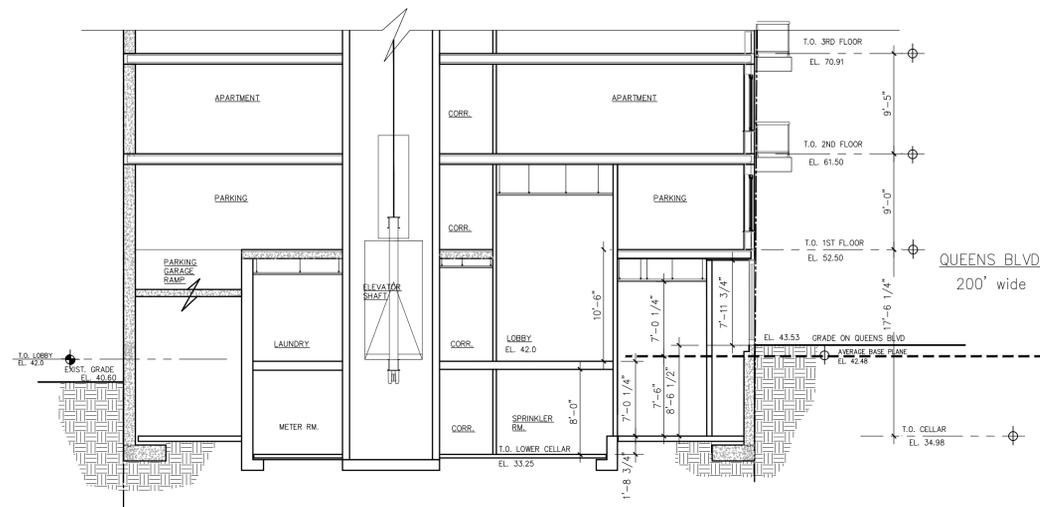
Drawing Title:  
**FRONT ELEVATION- 70TH STREET**

Sheet No:	
Scale:	AS NOTED
Date:	3-2-15
Project No:	1412
Drawing No:	

**A-021.00**



1 SECTION 1-1  
A-10 SCALE: 1/8" = 1'-0"



1 SECTION 2-2  
A-10 SCALE: 1/8" = 1'-0"

Architect: **ANGELO NG & ANTHONY NG**  
**ARCHITECTS STUDIO, P.C.**

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MASPETH, NEW YORK 11378  
TEL: (718) 457-1151  
FAX: (718) 335-5364

ARCHITECTURE INTERIOR DESIGN CODE CONSULTANT

No.	Date	Description

Project: **JJ QUEENS DEVELOPMENT LLC**

**8 STORY MIXED USE**  
**46-02 70TH STREET,**  
**AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.**  
**WOODSIDE, NY.**

Drawing Title:

**FRONT ELEVATION- QUEENS BLVD.**

Sheet No.	
Scale	AS NOTED
Date	3-2-15
Project No.	1412
Drawing No.	

**A-030.00**

**ZONING ANALYSIS :**

PREMISES: 69-28 QUEENS BLVD. BLOCK : 2432  
 WOODSIDE, NY. LOT: 23  
 ZONE : C2-3 / R7X MAP : 9d  
 ZONING LOT AREA = 13743.8 sf. ( SEE SURVEY DATED 9-19-2014)

**USE REGULATION**

- ZR# 32-15 U.G. 6 OFFICES PERMITTED AS OF RIGHT
- ZR# 32-11 U.G. 2 APARTMENTS PERMITTED AS OF RIGHT

**BULK REGULATION**

- ZR# 23-922(d) THE SUBJECT SITE IS SUBJECT TO INCLUSIONARY HOUSING PROGRAM AS PER MAP 5
- ZR# 23-142 MAX. FLOOR AREA RATIO OF A DEVELOPMENT = BASE F.A.R. = 3.75  
 MAX. F.A.R. = 5.0 IF LOWER INCOME HOUSING IS PROVIDED.  
 LOWER INCOME HOUSING WILL NOT BE PROVIDED ON THIS DEVELOPMENT, HENCE, F.A.R. OF 3.75 WILL BE USED  
 MAXIMUM F.A. = 3.75 x 13743.8 SF. = 51,539.25 SF.  
 INCLUSIONARY HOUSING PROGRAM IS NOT APPLICABLE FOR THIS PROJECT.
- ZR# 33-12 F.A.R. OF 2.0 WILL BE USED FOR COMMERCIAL SPACE (OFFICE U.G. 6)  
 2.0 x 13743.8 SF = 27487.6 SF  
 PROPOSED OFFICE IS LOCATED AT CELLAR LEVEL.

**PROPOSED RESIDENTIAL FLOOR AREA:**

TOTAL RESIDENTIAL F.A. ( U.G. 2 ) =

**ZR# 23-145 LOT COVERAGE**

MAX. LOT COVERAGE FOR RESIDENTIAL = 80% ( CORNER LOT PORTION )  
 = 7781 X 80% = 6,224.8 SF  
 = 70 % INTERIOR LOT PORTION = 5962.8 X 70% = 4,173.96 SF  
 TOTAL ALLOWED = 6,224 + 4,173.96 = 10,398.76 SF  
 PROPOSED LOT COVERAGE =

**ZR# 23-22 DENSITY**

MAX. NUMBER OF D.U. = 51539.25 SF. / 680 SF. (FACTOR) = 75.79 = 76 DU  
 ACTUAL DWELLING UNITS = 76

**ZR# 35-24 STREET WALL LOCATION**

(b) (1) THE STREET WALL OF ANY DEVELOPMENT, AT LEAST 70 % OF THE AGGREGATE WIDTH OF STREET WALLS SHALL BE LOCATED WITHIN 8 FEET OF THE STREET LINE, AND SHALL EXTEND TO AT LEAST 60 FEET, THE REMAINING 30 % OF THE AGGREGATE WIDTH OF STREET WALLS MAY BE LOCATED BEYOND 8 FEET OF THE STREET LINE.

PROPOSED STREET WALL IS LOCATED WITHIN 8 FEET OF THE STREET LINE.

(c) (1) A SETBACK W/ A DEPTH OF AT LEAST 10' SHALL BE PROVIDED FROM STREET WALL AT A HEIGHT NOT LOWER THAN 60 FEET OR HIGHER THAN 85 FEET IF PORTION OF THE BUILDING EXCEED THE MAX. BASE HT. OF 85 FT.

PROPOSED BUILDING DOES NOT EXCEED MAXIMUM BASE HT. OF 85' (SEE HT. & SETBACK DIAGRAM)

**ZR# 35-24 STREET WALL AND HEIGHT AND ZONING REGULATIONS:**

HEIGHT REGULATIONS (SEE TABLE A) :

MAX. BASE HT. OF 85'  
 MAX. BUILDING HT. OF 125'  
 PROP. BASE HT. = 84'-9" (SEE HT. & SETBACK DIAGRAM)  
 PROP. BLDG. HT. = 72.83'

NO PORTION OF BLDG. THAT EXCEEDS MAX. BASE HT. SHALL BE NEARER TO THE 'REAR YARD LINE' THAN 10'  
 PROPOSED BUILDING DOES NOT EXCEED MAX. BASE HT. (SEE HT. & SETBACK DIAGRAM)

**YARD REQUIREMENT**

ZR# 23-462(C) NO MINIMUM REQUIRED SIDE YARD.  
 ZR# 35-52

ZR# 23-541 MINIMUM REQUIRED REAR YARD:  
 NONE REQUIRED WITHIN 100 FT. OF CORNERS, 30 FT. IS REQUIRED BEYOND THAT.

ZR# 35-53 THE REAR YARD FOR THE RESIDENTIAL PORTION OF A MIXED USE BUILDING, THE LEVEL OF YARD SHALL BE PROVIDED AT THE FLOOR LEVEL OF THE LOWEST STORY USED FOR DWELLING UNITS. PROPOSED RESIDENTIAL REAR YARD IS AT FIRST FLOOR.

**PARKING REGULATION**

ZR# 25-23 PARKING REQUIREMENT FOR RESIDENTIAL :  
 ACCESSORY OFF-STREET PARKING SPACES REQUIRED:  
 76 DWELLING UNITS = 50% x 76 D.U. = 38 SPACES  
 PROVIDED = 38 SPACES AT FIRST FLOOR ATTENDED.

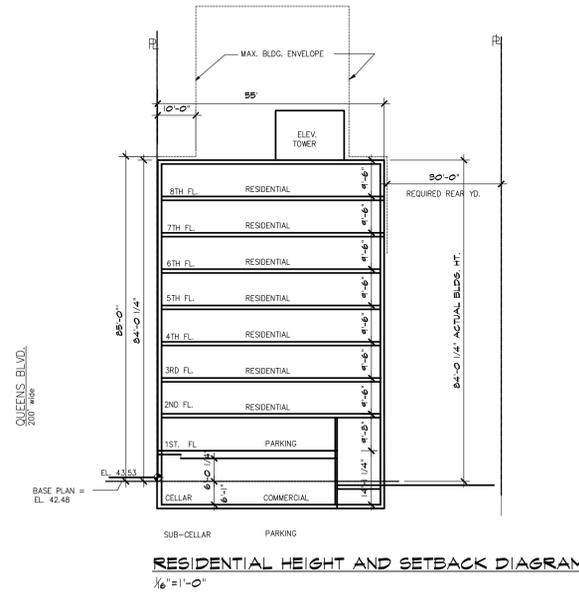
ZR# 36-21 PARKING REQUIREMENT FOR RETAIL (CELLAR) :  
 1 PER 400 S. TOTAL RETAIL AREA = 9700 SF. / 400 = 24 SPACES.  
 WAIVED IF LESS THAN 25 SPACES AS PER SEC. 36-231 ZR.

ZR# 36-62 REQUIRED LOADING BERTH = NONE REQUIRED FOR RETAIL/OFFICES = FIRST 25,000SF.

ZR# 25-25 LOCATION OF ACCESSORY PARKING:  
 NO PARKING SHALL BE PERMITTED BETWEEN THE STREET LINE AND THE STREET WALL OF THE BUILDING.  
 PROPOSED PARKINGS ARE LOCATED IN THE REAR OF THE BUILDING.

ZR# 25-631(e) LOCATION AND WIDTH OF CURB CUT:  
 ONLY ONE CURB CUT IS ALLOWED WITH A MAXIMUM WIDTH OF 12 FEET.  
 PROVIDED ONE CURB CUT AT 12 FEET.

ZR# 36-711 REQUIRED BICYCLE PARKING SPACES:  
 1 PER 2 DWELLING UNITS, 76 D.U. / 2 = 38 SPACES  
 & 1 PER 10,000 SF. FOR U.G. 64 (OFFICE - RETAIL).  
 REQUIRED = 9700 SF / 10,000 = 1 SPACE.  
 TOTAL PROVIDED = 39 SPACES AT FIRST FLOOR



**QUALITY HOUSING PROGRAM NEIGHBORHOOD IMPACT**

**BUILDING INTERIOR**

- ZR# 28-21 SIZE OF DWELLING UNITS  
 MINIMUM NET S.F. OF A DWELLING UNIT = MIN. 400 S.F., PROVIDED MIN. = 503 S.F.
- ZR# 28-22 ALL WINDOWS IN THE RESIDENTIAL PORTION OF A DEVELOPMENT OR ENLARGEMENT SHALL BE DOUBLE GLAZED.
- ZR# 28-23 FOR BUILDING OF MORE THAN 3 DWELLING UNITS SHALL PROVIDE REFUSE STORAGE AREA OF 2.9 CUBIC FEET PER DWELLING UNIT.  
 PROPOSED 70 DWELLINGS; REQ'D. 2.9 C.F. x 70 = 203 C.F. OF REFUSE STORAGE AREA.  
 PROPOSED REFUSE STORAGE IN CELLAR WITH 4' X 3' X 8' HT. = 96.00 C.F. > 58 C.F. MIN. REQ'D.  
 REFUSE DISPOSAL ROOM ON EACH STORY SHALL BE MORE THAN 12 S.F.; WITH AT LEAST DIMENSION OF 3'-0", PROPOSED REFUSE DISPOSAL ROOM AT EACH STORY IS 3'-7" X 5'-0" = 17.9 S.F.
- ZR# 28-25 DAYLIGHT IN CORRIDORS  
 50 PERCENT OF CORRIDOR MAY BE EXCLUDED FROM THE DEFINITION OF FLOOR AREA IF A WINDOW WITH A CLEAR, NON-TINTED, GLAZED AREA OF AT LEAST 20 SF. IS PROVIDED IN SUCH CORRIDOR, PROVIDED THAT SUCH WINDOW SHALL BE DIRECTLY VISIBLE FROM 50 PERCENT OF THE CORRIDOR OR FROM THE VERTICAL CIRCULATION CORE.  
 PROPOSED STREET FLOOR LOBBY QUALIFIES FOR SUCH DEDUCTION.

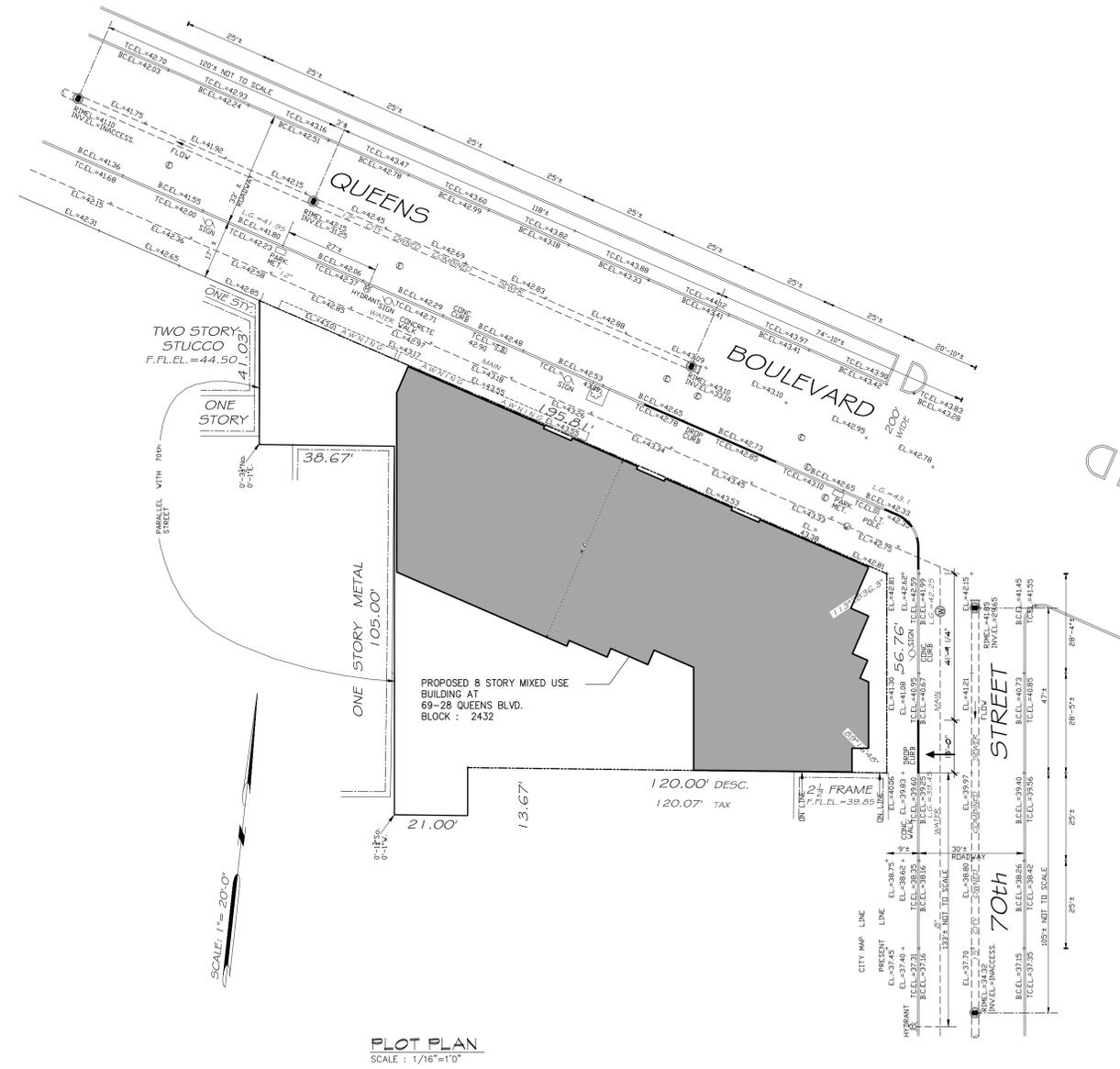
**RECREATION SPACE AND PLANTING AREAS**

- ZR# 28-31 REQUIRED INDOOR AND OUTDOOR RECREATION SPACE:  
 PROVIDE NOT LESS THAN 3.3% OF RESIDENTIAL FLOOR AREA  
 REQ'D. OUTDOOR REC. AREA = 3.3% X 10370 SF = 341 SF;  
 ACTUAL = ROOF RECREATION = 625 S. F. OK.
- ZR# 28-32 STANDARDS FOR RECREATION SPACE:  
 MINIMUM DIMENSION OF ANY RECREATION SPACE SHALL BE 15 FEET.  
 THE MINIMUM SIZE OF ANY OUTDOOR RECREATION SPACE SHALL BE 225 SF  
 OUTDOOR RECREATION SPACE SHALL OPEN TO THE SKY. PROPOSED ROOF TOP OPEN SPACE IS OPEN TO THE SKY O.K.
- ZR# 28-33 PLANTING AREAS:  
 THE AREA OF THE ZONING LOT BETWEEN THE STREET LINE & THE STREET WALL, EXCEPT AT THE ENTRANCES TO AND EXITS FROM THE BUILDING.

**SAFETY AND SECURITY**

ZR# 28-41 IF THE NUMBER OF DWELLING UNITS SERVED BY THE VERTICAL CIRCULATION CORE AND CORRIDOR ON EACH STORY DOES NOT EXCEED 11 UNITS, 50% OF THE S.F. OF THE CORRIDOR SERVING SUCH DWELLING UNITS ON SUCH STORY MAY BE EXCLUDED FROM THE DEFINITION OF FLOOR AREA  
 ACTUAL MAX. D.U. ON EACH STORY = 2 D.U.  
 50 % OF CORRIDOR AREA MAY BE DEDUCTED UNDER THIS CATEGORY ( SEE FLOOR AREA BREAKDOWN CALC.)

ZR# 28-50 PARKING FOR QUALITY HOUSING  
 ON SITE ACCESSORY OFF-STREET PARKING SHALL NOT BE PERMITTED BETWEEN THE STREET LINE AND THE STREET WALL OF A BUILDING OR PROLONGATION.



Architect:  
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ARCHITECTURE INTERIOR DESIGN CODE CONSULTANT

No	Date	Description

Project:  
**JJ QUEENS DEVELOPMENT LLC**  
 8 STORY MIXED USE  
 46-02 70TH STREET,  
 AKA 69-24,-28,-30,-32,-34 QUEENS BLVD.  
 WOODSIDE, NY.

Drawing Title:  
**ZONING ANALYSIS**

Sheet No:	AS NOTED
Scale:	3-2-15
Date:	1412
Project No:	Z-000.00
Drawing No.	

## **ATTACHMENT B**

### **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and JJ Queens Development, LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, JJ Queens Development, LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Sarah Pong, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 442-8342.

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

added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at [brownfields@cityhall.nyc.gov](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. Park Avenue Management will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Repository Name: Queens Public Library – Elmhurst Branch

Repository Address: 8508 51<sup>st</sup> Avenue, Elmhurst, NY 11373

Repository Telephone Number: 718-271-1020

Repository Hours of Operation:

Mon	9:00AM - 8:00PM
Tue	1:00 PM - 6:00 PM
Wed	10:00AM - 6:00PM
Thu	12:00PM - 8:00PM
Fri	10:00AM - 6:00PM
Sat	10:00AM - 5:30PM
Sun	closed

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

**Identify Issues of Public Concern.** The major issues of concern to the public will be potential

impacts of nuisance odors and dust during the disturbance of historic fill soils at the Site. This work will be performed in accordance with procedures which will be specified under a detailed Remedial Program which considers and takes preventive measures for exposures to future residents of the property and those on adjacent properties during construction. Detailed plans to monitor the potential for exposure including a Construction Health and Safety Plan and a Community Air Monitoring Plan are required components of the remedial program. Implementation of these plans will be under the direct oversight of the New York City Department of Environmental Remediation (NYCOER).

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

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

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

**Public Notice and Public Comment.** Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by Park Avenue Management, reviewed and approved by OER prior to distribution and mailed by Park Avenue Management. 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.**

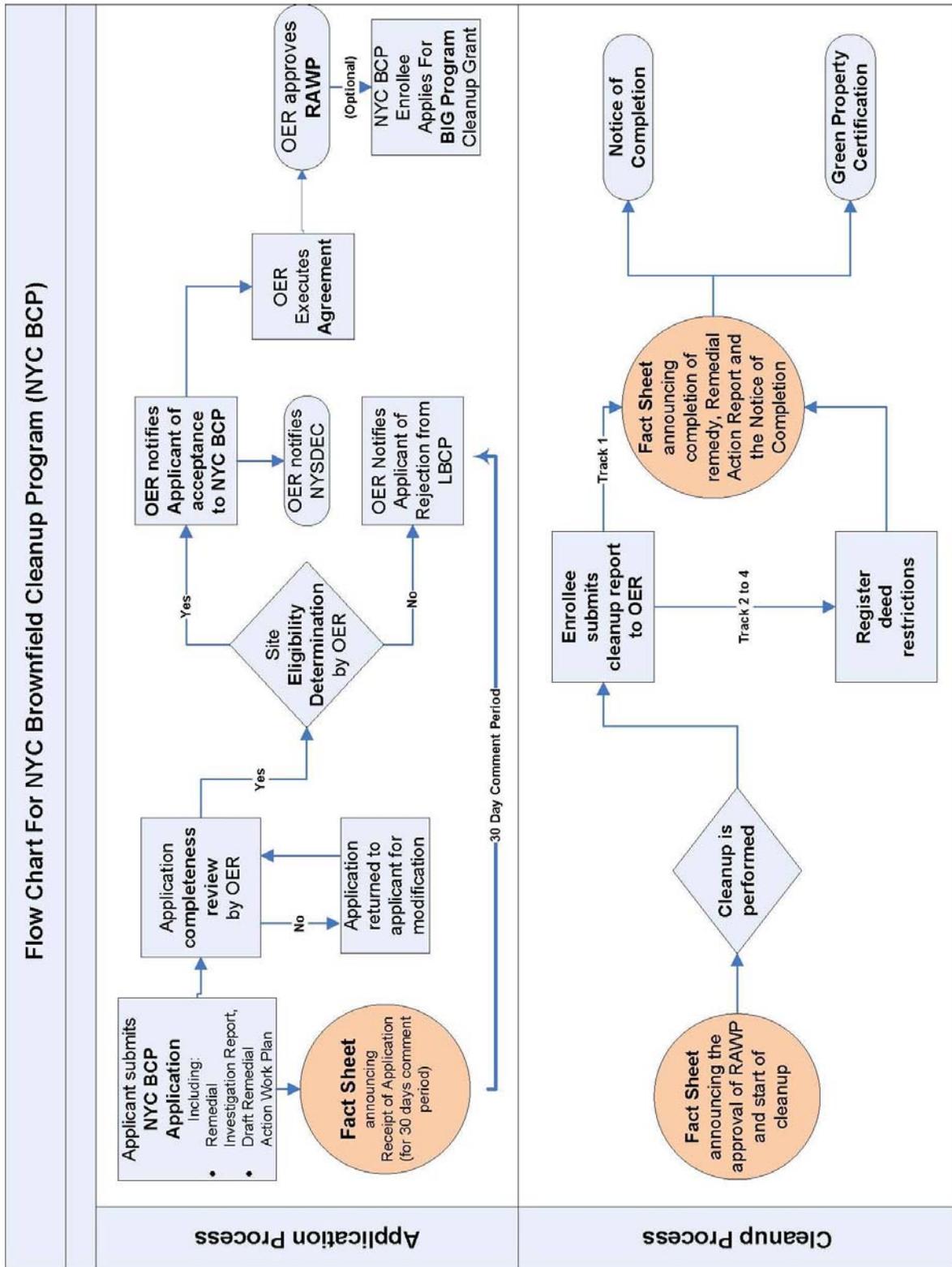
Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes 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.



## **ATTACHMENT C SUSTAINABILITY STATEMENT**

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

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

This project intends to use recycled concrete aggregate wherever possible in grading and backfilling the Site. An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

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

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

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

Recycled concrete materials and other backfill materials will be locally sourced reducing the energy consumption associated with transporting these materials to the Site. Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the

Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

**Paperless Voluntary Cleanup Program.** JJ Queens Development, LLC is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

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

## **ATTACHMENT D**

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

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

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

#### **1.2 STOCKPILE METHODS**

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

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

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

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

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

The PE/QEP overseeing the remedial action will:

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

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

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

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

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

shown on Figure 9.

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

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

## **1.8 DEMARCATION**

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

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

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

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

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

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

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

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

### **Source Screening and Testing**

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

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

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

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional

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

### **1.10 FLUIDS MANAGEMENT**

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

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

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

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

of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

### **1.12 CONTINGENCY PLAN**

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

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

#### **Odor Control**

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

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

## **Dust Control**

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

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

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

## **Other Nuisances**

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

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

## **ATTACHMENT E**

### **HEALTH AND SAFETY PLAN**

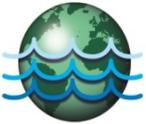
**69-28 QUEENS BLVD, WOODSIDE, NY  
BLOCK 2432, LOTS 23, 26, 34, AND 37  
OER PROJECT NUMBER: 15EHAN415Q**

## **CONSTRUCTION HEALTH AND SAFETY PLAN**

**PREPARED FOR:**

JJ Queens Development, LLC  
25 W 29<sup>th</sup> Street  
New York, New York 10001

**PREPARED BY:**



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PWGC Project Number: JJQ1501

**APRIL 2015**

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**FIGURES**

FIGURE 1	HOSPITAL ROUTE MAP
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**APPENDICES**

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APPENDIX B	SITE SAFETY AMENDMENT FORM
APPENDIX C	CHEMICAL HAZARDS
APPENDIX D	FIELD ACCIDENT REPORT

## STATEMENT OF COMMITMENT

On-site employees may be exposed to chemical contaminants of concern identified within the soil/fill during the planned construction activities to be performed on the 69-28 Queens Blvd, Woodside, New York project site. P.W. Grosser Consulting Inc.'s (PWGC's) policy is to minimize the possibility of work-related exposure through awareness and qualified supervision, health and safety training, use of appropriate personal protective equipment, and the following activity specific safety protocols contained in this Construction Health and Safety Plan (CHASP). PWGC has established a guidance program to implement this policy in a manner that protects personnel to the maximum reasonable extent.

This CHASP describes emergency response procedures for actual and potential chemical hazards. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy by signing off on receipt of their individual copy of the document. Contractors and suppliers are retained as independent contractors and are responsible for ensuring the health and safety of their own employees as it relates to general construction practices.

## 1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by P.W. Grosser Consulting, Inc. (PWGC) at the request of JJ Queens Development, LLC for the proposed site re-development to be performed at the 69-28 Queens Blvd, Woodside, New York site to protect on-site personnel, visitors, and the public from exposure to hazardous materials or wastes. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards relating to each phase of site operations and is based on the best information available. The CHASP may be revised by PWGC at the request of JJ Queens Development, LLC upon receipt of new information regarding site conditions. Changes will be documented by written amendments.

### 1.1 *Site Safety Plan Acceptance, Acknowledgment and Amendments*

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

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

### 1.2 *Daily Safety Meetings*

Each day before work begins; the site safety officer will hold safety (tailgate or tool box) meetings to ensure that on-site personnel understand the site conditions and operating procedures and to address safety questions and concerns. Meeting minutes and attendance will be recorded. Project staff will discuss and remedy health and safety issues at these meetings.

### 1.3 *Key Personnel - Roles and Responsibilities*

The following key personnel are planned for this project:

- Project Manager
- Site Safety Officer

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

will be consulted.

The site safety officer is responsible for the following:

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

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

## 2.0 SITE BACKGROUND AND SCOPE OF WORK

The subject property is located at 69-28 Queens Blvd in Woodside, New York. The site is designated as Block 2432, Lots 23, 26, 34, and 37 by the City of New York Department of Assessment. The property is approximately 13,773-square feet in size. Currently, the Site contains four vacant buildings most recently utilized as residential apartments, an automotive detailing and modification shop, a liquor store, and a sign fabricator.

The property is listed with the New York City Office of Environmental Remediation (NYCOER) as E Restricted for hazardous materials, air, and noise.

The proposed use of the Site will consist of construction of an 8-story mixed-use building with a single cellar level. The basement level is proposed at Elevation +34.98 feet and excavation is anticipated to Elevation +19 across the site with two elevator pits to Elevation +12.

Since the re-development of the subject property includes excavation and the property is listed as E Restricted by the NYCOER, a Remedial Investigation was performed at the site to fulfill the soil, groundwater, and soil vapor characterization requirements; to determine if historical site and/or neighboring operations have impacted the subsurface. This CHASP pertains to proposed construction plans for site development.

### 3.0 CHEMICAL HAZARDS

Soil sample results obtained during the Remedial Investigation at the site revealed no significant concentrations of volatile organic compounds or polychlorinated biphenyls (PCBs) detected at concentrations greater than New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Clean-up Objectives (UUSCOs). Several semi-volatile organic compounds (SVOCs), pesticides, and metals were detected above their respective NYSDCE UUSCOs.

Semi-volatile organic compounds reported above their respective UUSCOs include the following:

Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
Chrysene	Dibenzo(a,h)anthracene	Ideno(1,2,3-cd)pyrene	

Several inorganic metals were reported at concentrations exceeding their UUSCOs including:

Arsenic	Copper	Lead	Mercury
Zinc			

Several pesticides were reported at concentrations exceeding their UUSCOs including:

4,4'-DDT	Chlordane	Cis-Chlordane	Heptachlor
----------	-----------	---------------	------------

The compounds detected are not associated with a particular on-site source of contamination, but are rather indicative of historic fill material. The primary routes of exposure to suspected and identified contaminants in soil are inhalation, ingestion and absorption.

Groundwater sample results obtained during the Remedial Investigation at the site revealed several naturally occurring inorganic metals compounds and one pesticide at concentrations greater than NYSDCE Ambient Groundwater Quality Standards (AWQS).

The pesticides detected are associated likely the result of general usage of the chemicals on the landscaped portions of the site. The metal compounds detected are not associated with a particular on-site source of contamination, but are rather indicative of background groundwater quality for the area. Groundwater is not anticipated to be disturbed as part of construction activities and should not pose a threat to workers.

Soil vapor results obtained during the Remedial Investigation yield the presence of low concentrations of VOCs across the site.

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

## 4.0 PERSONAL PROTECTIVE EQUIPMENT

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

### 4.1 Level D

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

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

### 4.2 Level C

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

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

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

#### **4.3 Level B**

Level B PPE shall be donned when the contaminants have not been identified and/or the concentrations of unknown measured total organic vapors in the breathing zone exceed 5 ppm (using a portable OVA, or equivalent). Level B PPE shall be donned if the IDLH of a known contaminant is exceeded. If a contaminant is identified or is expected to be encountered for which NIOSH and/or OSHA recommend the use of a positive pressure self-contained breathing apparatus (SCBA) when that contaminant is present, Level B PPE shall be donned even though the total organic vapors in the breathing zone may not exceed 5 ppm. Level B shall be donned for confined space entry, and when the atmosphere is oxygen deficient (oxygen less than 19.5%) or potentially oxygen deficient. If Level B PPE is required for a task, at least three people shall be donned in Level B at any one time during that task. PPE shall only be donned at the direction of the site safety officer. Level B PPE consists of:

- supplied air SCBA or air line system with five minute egress system;
- chemical resistant coveralls;
- steel-toe work boots;
- chemical resistant over boots or disposable boot covers;
- disposable inner gloves;
- disposable outer gloves;
- hard hat; and,
- ankles/wrists taped.

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

## 5.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

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

Emergency telephone numbers and a map to the hospital (**Figure 1**) will be posted in the command post. Site personnel should be familiar with the emergency procedures, and the locations of site safety, first aid, and communication equipment. These will be outlined in the site specific CHASP.

### 5.1 *Emergency Equipment On-site*

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

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

### 5.2 *Emergency Telephone Numbers*

General Emergencies	911
New York City Police	911
Elmhurst Hospital Center	1-718-205-7772
NYSDEC Spills Division	1-800-457-7362
NYSDEC Hazardous Waste Division	1-718-482-4996
NYCDEP	1-212-639-9675
NYCOER	1-212-788-8841
NYC Department of Health	1-212-788-4711
NYC Fire Department	911
National Response Center	1-800-424-8802
Poison Control	1-212-764-7667

A copy of this page shall be posted in the office.

### 5.3 *Personnel Responsibilities During an Emergency*

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

- Take appropriate measures to protect personnel;
- Ensure that appropriate federal, state, and local agencies are informed and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. If toxic materials are released to the air, the local authorities should be informed in order to assess the need for evacuation;
- Ensure appropriate decontamination, treatment, or testing for exposed or injured personnel;
- Determine the cause of incidents and make recommendations to prevent recurrence; and,
- Ensure that all required reports have been prepared.

#### **5.4 Medical Emergencies**

A person who becomes ill or injured, first aid will be administered while waiting for an ambulance or paramedics. A Field Accident Report (**Appendix D**) must be filled out for any injury.

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

#### **5.5 Fire or Explosion**

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

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

#### **5.6 Evacuation Routes**

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

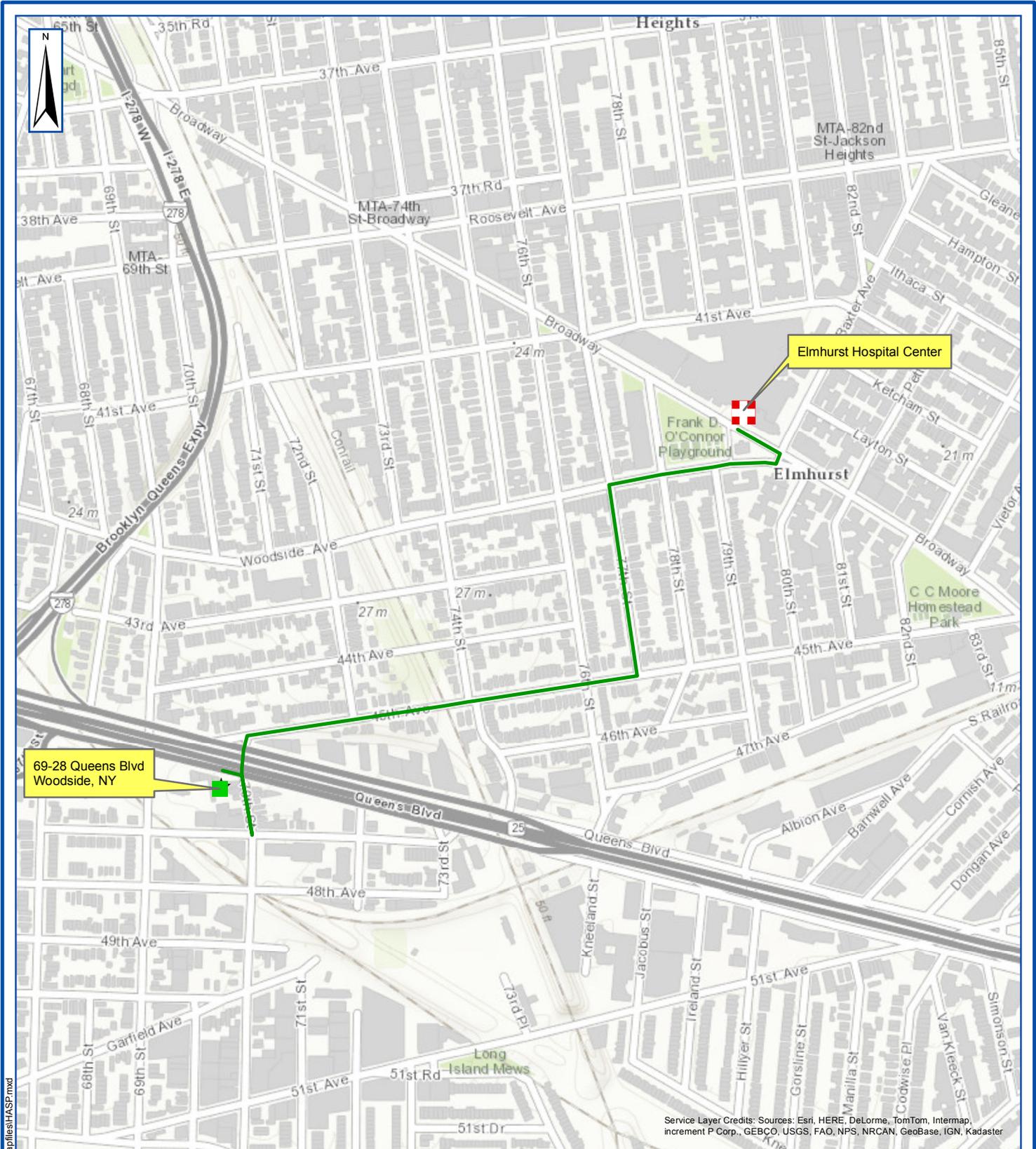
Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

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

entry/exit log.

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

## FIGURE



69-28 Queens Blvd  
Woodside, NY

Elmhurst Hospital Center

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster

Document Path: Z:\GIS\Projects\E-L\JQ1501\mapfiles\HASP.mxd



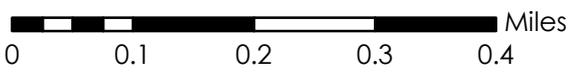
**PWGC**  
Strategic Environmental and Engineering Solutions

P.W. GROSSER CONSULTING, INC.

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Bohemia, NY 11716-2618  
Phone: (631) 589-6353 • Fax: (631) 589-8705  
E-mail: INFO@PWGROSSER.COM

# HOSPITAL ROUTE MAP

69-28 QUEENS BLVD  
WOODSIDE, NY



Project:	JQ1501
Date:	3/17/2015
Designed by:	JCG
Drawn by:	JCG
Approved by:	JLL
Figure No:	1

**APPENDIX A**  
**SITE SAFETY PLAN ACCEPTANCE AND ACKNOWLEDGMENT FORM**



**APPENDIX B**  
**SITE SAFETY AMENDMENT FORM**

**SITE SAFETY PLAN AMENDMENT FORM**

SITE SAFETY PLAN AMENDMENT # \_\_\_\_\_: \_\_\_\_\_

SITE NAME: \_\_\_\_\_

REASON FOR AMENDMENT: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

ALTERNATIVE PROCEDURES: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

REQUIRED CHANGES IN PPE: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
PROJECT SUPERINTENDENT

\_\_\_\_\_  
DATE

\_\_\_\_\_  
HEALTH & SAFETY CONSULTANT

\_\_\_\_\_  
DATE

\_\_\_\_\_  
SITE SAFETY OFFICER

\_\_\_\_\_  
DATE

## APPENDIX C

### CHEMICAL HAZARDS

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 4,4'-DDT

Product Number : 386340  
Brand : Aldrich

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

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

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

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Carcinogen, Toxic by ingestion, Toxic by skin absorption

##### Target Organs

Liver, Pancreas.

##### GHS Classification

Acute toxicity, Dermal (Category 3)

Acute toxicity, Oral (Category 3)

Carcinogenicity (Category 2)

Specific target organ toxicity - repeated exposure, Oral (Category 1)

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 4)

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

Pictogram



Signal word

Danger

Hazard statement(s)

H301 + H311

Toxic if swallowed or in contact with skin

H351

Suspected of causing cancer.

H372

Causes damage to organs through prolonged or repeated exposure if swallowed.

H400

Very toxic to aquatic life.

H413

May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273

Avoid release to the environment.

P280

Wear protective gloves/ protective clothing.

P301 + P310

IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.

P314

Get medical advice/ attention if you feel unwell.

**HMIS Classification**  
Health hazard: 2  
Chronic Health Hazard: \*  
Flammability: 0  
Physical hazards: 0

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

**Potential Health Effects**

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

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane  
1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane

Formula : C<sub>14</sub>H<sub>9</sub>Cl<sub>5</sub>  
Molecular Weight : 354.49 g/mol

Component	Concentration
<b>1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane</b>	
CAS-No. 50-29-3	-
EC-No. 200-024-3	-
Index-No. 602-045-00-7	-

---

**4. FIRST AID MEASURES**

**General advice**

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

**If inhaled**

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

**In case of skin contact**

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**

Flush eyes with water as a precaution.

**If swallowed**

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

---

**5. FIREFIGHTING MEASURES**

**Conditions of flammability**

Not flammable or combustible.

**Suitable extinguishing media**

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

**Special protective equipment for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

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

---

**6. ACCIDENTAL RELEASE MEASURES**

**Personal precautions**

Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

**Environmental precautions**

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

**Methods and materials for containment and cleaning up**

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

**7. HANDLING AND STORAGE****Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

**Conditions for safe storage**

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

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Basis
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	TWA	0.5 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
Remarks	Potential Occupational Carcinogen See Appendix A			
		TWA	1 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
	Liver damage Confirmed animal carcinogen with unknown relevance to humans			
		TWA	1 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		TWA	1 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Skin designation Substance listed; for more information see OSHA document 1910.1044			

**Personal protective equipment****Respiratory protection**

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

**Hand protection**

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

**Eye protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**

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

#### Hygiene measures

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

---

### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### Appearance

Form	solid
Colour	no data available

#### Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 107 - 110 °C (225 - 230 °F) - lit.
Boiling point	260.0 °C (500.0 °F)
Flash point	72.0 - 77.0 °C (161.6 - 170.6 °F)
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	0.0000021 hPa (0.0000016 mmHg) at 20.0 °C (68.0 °F)
Density	0.99 g/cm <sup>3</sup>
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 6.91
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

### 10. STABILITY AND REACTIVITY

#### Chemical stability

Stable under recommended storage conditions.

#### Possibility of hazardous reactions

no data available

#### Conditions to avoid

no data available

#### Materials to avoid

Oxidizing agents, Iron and iron salts.

#### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas  
Other decomposition products - no data available

---

### 11. TOXICOLOGICAL INFORMATION

**Acute toxicity****Oral LD50**

LD50 Oral - rat - 87.0 mg/kg

**Inhalation LC50**

no data available

**Dermal LD50**

LD50 Dermal - rabbit - 300.0 mg/kg

Remarks: Behavioral:Tremor. Behavioral:Muscle weakness. Behavioral:Ataxia.

**Other information on acute toxicity**

no data available

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

NTP: Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

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

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

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

no data available

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

Ingestion - Causes damage to organs through prolonged or repeated exposure.

**Aspiration hazard**

no data available

**Potential health effects****Inhalation**

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

**Ingestion**

Toxic if swallowed.

**Skin**  
**Eyes**

Toxic if absorbed through skin. May cause skin irritation.  
May cause eye irritation.

**Signs and Symptoms of Exposure**

CNS stimulation.

**Synergistic effects**

no data available

**Additional Information**

RTECS: KJ3325000

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.01 mg/l - 96.0 h LC50 - Lepomis macrochirus (Bluegill) - 0.01 mg/l - 96.0 h LC50 - Oncorhynchus mykiss (rainbow trout) - 0.003400 mg/l - 96.0 h LOEC - Oncorhynchus mykiss (rainbow trout) - 150 mg/l - 3.0 d NOEC - Oncorhynchus mykiss (rainbow trout) - 113 mg/l - 3.0 d
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 0.00108 mg/l - 48 h
Toxicity to algae	LC100 - Scenedesmus quadricauda (Green algae) - > 20 mg/l - 7 d

**Persistence and degradability**

**Bioaccumulative potential**

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 20 d Bioconcentration factor (BCF): 46,670
-----------------	---

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Very toxic to aquatic life.

---

**13. DISPOSAL CONSIDERATIONS**

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**

**DOT (US)**

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

**IMDG**

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

**IATA**

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

---

**15. REGULATORY INFORMATION**

**OSHA Hazards**

Carcinogen, Toxic by ingestion, Toxic by skin absorption

**SARA 302 Components**

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

**SARA 313 Components**

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

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2007-03-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2007-03-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	2007-03-01

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1990-06-15

**California Prop. 65 Components**

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1990-06-15

---

**16. OTHER INFORMATION**

**Further information**

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# ARSENIC

0013

October 1999

CAS No: 7440-38-2  
 RTECS No: CG0525000  
 UN No: 1558  
 EC No: 033-001-00-X

Grey arsenic  
 As  
 Atomic mass: 74.9

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>		<b>PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!</b>	<b>IN ALL CASES CONSULT A DOCTOR!</b>
<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	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.	T Symbol N Symbol R: 23/25-50/53 S: (1/2-)20/21-28-45-60-61 UN Hazard Class: 6.1 UN Pack Group: II Do not transport with food and feedstuffs. Marine pollutant.

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-61GT5-II	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.

### IMPORTANT DATA

**Physical State; Appearance**

ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

**Chemical dangers**

Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce toxic arsine gas (see: ICSC 0222).

**Occupational exposure limits**

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).

**Routes of exposure**

The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

**Inhalation risk**

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

**Effects of short-term exposure**

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 and 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.

**Effects of long-term or repeated exposure**

Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system, liver and 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.

### PHYSICAL PROPERTIES

Sublimation point: 613°C  
Density: 5.7 g/cm<sup>3</sup>

Solubility in water: none

### ENVIRONMENTAL DATA

The substance is toxic to aquatic organisms. It is strongly advised that this substance does not enter the environment.

### 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).

Card has been partly updated in October 2004. See sections Occupational Exposure Limits, EU classification, Emergency Response.

Card has been partly updated in October 2005 in section Effects of long-term or repeated exposure.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

**BENZ(a)ANTHRACENE****0385**

October 1995

CAS No: 56-55-3  
 RTECS No: CV9275000  
 EC No: 601-033-00-9

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

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

**SPILLAGE DISPOSAL**

Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.

**PACKAGING & LABELLING**

T Symbol  
 N Symbol  
 R: 45-50/53  
 S: 53-45-60-61

**EMERGENCY RESPONSE****SAFE STORAGE**

Well closed.

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### IMPORTANT DATA

**Physical State; Appearance**

COLOURLESS TO YELLOW - BROWN FLUORESCENT FLAKES OR POWDER.

**Physical dangers**

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

**Occupational exposure limits**

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

**Routes of exposure**

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

**Inhalation risk**

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

**Effects of long-term or repeated exposure**

This substance is probably carcinogenic to humans.

### PHYSICAL PROPERTIES

Sublimation point: 435/C  
Melting point: 162/C  
Relative density (water = 1): 1.274

Solubility in water: none  
Vapour pressure, Pa at 20/C: 292  
Octanol/water partition coefficient as log Pow: 5.61

### ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

### NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form.

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

Do NOT take working clothes home.

Tetraphene is a common name.

Card has been partly updated in October 2005. See sections Occupational Exposure Limits, EU classification.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

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**BENZO(a)PYRENE****0104**

October 2005

CAS No: 50-32-8  
 RTECS No: DJ3675000  
 EC No: 601-032-00-3

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

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>			

EXPOSURE	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****PACKAGING & LABELLING**

Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.

T Symbol  
 N Symbol  
 R: 45-46-60-61-43-50/53  
 S: 53-45-60-61

**EMERGENCY RESPONSE****SAFE STORAGE**

Separated from strong oxidants.

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### IMPORTANT DATA

**Physical State; Appearance**

PALE-YELLOW CRYSTALS

**Chemical dangers**

Reacts with strong oxidants causing fire and explosion hazard.

**Occupational exposure limits**

TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005).

MAK: Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).

**Routes of exposure**

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

**Inhalation risk**

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

**Effects of long-term or repeated exposure**

This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

### PHYSICAL PROPERTIES

Boiling point: 496/C  
Melting point: 178.1/C  
Density: 1.4 g/cm<sup>3</sup>

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

### ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.

### NOTES

Do NOT take working clothes home.

Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

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**BENZO(b)FLUORANTHENE****0720**

March 1999

CAS No: 205-99-2  
 RTECS No: CU1400000  
 EC No: 601-034-00-4

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>			In case of fire in the surroundings: use appropriate extinguishing media.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>Inhalation</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>Skin</b>		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.
<b>SPILLAGE DISPOSAL</b>		<b>PACKAGING &amp; LABELLING</b>	
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.		T Symbol N Symbol R: 45-50/53 S: 53-45-60-61	
<b>EMERGENCY RESPONSE</b>		<b>SAFE STORAGE</b>	
		Provision to contain effluent from fire extinguishing. Well closed.	

## IMPORTANT DATA

**Physical State; Appearance**  
COLOURLESS CRYSTALS

**Chemical dangers**

Upon heating, toxic fumes are formed.

**Occupational exposure limits**

TLV: A2 (suspected human carcinogen); (ACGIH 2004).  
MAK: Carcinogen category: 2; (DFG 2004).

**Routes of exposure**

The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

**Inhalation risk**

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

**Effects of long-term or repeated exposure**

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

## PHYSICAL PROPERTIES

Boiling point: 481°C  
Melting point: 168°C

Solubility in water: none  
Octanol/water partition coefficient as log Pow: 6.12

## ENVIRONMENTAL DATA

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

## NOTES

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

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

Card has been partly updated in October 2005. See section Occupational Exposure Limits.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

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**BENZO(k)FLUORANTHENE****0721**

March 1999

CAS No: 207-08-9  
RTECS No: DF6350000  
EC No: 601-036-00-5Dibenzo(b,jk)fluorene  
8,9-Benzofluoranthene  
11,12-Benzofluoranthene  
C<sub>20</sub>H<sub>12</sub>  
Molecular mass: 252.3

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

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.

**PACKAGING & LABELLING**T Symbol  
N Symbol  
R: 45-50/53  
S: 53-45-60-61**EMERGENCY RESPONSE****SAFE STORAGE**

Provision to contain effluent from fire extinguishing. Well closed.

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## IMPORTANT DATA

**Physical State; Appearance**

YELLOW CRYSTALS

**Chemical dangers**

Upon heating, toxic fumes are formed.

**Occupational exposure limits**

TLV not established.

MAK: Carcinogen category: 2; (DFG 2004).

**Routes of exposure**

The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

**Inhalation risk**

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

**Effects of long-term or repeated exposure**

This substance is possibly carcinogenic to humans.

## PHYSICAL PROPERTIES

Boiling point: 480°C

Melting point: 217°C

Solubility in water: none

Octanol/water partition coefficient as log Pow: 6.84

## ENVIRONMENTAL DATA

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

## NOTES

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

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

Card has been partly updated in October 2005. See section Occupational Exposure Limits.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

**CHLORDANE (TECHNICAL PRODUCT)****0740**

March 1998

**CAS No: 57-74-9**

RTECS No:

UN No: 2996

EC No: 602-047-00-8

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<sub>10</sub>H<sub>6</sub>Cl<sub>8</sub>

Molecular mass: 409.8

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>		<b>PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!</b>	<b>IN ALL CASES CONSULT A DOCTOR!</b>
<b>Inhalation</b>	(See Ingestion).	Breathing protection.	Fresh air, rest. Refer for medical attention.
<b>Skin</b>	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>	Redness. Pain.	Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>	Confusion. Convulsions. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

**SPILLAGE DISPOSAL**

Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: chemical protection suit including self-contained breathing apparatus.

**PACKAGING & LABELLING**

Xn Symbol  
N Symbol  
R: 21/22-40-50/53  
S: (2-)36/37-60-61  
UN Hazard Class: 6.1  
UN Pack Group: III

Do not transport with food and feedstuffs. Severe marine pollutant.

**EMERGENCY RESPONSE**

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

**SAFE STORAGE**

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.

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## IMPORTANT DATA

**Physical State; Appearance**

TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID

**Chemical dangers**

The substance decomposes on burning, on contact with bases producing toxic fumes including phosgene, hydrogen chloride. Attacks iron, zinc, plastic, rubber and coatings.

**Occupational exposure limits**

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).

**Routes of exposure**

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

**Inhalation risk**

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

**Effects of short-term exposure**

Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.

**Effects of long-term or repeated exposure**

The substance may have effects on the liver and immune system, resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.

## PHYSICAL PROPERTIES

Boiling point at 0.27kPa: 175/C  
Relative density (water = 1): 1.59-1.63  
Solubility in water: none

Vapour pressure, Pa at 25/C: 0.0013  
Octanol/water partition coefficient as log Pow: 2.78

## ENVIRONMENTAL DATA

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.

## NOTES

If the substance is formulated with solvents also consult the ICSCs of these materials.  
Carrier solvents used in commercial formulations may change physical and toxicological properties.  
Belt, Chlor Kil, Chlortox, Corodan, Gold Crest, Intox, Kypchlor, Niran, Octachlor, Sydane, Synklor, Termi-Ded, Topiclor, and Toxichlor are trade names.  
Also consult ICSC 0743 Heptachlor.  
Card has been partly updated in October 2005. See sections Occupational Exposure Limits, Emergency Response.

## ADDITIONAL INFORMATION

## LEGAL NOTICE

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# Safety (MSDS) data for chrysene



## General

Synonyms: 1,2-benzophenanthrene, benzo(a)phenanthrene, 1,2-benzphenanthrene, coal tar pitch, benz(a)phenanthrene, 1,2,5,6-dibenzonaphthalene

Molecular formula:  $C_{18}H_{12}$

CAS No: 218-01-9

EC No: 205-923-4

## Physical data

Appearance: crystalline powder

Melting point: 253 C

Boiling point: 448 C

Vapour density:

Vapour pressure:

Density ( $g\ cm^{-3}$ ): 1.27

Flash point:

Explosion limits:

Autoignition temperature:

Water solubility: insoluble

## Stability

Stable. Combustible. Incompatible with strong oxidizing agents.

## Toxicology

Toxic. Confirmed animal carcinogen, possible human carcinogen. Harmful if

swallowed, inhaled or absorbed through the skin.

**Toxicity data**

(The meaning of any abbreviations which appear in this section is given [here](#).)

IPR-MUS LD50 >320 mg kg<sup>-1</sup>

**Risk phrases**

(The meaning of any risk phrases which appear in this section is given [here](#).)

R20 R21 R22 R45 R46.

**Transport information**

(The meaning of any UN hazard codes which appear in this section is given [here](#).)

UN No 2811. Packing group I. Hazard class 6.1. CDG UK Transport category 1. EMS No 6.1-04.

**Personal protection**

Safety glasses, good ventilation, gloves. Handle as a carcinogen. A COSHH assessment is required.

**Safety phrases**

(The meaning of any safety phrases which appear in this section is given [here](#).)

S3 S7 S9 S36 S37 S39 S45.

[Return to [Physical & Theoretical Chemistry Lab. Safety home page](#).]

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This information was last updated on April 1, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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## 1. Identification

**Product identifier**                      **cis-Chlordane**

**Other means of identification**

**Product code**                      N-11480

**Synonym(s)**                              alpha Chlordane

**Recommended use**                      For Laboratory Use Only

**Recommended restrictions**            None known.

### Manufacturer/Importer/Supplier/Distributor information

#### Manufacturer

<b>Company name</b>	Chem Service, Inc.	
<b>Address</b>	660 Tower Lane West Chester, PA 19380 United States	
<b>Telephone</b>	Toll Free	800-452-9994
	Direct	610-692-3026
<b>Website</b>	www.chemservice.com	
<b>E-mail</b>	info@chemservice.com	
<b>Emergency phone number</b>	Chemtrec US	800-424-9300
	Chemtrec outside US	+1 703-527-3887

## 2. Hazard(s) identification

<b>Physical hazards</b>	Not classified.	
<b>Health hazards</b>	Acute toxicity, oral	Category 3
	Acute toxicity, dermal	Category 3
	Acute toxicity, inhalation	Category 2
	Carcinogenicity	Category 2
	Reproductive toxicity	Category 2
<b>Environmental hazards</b>	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1
<b>OSHA defined hazards</b>	Not classified.	
<b>Label elements</b>		



<b>Signal word</b>	Danger
<b>Hazard statement</b>	Toxic if swallowed. Toxic in contact with skin. Fatal if inhaled. Suspected of causing cancer. Suspected of damaging fertility or the unborn child. Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.
<b>Precautionary statement</b>	
<b>Prevention</b>	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area. Do not breathe dust/fume. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection. Wear respiratory protection.
<b>Response</b>	If swallowed: Immediately call a poison center/doctor. If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor. Specific treatment is urgent (see this label). Rinse mouth. Take off immediately all contaminated clothing and wash it before reuse. Collect spillage.
<b>Storage</b>	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
<b>Disposal</b>	Dispose of contents/container in accordance with local/regional/national/international regulations.
<b>Hazard(s) not otherwise classified (HNOC)</b>	None known.

### 3. Composition/information on ingredients

#### Substances

Chemical name	Common name and synonyms	CAS number	%
cis-Chlordane	alpha Chlordane	5103-71-9	100

\*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

### 4. First-aid measures

#### Inhalation

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician or poison control center immediately.

#### Skin contact

Take off immediately all contaminated clothing. Wash off with soap and plenty of water. Call a POISON CENTER or doctor/physician if you feel unwell. Get medical attention if irritation develops and persists.

#### Eye contact

Do not rub eyes. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

#### Ingestion

Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Do not use mouth-to-mouth method if victim ingested the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

#### Most important symptoms/effects, acute and delayed

Direct contact with eyes may cause temporary irritation.

#### Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

#### General information

Take off immediately all contaminated clothing. IF exposed or concerned: Get medical advice/attention. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

### 5. Fire-fighting measures

#### Suitable extinguishing media

Alcohol resistant foam. Water fog. Dry chemical powder. Carbon dioxide (CO<sub>2</sub>).

#### Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

#### Specific hazards arising from the chemical

During fire, gases hazardous to health may be formed.

#### Special protective equipment and precautions for firefighters

Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

#### Fire-fighting equipment/instructions

Use water spray to cool unopened containers.

#### Specific methods

Use standard firefighting procedures and consider the hazards of other involved materials.

#### General fire hazards

No unusual fire or explosion hazards noted.

### 6. Accidental release measures

#### Personal precautions, protective equipment and emergency procedures

Immediately evacuate personnel to safe areas. Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Do not breathe dust. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

#### Methods and materials for containment and cleaning up

Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). This material is classified as a water pollutant under the Clean Water Act and should be prevented from contaminating soil or from entering sewage and drainage systems which lead to waterways. Stop the flow of material, if this is without risk. Collect spillage.

Large Spills: Wet down with water and dike for later disposal. Following product recovery, flush area with water.

Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

**Environmental precautions** Avoid release to the environment. Contact local authorities in case of spillage to drain/aquatic environment. Prevent further leakage or spillage if safe to do so. Do not contaminate water. Avoid discharge into drains, water courses or onto the ground.

## 7. Handling and storage

**Precautions for safe handling** Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Do not breathe dust. Do not taste or swallow. Avoid contact with skin. Avoid contact with eyes. Avoid contact during pregnancy/while nursing. Avoid prolonged exposure. Avoid contact with clothing. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. When using, do not eat, drink or smoke. Wash hands thoroughly after handling. Wash contaminated clothing before reuse. Avoid release to the environment. Do not empty into drains.

**Conditions for safe storage, including any incompatibilities** Store locked up. Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Material	Type	Value
cis-Chlordane (CAS 5103-71-9)	PEL	0.5 mg/m3

#### US. ACGIH Threshold Limit Values

Material	Type	Value
cis-Chlordane (CAS 5103-71-9)	TWA	0.5 mg/m3

#### US. NIOSH: Pocket Guide to Chemical Hazards

Material	Type	Value
cis-Chlordane (CAS 5103-71-9)	TWA	0.5 mg/m3

**Biological limit values** No biological exposure limits noted for the ingredient(s).

### Exposure guidelines

#### US - California OELs: Skin designation

cis-Chlordane (CAS 5103-71-9) Can be absorbed through the skin.

#### US - Minnesota Haz Subs: Skin designation applies

cis-Chlordane (CAS 5103-71-9) Skin designation applies.

#### US - Tennessee OELs: Skin designation

cis-Chlordane (CAS 5103-71-9) Can be absorbed through the skin.

#### US ACGIH Threshold Limit Values: Skin designation

cis-Chlordane (CAS 5103-71-9) Can be absorbed through the skin.

#### US NIOSH Pocket Guide to Chemical Hazards: Skin designation

cis-Chlordane (CAS 5103-71-9) Can be absorbed through the skin.

#### US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

cis-Chlordane (CAS 5103-71-9) Can be absorbed through the skin.

**Appropriate engineering controls** Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

### Individual protection measures, such as personal protective equipment

**Eye/face protection** Wear eye/face protection. Wear safety glasses with side shields (or goggles).

#### Skin protection

**Hand protection** Wear protective gloves.

**Other** Wear appropriate chemical resistant clothing.

**Respiratory protection** Wear positive pressure self-contained breathing apparatus (SCBA).

**Thermal hazards** Wear appropriate thermal protective clothing, when necessary.

**General hygiene considerations** When using, do not eat, drink or smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

## 9. Physical and chemical properties

### Appearance

<b>Physical state</b>	Solid.
<b>Form</b>	Solid. Crystalline Solid
<b>Color</b>	White
<b>Odor</b>	Not available.
<b>Odor threshold</b>	Not available.
<b>pH</b>	Not available.
<b>Melting point/freezing point</b>	222.8 - 224.6 °F (106 - 107 °C)
<b>Initial boiling point and boiling range</b>	347 °F (175 °C) 0.133322 kPa
<b>Flash point</b>	225.0 °F (107.2 °C) Open Cup
<b>Evaporation rate</b>	Not available.
<b>Flammability (solid, gas)</b>	Not available.
<b>Upper/lower flammability or explosive limits</b>	
<b>Flammability limit - lower (%)</b>	Not available.
<b>Flammability limit - upper (%)</b>	Not available.
<b>Explosive limit - lower (%)</b>	Not available.
<b>Explosive limit - upper (%)</b>	Not available.
<b>Vapor pressure</b>	0 kPa at 25 °C
<b>Vapor density</b>	14
<b>Relative density</b>	Not available.
<b>Solubility(ies)</b>	
<b>Solubility (water)</b>	0 g/l
<b>Partition coefficient (n-octanol/water)</b>	5.2
<b>Auto-ignition temperature</b>	Not available.
<b>Decomposition temperature</b>	Not available.
<b>Viscosity</b>	Not available.
<b>Other information</b>	
<b>Density</b>	1.59 g/ml
<b>Flammability class</b>	Combustible IIIB estimated
<b>Molecular formula</b>	C10-H6-Cl8
<b>Molecular weight</b>	409.8 g/mol
<b>Specific gravity</b>	1.59 - 1.63 at 25 °C

## 10. Stability and reactivity

<b>Reactivity</b>	The product is stable and non-reactive under normal conditions of use, storage and transport.
<b>Chemical stability</b>	Material is stable under normal conditions.
<b>Possibility of hazardous reactions</b>	Hazardous polymerization does not occur.
<b>Conditions to avoid</b>	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
<b>Incompatible materials</b>	Strong oxidizing agents.
<b>Hazardous decomposition products</b>	No hazardous decomposition products are known.

## 11. Toxicological information

### Information on likely routes of exposure

<b>Ingestion</b>	Toxic if swallowed.
<b>Inhalation</b>	Fatal if inhaled.
<b>Skin contact</b>	Toxic in contact with skin.
<b>Eye contact</b>	Direct contact with eyes may cause temporary irritation.
<b>Symptoms related to the physical, chemical and toxicological characteristics</b>	Direct contact with eyes may cause temporary irritation.

### Information on toxicological effects

**Acute toxicity** Fatal if inhaled. Toxic if swallowed. Toxic in contact with skin.

<b>Product</b>	<b>Species</b>	<b>Test Results</b>
cis-Chlordane (CAS 5103-71-9)		
<b>Acute</b>		
<i>Dermal</i>		
LD50	Rat	590 - 840 mg/kg
<i>Inhalation</i>		
LC50	Cat	0.1 mg/l, 4 Hours
<i>Oral</i>		
LD50	Mouse	430 mg/kg
	Rabbit	300 mg/kg
	Rat	590 mg/kg
TD	Rat	25 mg/kg
<i>Other</i>		
LD50	Rat	343 mg/kg

\* Estimates for product may be based on additional component data not shown.

**Skin corrosion/irritation** Prolonged skin contact may cause temporary irritation.

**Serious eye damage/eye irritation** Direct contact with eyes may cause temporary irritation.

**Respiratory or skin sensitization**

**Respiratory sensitization** Not available.

**Skin sensitization** This product is not expected to cause skin sensitization.

**Germ cell mutagenicity** No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Carcinogenicity** Suspected of causing cancer.

**IARC Monographs. Overall Evaluation of Carcinogenicity**

cis-Chlordane (CAS 5103-71-9) 2B Possibly carcinogenic to humans.

**US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

Not listed.

**Reproductive toxicity** Suspected of damaging fertility or the unborn child.

**Specific target organ toxicity - single exposure** Not classified.

**Specific target organ toxicity - repeated exposure** Not classified.

**Aspiration hazard** Not available.

**Chronic effects** Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

**12. Ecological information**

**Ecotoxicity** Very toxic to aquatic life with long lasting effects. Accumulation in aquatic organisms is expected.

<b>Product</b>	<b>Species</b>	<b>Test Results</b>
cis-Chlordane (CAS 5103-71-9)		
<b>Aquatic</b>		
Fish	LC50 Bluegill ( <i>Lepomis macrochirus</i> )	0.0043 - 0.0118 mg/l, 96 hours

\* Estimates for product may be based on additional component data not shown.

**Persistence and degradability** No data is available on the degradability of this product.

**Bioaccumulative potential** Not available.

**Partition coefficient n-octanol / water (log Kow)**

5.16

**Mobility in soil** No data available.

**Other adverse effects** No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

### 13. Disposal considerations

<b>Disposal instructions</b>	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
<b>Local disposal regulations</b>	Dispose in accordance with all applicable regulations.
<b>Hazardous waste code</b>	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

#### US RCRA Hazardous Waste U List: Reference

cis-Chlordane (CAS 5103-71-9) U036

<b>Waste from residues / unused products</b>	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
<b>Contaminated packaging</b>	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

### 14. Transport information

#### DOT

<b>UN number</b>	UN2811
<b>UN proper shipping name</b>	Toxic solids, organic, n.o.s. (cis-Chlordane), MARINE POLLUTANT
<b>Transport hazard class(es)</b>	
<b>Class</b>	6.1(PGIII)
<b>Subsidiary risk</b>	-
<b>Label(s)</b>	6.1
<b>Packing group</b>	III
<b>Environmental hazards</b>	
<b>Marine pollutant</b>	Yes
<b>Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.
<b>Special provisions</b>	IB8, IP3, T1, TP33
<b>Packaging exceptions</b>	153
<b>Packaging non bulk</b>	213
<b>Packaging bulk</b>	240

#### IATA

<b>UN number</b>	UN2811
<b>UN proper shipping name</b>	Toxic solid, organic, n.o.s. (cis-Chlordane)
<b>Transport hazard class(es)</b>	
<b>Class</b>	6.1(PGIII)
<b>Subsidiary risk</b>	-
<b>Packing group</b>	III
<b>Environmental hazards</b>	No.
<b>ERG Code</b>	6L
<b>Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.
<b>Other information</b>	
<b>Passenger and cargo aircraft</b>	Allowed.
<b>Cargo aircraft only</b>	Allowed.

#### IMDG

<b>UN number</b>	UN2811
<b>UN proper shipping name</b>	TOXIC SOLID, ORGANIC, N.O.S. (cis-Chlordane), MARINE POLLUTANT
<b>Transport hazard class(es)</b>	
<b>Class</b>	6.1(PGIII)
<b>Subsidiary risk</b>	-
<b>Packing group</b>	III
<b>Environmental hazards</b>	
<b>Marine pollutant</b>	Yes
<b>EmS</b>	F-A, S-A
<b>Special precautions for user</b>	Read safety instructions, SDS and emergency procedures before handling.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable.

DOT



IATA; IMDG



Marine pollutant



### 15. Regulatory information

#### US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.  
One or more components are not listed on TSCA.

#### TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

#### CERCLA Hazardous Substance List (40 CFR 302.4)

cis-Chlordane (CAS 5103-71-9) Listed.

#### SARA 304 Emergency release notification

cis-Chlordane (CAS 5103-71-9) 1 LBS

#### US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

#### Superfund Amendments and Reauthorization Act of 1986 (SARA)

##### Hazard categories

Immediate Hazard - Yes  
Delayed Hazard - Yes  
Fire Hazard - No  
Pressure Hazard - No  
Reactivity Hazard - No

#### SARA 302 Extremely hazardous substance

Chemical name	CAS number	Reportable quantity	Threshold planning quantity	Threshold planning quantity, lower value	Threshold planning quantity, upper value
cis-Chlordane	5103-71-9	1	1000 lbs		

SARA 311/312 Hazardous chemical Yes

#### SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
cis-Chlordane	5103-71-9	100

#### Other federal regulations

##### Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

cis-Chlordane (CAS 5103-71-9)

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**

Not regulated.

**Clean Water Act (CWA) Section 112(r) (40 CFR 68.130)** Hazardous substance**Safe Drinking Water Act (SDWA)** 0 mg/l  
0.002 mg/l**US state regulations****US. Massachusetts RTK - Substance List**

cis-Chlordane (CAS 5103-71-9)

**US. New Jersey Worker and Community Right-to-Know Act**

cis-Chlordane (CAS 5103-71-9) 500 LBS

**US. Pennsylvania RTK - Hazardous Substances**

cis-Chlordane (CAS 5103-71-9)

**US. Rhode Island RTK**

Not regulated.

**US. California Proposition 65**

WARNING: This product contains a chemical known to the State of California to cause cancer.

**US - California Proposition 65 - CRT: Listed date/Carcinogenic substance**

cis-Chlordane (CAS 5103-71-9) Listed: July 1, 1988

**International Inventories**

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

\*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**16. Other information, including date of preparation or last revision**

**Issue date** 06-12-2014  
**Version #** 01  
**NFPA ratings** Health: 2  
Flammability: 1  
Instability: 0

## Disclaimer

The above information is believed to be correct on the date it was last revised and must not be considered all inclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. OSHA regulations require that if other hazards become evident, an upgraded SDS must be made available to the employee within three months. RESPONSIBILITY for updates lies with the employer and not with CHEM SERVICE, Inc.

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This product is furnished FOR LABORATORY USE ONLY.

**COPPER****0240**

September 1993

CAS No: 7440-50-8  
RTECS No: GL5325000  
UN No:  
EC No:Cu  
Atomic mass: 63.5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Special powder, dry sand, NO other agents.
<b>EXPLOSION</b>			

EXPOSURE		PREVENT DISPERSION OF DUST!	
<b>Inhalation</b>	Cough. Headache. Shortness of breath. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
<b>Skin</b>	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

**SPILLAGE DISPOSAL**

Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place (extra personal protection: P2 filter respirator for harmful particles).

**PACKAGING & LABELLING**Symbol  
R:  
S:**EMERGENCY RESPONSE****STORAGE**

Separated from: see Chemical Dangers.

### IMPORTANT DATA

**Physical State; Appearance**

RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

**Chemical Dangers**

Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxides and azides. Reacts with strong oxidants like chlorates, bromates and iodates, causing explosion hazard.

**Occupational Exposure Limits**

TLV: ppm; 0.2 mg/m<sup>3</sup> fume (ACGIH 1992-1993).  
TLV (as Cu, dusts & mists): ppm; 1 mg/m<sup>3</sup> (ACGIH 1992-1993).

**Routes of Exposure**

The substance can be absorbed into the body by inhalation and by ingestion.

**Inhalation Risk**

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

**Effects of Short-term Exposure**

Inhalation of fume may cause metal fever (see Notes).

**Effects of Long-term or Repeated Exposure**

Repeated or prolonged contact may cause skin sensitization.

### PHYSICAL PROPERTIES

Boiling point: 2595°C  
Melting point: 1083°C

Relative density (water = 1): 8.9  
Solubility in water: none

### ENVIRONMENTAL DATA

### NOTES

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

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

**DIBENZO(a,h)ANTHRACENE****0431**

October 1995

**CAS No: 53-70-3**

RTECS No: HN2625000

EC No: 601-041-00-2

1,2:5,6-Dibenzanthracene

C<sub>22</sub>H<sub>14</sub>

Molecular mass: 278.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Combustible.	NO open flames.	Water spray, powder.
<b>EXPLOSION</b>			
<b>EXPOSURE</b>		<b>AVOID ALL CONTACT!</b>	
<b>Inhalation</b>		Local exhaust or breathing protection.	Fresh air, rest.
<b>Skin</b>	Redness. Swelling. Itching.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
<b>Eyes</b>	Redness.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth.

**SPILLAGE DISPOSAL**

Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.  
Personal protection: P3 filter respirator for toxic particles.

**PACKAGING & LABELLING**

T Symbol  
N Symbol  
R: 45-50/53  
S: 53-45-60-61

**EMERGENCY RESPONSE****SAFE STORAGE**

Well closed.

**IPCS**International  
Programme on  
Chemical Safety

Prepared in the context of cooperation between the International Programme on Chemical Safety and the European Commission ©  
IPCS 2005

**SEE IMPORTANT INFORMATION ON THE BACK.**

### IMPORTANT DATA

**Physical State; Appearance**

COLOURLESS CRYSTALLINE POWDER.

**Occupational exposure limits**

TLV not established.

**Routes of exposure**

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

**Inhalation risk**

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

**Effects of long-term or repeated exposure**

The substance may have effects on the skin, resulting in photosensitization. This substance is probably carcinogenic to humans.

### PHYSICAL PROPERTIES

Boiling point: 524/C

Melting point: 267/C

Relative density (water = 1): 1.28

Solubility in water: none

Octanol/water partition coefficient as log Pow: 6.5

### ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in seafood.

### NOTES

This is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form.

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

Do NOT take working clothes home.

DBA is a commonly used name.

This substance is one of many polycyclic aromatic hydrocarbons (PAH).

Card has been partly updated in October 2005. See section EU classification.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

# Safety data for heptachlor



[Glossary](#) of terms on this data sheet.

The information on this web page is provided to help you to work safely, but it is intended to be an overview of hazards, not a replacement for a full Material Safety Data Sheet (MSDS). MSDS forms can be downloaded from the web sites of many chemical suppliers.

## General

Synonyms: 1,4,5,6,7,8,8-heptachloro-3A,4,7,7A-tetrahydro-4,7-methanoindene, 3,4,5,6,7,8,8A-heptachlorodicyclopentadiene, agroceres, drinox, GPKH, heptagran, hepta, heptachlorane, heptox, heptamul, rhodiachlor, velsicol heptachlor

Use: organochlorine pesticide (use restricted or no longer permitted in some countries)

Molecular formula:  $C_{10}H_5Cl_7$

CAS No: 76-44-8

EINECS No: 200-962-3

Annex I Index No: 602-046-00-2

## Physical data

Appearance: white crystalline solid

Melting point: 95 - 96 C

Boiling point: decomposes

Vapour density:

Vapour pressure:  
Density (g cm<sup>-3</sup>): 1.58  
Flash point:  
Explosion limits:  
Autoignition temperature:  
Water solubility:

## Stability

Stable. Non-combustible. Incompatible with strong alkali, oxidizing agents. Corrodes many metals.

## Toxicology

Toxic if inhaled, swallowed or absorbed through the skin. Readily absorbed through the skin. Possible carcinogen. May cause systemic effects.

### Toxicity data

(The meaning of any toxicological abbreviations which appear in this section is given [here.](#))

ORL-RAT LD50 40 mg kg<sup>-1</sup>  
SKN-RAT LD50 119 mg kg<sup>-1</sup>  
IPR-RAT LD50 27 mg kg<sup>-1</sup>  
ORL-MUS LD50 68 mg kg<sup>-1</sup>  
IVN-MUS LD50 20 mg kg<sup>-1</sup>  
SKN-GPG LDLO 1000 mg kg<sup>-1</sup>

### Risk phrases

(The meaning of any risk phrases which appear in this section is given [here.](#))

R24 R25 R33 R40 R50 R53.

## Environmental information

Toxic in the environment - very harmful to aquatic systems. May cause long-term damage.

## Transport information

(The meaning of any UN hazard codes which appear in this section is given [here.](#))

UN No 2761. Hazard class 6.1. Packing group II.

## Personal protection

Safety glasses and gloves. Use only in a well-ventilated area.

### Safety phrases

(The meaning of any safety phrases which appear in this section is given [here.](#))

S36 S37 S45 S60 S61.

[Return to [Physical & Theoretical Chemistry Lab. Safety home page.](#)]

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This information was last updated on October 4, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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**INDENO(1,2,3-cd)PYRENE****0730**

March 1999

CAS No: 193-39-5  
RTECS No: NK9300000o-Phenylenepyrene  
2,3-Phenylenepyrene  
C<sub>22</sub>H<sub>12</sub>  
Molecular mass: 276.3

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

**SPILLAGE DISPOSAL**

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.

**PACKAGING & LABELLING****EMERGENCY RESPONSE****SAFE STORAGE**

Provision to contain effluent from fire extinguishing. Well closed.

**IPCS**International  
Programme on  
Chemical SafetyPrepared in the context of cooperation between the International  
Programme on Chemical Safety and the European Commission ©  
IPCS 2005**SEE IMPORTANT INFORMATION ON THE BACK.**

### IMPORTANT DATA

**Physical State; Appearance**

YELLOW CRYSTALS

**Chemical dangers**

Upon heating, toxic fumes are formed.

**Occupational exposure limits**

TLV not established.

MAK: Carcinogen category: 2; (DFG 2004).

**Routes of exposure**

The substance can be absorbed into the body by inhalation of its aerosol and through the skin.

**Inhalation risk**

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

**Effects of long-term or repeated exposure**

This substance is possibly carcinogenic to humans.

### PHYSICAL PROPERTIES

Boiling point: 536°C

Melting point: 164°C

Solubility in water: none

Octanol/water partition coefficient as log Pow: 6.58

### ENVIRONMENTAL DATA

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

### NOTES

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

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

Card has been partly updated in October 2005. See section Occupational Exposure Limits.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

CAS No: 7439-92-1  
RTECS No: OF7525000

Lead metal  
Plumbum  
(powder)  
Pb  
Atomic mass: 207.2

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.	

EXPOSURE	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	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.	

EMERGENCY RESPONSE	SAFE STORAGE
	Separated from food and feedstuffs and incompatible materials. See Chemical Dangers.

### IMPORTANT DATA

**Physical State; Appearance**

BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

**Physical dangers**

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

**Chemical dangers**

On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

**Occupational exposure limits**

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: 3B; Germ cell mutagen group: 3A; (DFG 2004).  
EU OEL: as TWA 0.15 mg/m<sup>3</sup>; (EU 2002).

**Routes of exposure**

The substance can be absorbed into the body by inhalation and by ingestion.

**Inhalation risk**

A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

**Effects of long-term or repeated exposure**

The substance may have effects on the blood, bone marrow, central nervous system, peripheral nervous system and kidneys, resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

### PHYSICAL PROPERTIES

Boiling point: 1740/C  
Melting point: 327.5/C

Density: 11.34 g/cm<sup>3</sup>  
Solubility in water: none

### ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.

### NOTES

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.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

## Safety data for magnesium



Click here for data on magnesium in [student-friendly format](#), from the HSci project

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[Glossary](#) of terms on this data sheet.

The information on this web page is provided to help you to work safely, but it is intended to be an overview of hazards, not a replacement for a full Material Safety Data Sheet (MSDS). MSDS forms can be downloaded from the web sites of many chemical suppliers.

---

### General

Synonyms: magnesium ribbon, magnesium wire, magnesium powder

Molecular formula: Mg

CAS No: 7439-95-4

EC No: 231-104-6

### Physical data

Appearance: silver or grey rod, turnings or ribbon

Melting point: 650 C

Boiling point: 1107 C

Vapour density:

Vapour pressure: 1 mm at 621 C

Specific gravity: 1.73

Flash point: 634 C (closed cup)

Explosion limits:

Autoignition temperature: 510 C

## Stability

Stable. Reacts violently with halogens, chlorinated solvents, chloromethane. Air and moisture sensitive. Incompatible with acids, acid chlorides, strong oxidizing agents. Highly flammable.

## Toxicology

Harmful if swallowed or inhaled. Severe irritant. Vesicant.

### Risk phrases

(The meaning of any risk phrases which appear in this section is given [here.](#))

R11 R20 R22.

## Transport information

(The meaning of any UN hazard codes which appear in this section is given [here.](#))

Hazard class 4.1 Packing group III

## Personal protection

Safety glasses.

### Safety phrases

(The meaning of any safety phrases which appear in this section is given [here.](#))

S16 S26 S33 S36 S37 S39.

[Return to [Physical & Theoretical Chemistry Lab. Safety home page.](#)]

This information was last updated on May 20, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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# MERCURY

0056  
April 2004

CAS No: 7439-97-6  
RTECS No: OV4550000  
UN No: 2809  
EC No: 080-001-00-0

Quicksilver  
Liquid silver  
Hg  
Atomic mass: 200.6

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.

EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
<b>Inhalation</b>	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
<b>Skin</b>	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
<b>Eyes</b>		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

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

EMERGENCY RESPONSE	STORAGE
Transport Emergency Card: TEC (R)-80GC9-II+III	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Well closed.

### IMPORTANT DATA

**Physical State; Appearance**

ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

**Chemical dangers**

Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

**Occupational exposure limits**

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).

**Routes of exposure**

The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!

**Inhalation risk**

A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20/C.

**Effects of short-term exposure**

The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.

**Effects of long-term or repeated exposure**

The substance may have effects on the central nervous system and kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. May cause inflammation and discoloration of the gums. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

### PHYSICAL PROPERTIES

Boiling point: 357/C  
Melting point: -39/C  
Relative density (water = 1): 13.5  
Solubility in water: none

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

### ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

### NOTES

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

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

# SODIUM

0717  
April 2006

CAS No: 7440-23-5  
RTECS No: VY0686000  
UN No: 1428  
EC No: 011-001-00-0

Natrium  
Na  
Atomic mass: 23.0

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO contact with water, acid(s) and halogens. NO open flames, NO sparks, and NO smoking.	Special powder, dry sand, NO other agents.
<b>EXPLOSION</b>	Risk of fire and explosion. on contact with acid(s), halogens, water.		Combat fire from a sheltered position.
<b>EXPOSURE</b>			
<b>Inhalation</b>	Cough. Sore throat. Burning sensation.	Closed system and ventilation.	Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.
<b>Skin</b>	Pain. Blisters. Serious skin burns.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
<b>Eyes</b>	Severe deep burns. loss of vision.	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>	Burning sensation. Shock or collapse.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

## SPILLAGE DISPOSAL

Evacuate danger area! Consult an expert! Chemical protection suit including self-contained breathing apparatus. Cover the spilled material with dry powder.

## PACKAGING & LABELLING

**EU classification**  
F Symbol  
C Symbol  
R: 14/15-34  
S: (1/2)-5 -8-43-45  
**UN classification**  
UN Hazard Class: 4.3  
UN Pack Group: I  
**GHS classification**  
Signal: Danger  
Flam-Corr  
In contact with water releases flammable gases which may ignite spontaneously  
Causes severe skin burns and eye damage

Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container.

## EMERGENCY RESPONSE

Transport Emergency Card: TEC (R)-43S1428a  
NFPA Code: H3; F3; R2

## SAFE STORAGE

Fireproof. Keep under mineral oil. Dry. Well closed.

**IMPORTANT DATA****Physical State; Appearance**

SILVERY SOLID IN VARIOUS FORMS

**Chemical dangers**

Reacts violently with water, causing fire and explosion hazard.  
The substance decomposes rapidly under the influence of air and moisture, forming flammable/explosive gas (Hydrogen - see ICSC0001).

**Occupational exposure limits**

TLV not established.  
MAK not established.

**Routes of exposure**

Serious local effects by all routes of exposure.

**Effects of short-term exposure**

See ICSC 0360 (Sodium hydroxide)

**PHYSICAL PROPERTIES**

Boiling point: 880/C  
Melting point: 97.4/C  
Density: 0.97 g/cm<sup>3</sup>

Solubility in water: reaction  
Vapour pressure, Pa at 20/C: negligible  
Auto-ignition temperature: 120-125/C

**ENVIRONMENTAL DATA****NOTES**

Sodium is always kept under mineral oil.  
Reacts violently with fire extinguishing agents such as water and carbon dioxide.

**ADDITIONAL INFORMATION****LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible for the use which might be made of this information

**ZINC POWDER****1205**  
October 1994

**CAS No: 7440-66-6**  
 RTECS No: ZG8600000  
 UN No: 1436 (zinc powder or dust)  
 EC No: 030-001-00-1

Blue powder  
 Merrillite  
 (powder)  
 Zn  
 Atomic mass: 65.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
<b>FIRE</b>	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base(s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
<b>EXPLOSION</b>	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.

EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
<b>Inhalation</b>	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
<b>Skin</b>	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
<b>Eyes</b>		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
<b>Ingestion</b>	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

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

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-43GWS-II+III NFPA Code: H0; F1; R1	Fireproof. Separated from acids, bases oxidants. Dry.

### IMPORTANT DATA

**Physical State; Appearance**

ODOURLESS GREY TO BLUE POWDER.

**Physical dangers**

Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

**Chemical dangers**

Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001). Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

**Occupational exposure limits**

TLV not established.

**Routes of exposure**

The substance can be absorbed into the body by inhalation and by ingestion.

**Inhalation risk**

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

**Effects of short-term exposure**

Inhalation of fumes may cause metal fume fever. The effects may be delayed.

**Effects of long-term or repeated exposure**

Repeated or prolonged contact with skin may cause dermatitis.

### PHYSICAL PROPERTIES

Boiling point: 907°C  
Melting point: 419°C  
Relative density (water = 1): 7.14

Solubility in water: reaction  
Vapour pressure, kPa at 487°C: 0.1  
Auto-ignition temperature: 460°C

### ENVIRONMENTAL DATA

### NOTES

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC0001 and ICSC0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water. Card has been partly updated in April 2005. See sections EU classification, Emergency Response.

### ADDITIONAL INFORMATION

**LEGAL NOTICE**

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

**APPENDIX D**  
**FIELD ACCIDENT REPORT**

## FIELD ACCIDENT REPORT

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

PROJECT NAME: \_\_\_\_\_ PROJECT. NO.: \_\_\_\_\_

Date of Accident: \_\_\_\_\_ Time: \_\_\_\_\_ Report By: \_\_\_\_\_

Type of Accident (Check One):

Vehicular       Personal       Property

Name of Injured: \_\_\_\_\_ DOB or Age \_\_\_\_\_

How Long Employed: \_\_\_\_\_

Names of Witnesses: \_\_\_\_\_

Description of Accident: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Action Taken: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

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

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

\_\_\_\_\_  
\_\_\_\_\_

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

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **ATTACHMENT F**

# **VAPOR BARRIER SPECIFICATIONS**

## **PREPRUFE® Detail Tape**

Two Sided Self-Adhesive Tape

### **Description**

Preprufe® Detail Tape is a specially formulated, two-sided, highly aggressive tape. It is a 2 in (50 mm) wide x 50 ft (15 m) long self-adhesive tape with a release liner.

Preprufe Detail Tape is provided in Low Temperature and Hot Climate Grades as follows:

- Preprufe Detail Tape LT Grade—for temperatures between 25°F (-4°C) and 86°F (+30°C)
- Preprufe Detail Tape HC Grade—for use in Hot Climates (minimum 50°F (+10°C))

### **Use**

Preprufe Detail Tape is ideally suited for the following uses:

- As a detailing accessory to the Preprufe and Preprufe SCS Systems
- Adhering Hydroduct® drainage composites and insulation boards to waterproofing membranes

### **Application**

#### **Surface Preparation**

All surfaces must be clean, dry and free from dirt, grease oil, dust or other contaminants.

**Preprufe and Preprufe SCS Systems**— Preprufe Detail Tape must be rolled firmly into place prior to removing the release liner. Ensure the release liner is then removed prior to adhering the next piece of membrane to the Preprufe Detail Tape, which then must be rolled into place as well over the Preprufe Detail Tape. Refer to applicable system detail drawings at [www.graceconstruction.com](http://www.graceconstruction.com)

**Hydroduct drainage composites**— Where Hydroduct drainage composites are placed horizontally from rolls onto a wall, a continuous strip of Preprufe Detail Tape near the top and another strip near the bottom is recommended. If the drainage composite is cut and applied vertically in 6 to 8 ft (1.8 to 2.4 m) lengths, a strip is recommended near the top, another near the middle and a third near the bottom.

On decks, a strip of tape is recommended at approximately 10 ft (3 m) intervals, or more frequently in the event of high wind. Unroll the tape and adhere to the waterproofing membrane. Leave the release sheet on the tape until just before applying the drainage composite. The tape and release liner may be cut with a utility knife. Peel the release liner and apply the drainage composite. Press the composite firmly to assure good contact. For deck applications, the tape may be applied to the back of the drainage composite rather than to the waterproofing membrane, if it is more convenient.

#### **Polystyrene protection board and insulation**—

On walls, apply a strip of tape near the top and bottom edge of the board or insulation. If the board is applied vertically in lengths of 8 ft (2.4m) or more, apply a third strip of tape in the middle of the board or insulation. Press panel firmly over the tape to assure a good bond. Preprufe Detail Tape may also be used to adhere polystyrene board or insulation in deck applications in the event of high winds.

## Supply

<b>Preprufe Detail Tape</b>	
Roll size	2 in. x 50ft. (50 mm x 15m)
Packaging	16 rolls/carton

[www.graceconstruction.com](http://www.graceconstruction.com)

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

Preprufe, and Hydroduct are trademarks of W. R. Grace & Co.–Conn. registered in the United States and other countries.

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

In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This product may be covered by patents or patents pending.  
PF-197 Printed in U.S.A. 11/13

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GCS/PDF

The logo for GRACE, featuring the word "GRACE" in a bold, green, sans-serif font.

## PREPRUFE® 300R & 160R

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

### Description

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

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

The Preprufe R System includes:

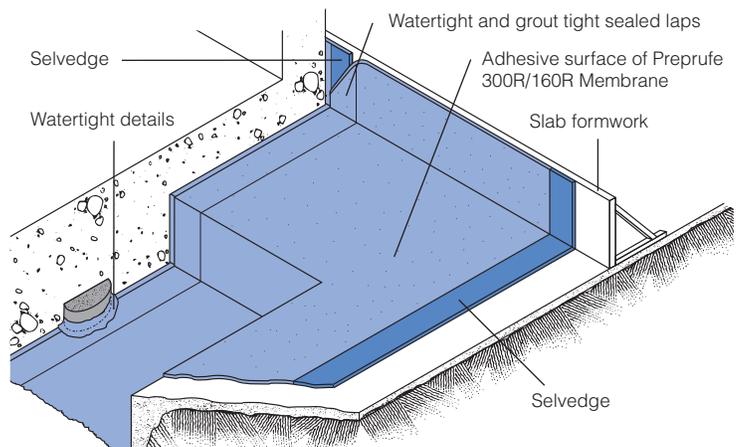
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe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

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

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

### Advantages

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



Drawings are for illustration purposes only. Please refer to [graceconstruction.com](http://graceconstruction.com) for specific application details.

## Installation

The most current application instructions, detail drawings and technical letters can be viewed at [graceconstruction.com](http://graceconstruction.com). For other technical information contact your local Grace representative.

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

### Substrate Preparation

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

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

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

### Membrane Installation

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

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

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

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

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

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

overlap. Roll firmly to ensure a watertight seal.

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

### Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [graceconstruction.com](http://graceconstruction.com). This manual gives comprehensive guidance and standard details.

### Membrane Repair

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

### Pouring of Concrete

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

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

### Removal of Formwork

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

A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

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

Figure 1



Figure 2

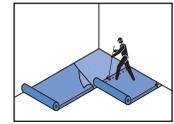
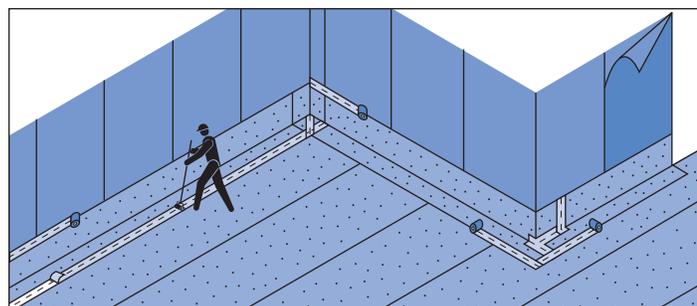
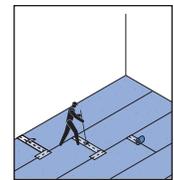


Figure 3

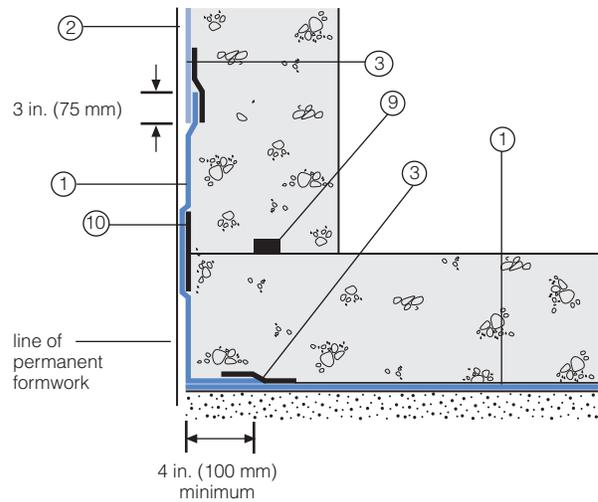


## Detail Drawings

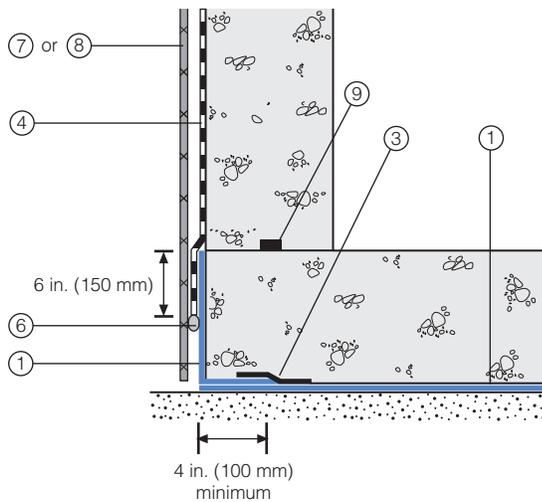
Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [graceconstruction.com](http://graceconstruction.com).

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

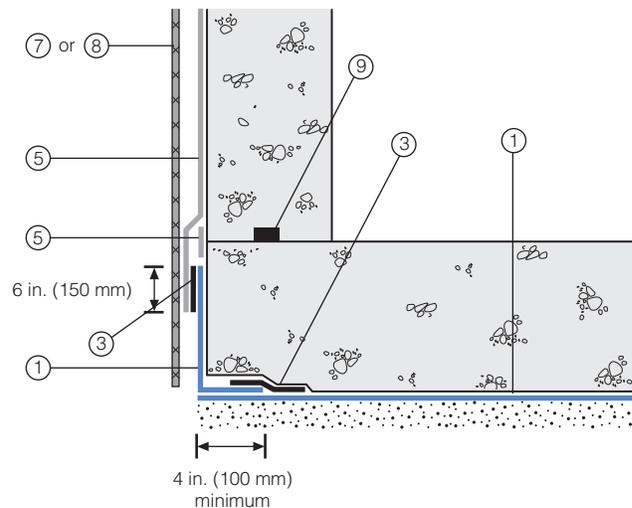
### Wall base detail against permanent shutter



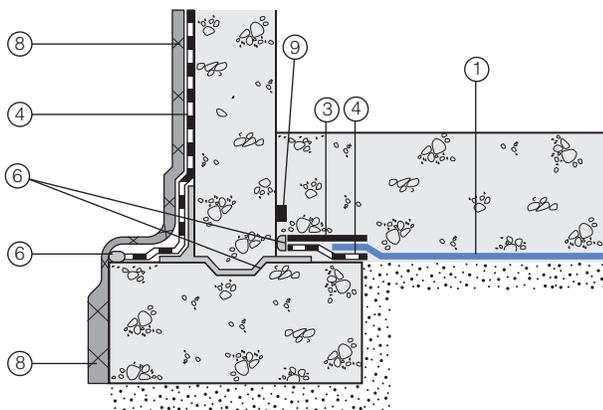
### Bituthene wall base detail (Option 1)



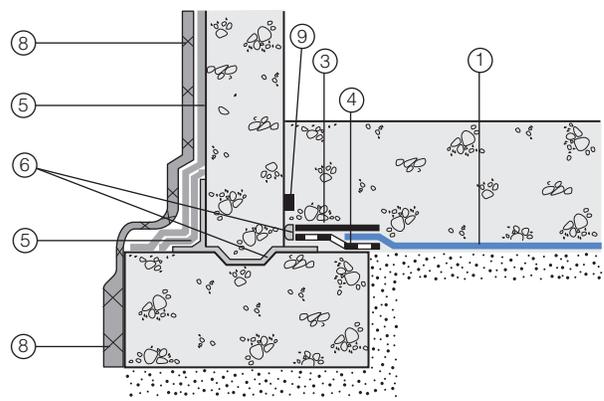
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



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

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

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

## Supply

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

## Physical Properties

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

### Footnotes:

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

### Specification Clauses

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

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

### Health and Safety

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

[www.graceconstruction.com](http://www.graceconstruction.com)

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

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PF-111H Printed in U.S.A. 07/12

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