TENEN ENVIRONMENTAL

August 20, 2015

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

Re: VCP # 16CVCP007K
E-Designation # 14EHAZ352K
56 Frost Street
Remedial Action Work Plan (RAWP) Stipulation List

Dear Mr. Chawla:

Tenen Environmental 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 56 Frost Street, 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 Historic Fill Transfer and Disposal Notification Form to each disposal facility and a pre-approval letter from all disposal facilities will be provided to OER prior to any soil/fill material removal from the site. The Historic Fill Transfer and Disposal Notification Form template is attached in **Appendix 2**. 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 3**) 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 will work with your development team to seek an exemption for your property from the state Hazardous Waste Program Fee ($130/ton) and Special Assessment on Hazardous Waste (up to $27/ton). 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 the supervising Project Manager and OER Deputy Director 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. This exemption does not cover, and you remain responsible for, a Hazardous Waste Annual Report to be filed with DEC and Quarterly Returns for Special Assessments on Hazardous Waste to be filed with the state Department of Taxation and Finance. Appendix 4 includes additional information about the exemption from the Hazardous Waste Program Fee and the Special Assessment on Hazardous Waste.

6. Collection and analysis of 3 end-point samples from the bottom of the excavation to evaluate the performance of the remedy with respect to attainment of Track 4 SCOs. A map indicating end-point sampling locations is attached in **Appendix 5**. Samples will be analyzed for contaminants of concern SVOCs and metals.

7. 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 contractor's 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 6**.

8. 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 7.**

9. Monthly reports will be provided by the owner/developer after excavation work is completed for the duration of the construction period. Monthly report template is attached in **Appendix 8**.

10. Trucking log sheets will be utilized as trucks are transported from sites, and completed logs should be attached to the Remedial Action Report (RAR) as an appendix. The goal of this log is to clearly document the destination of material leaving the site, the parties responsible for its transfer, and other pertinent details. The trucking log template is provided in **Appendix 9**.

11. A 20-mil vapor barrier will be installed beneath the structure's slab and along foundation sidewalls. The barrier chosen for this project is manufactured by Stego 20-mil vapor barrier. **Appendix 10** provides manufactures specifications and PE/RA certified building plans with the extent of the vapor barrier installation details (penetrations, joints, etc.) with respect to the proposed foundation, footings, etc.

12. An engineered composite site cover will be placed over the entire footprint of the Site. The composite cover system will be comprised of concrete foundation/slabs. Drawings of the composite site cover are provided as **Appendix 11**.

13. Truck route is included in **Appendix 12.**

14. The signed RIR certification page and stamped/signed RAWP certification page is included in **Appendix 13.**

15. Development plans are attached in **Appendix 14**.

16. Construction Health and Safety Plan (CHASP) is attached in **Appendix 15.**

17. Updated project description is: (update if any changes from RAWP).

Sincerely,

Tenen Environmental, LLC

Mohamed Ahmed, Ph.D., CPG
Principal / Senior Geologist

Cc: A. Alfieri, 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).

<u>Impacted Soil Excavation Methods</u>
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

Historic Fill Transfer and Disposal Notification Form

Historic Fill & Soil Disposal Notification Form
New York City Office of Environmental Remediation

Historic Fill & Soil Disposal Notification Form
New York City Office of Environmental Remediation

Date: _____

To operators and representatives of disposal facilities and government regulators:

The New York City Office of Environmental Remediation (OER) operates several environmental remediation regulatory programs in New York City that manage light to moderately contaminated properties that are planned for redevelopment. These projects commonly involve the removal of historical fill and soil from properties for development and other purposes. As with any environmental regulatory program, lawful transport and disposal of historic fill and soil is mandatory. It is also our highest priority.

Disposal facilities, recycling facilities and clean fill facilities (collectively, "receiving facilities") for historic fill and soil may be located in New York or neighboring states. Our research has indicated that a wide range of facility types and a complex set of regulatory requirements and obligations for a receiving facility operation exist within each jurisdiction. Receiving facilities are required to comply with applicable laws and regulations and may operate under state and local authority via permits, licenses, registrations, agreements and other legal instruments that dictate requirements for the material they can receive. Operating requirements may include adherence to applicable chemical standards, guidance levels, criteria, policy or other bases to determine the suitability for receipt of historical fill or soil at a receiving facility. Such requirements may also specify sample frequency, location, sampling method, chemical analytes, or analytical methods. Receiving facility soil/fill sampling requirements often differ from standard remedial investigation protocol performed in the original environmental study of the property.

Given the variability of data requirements for receiving facilities, the wide range of receiving facility types, and the complexity of regulatory requirements and obligations, OER is seeking to assist government regulators and facility operators and their technical representatives to achieve compliance with regulatory requirements for disposal of historic fill and soil at receiving facilities for projects we administer. Further, we seek to ensure that all of the data and information that is developed in OER's regulatory programs (for instance, site environmental history and soil chemistry) is available to government regulators and to facility managers when making decisions on suitability for disposal to a receiving facility.

This document provides formal notification from OER of the availability of environmental information regarding the physical and chemical content of historical fill and soil that is proposed for transfer to a disposal, recycling or clean fill facility from a property located at:

56 Frost Street, Brooklyn, New York
OER Site # 14EHAZ352K/16CVCP007K

The above referenced property has undergone regulated environmental investigation and is the subject of remedial action work plan under the authority of OER. All environmental data and information generated during this regulatory process is available online in OER's Document Repository listed below. Be advised that many properties are also regulated under state environmental law, and additional data may be available from state agencies. OER reserves the right to share this information with applicable state regulators.

http://www.nyc.gov/html/oer/html/document-repository/document-repository.shtml

Note: when logged on to above URL, select the borough for the site (listed in the address above) and scroll through the list and select the address for the site (listed above). All documents are available in PDF format.

According to New York State DER-10 Technical Guidance for Site Investigation and Remediation, historical fill is non-indigenous fill material deposited on a property to raise its topographic elevation. The origin of historical fill is unknown but it is commonly known to contain ash from wood and coal combustion, slag, clinker, construction debris, dredge spoils, incinerator residue, and demolition debris. Historic fill is a regulated solid waste in the State of New York. Prior to making a determination regarding the suitability of historic fill and/or soil from this property for disposal at this receiving facility, **we strongly recommend that you review all of the data and information available for this property in our Document Repository** listed above. The repository includes:

- A Phase 1 history of use of the property;
- A Remedial Investigation Report for the property which includes:
    - Boring logs that describe physical observations of the historical fill material made by a trained environmental professional;

    - Chemical data for grab samples of historical fill collected during the remedial investigation;
- A Remedial Action Work Plan for the property.

If you have any questions, please contact Horace Zhang at (212) 788-8484 or Hzhang@dep.nyc.gov for more information.

Appendix 3
NYC VCP Signage

NYC Voluntary Cleanup Program

56 Frost Street
Site #: 16CVCP007K

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

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

Appendix 4
Hazardous Waste Fee Exemption Fact Sheet

PlaNYC
NYC Office of Environmental Remediation

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 and Mark McIntyre 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

or

Mark McIntyre
General Counsel
(212) 788-3015
MMcintyre@cityhall.nyc.gov

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 5
End-Point Sampling Map

DRAWING NOTES:
Site layout based on Proposed Cellar Floor Plan by De-Jan Lu, RA & J Frankl Associates, 9/2/14.

CLIENT
56 Frost Street
Brooklyn, NY

CONSULTANT
TENEN ENVIRONMENTAL
TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suite 303
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

DRAWN BY: MC
CHECKED BY: MA
DATE: AUGUST 2015
SCALE: AS NOTED

DRAWING TITLE: PROPOSED EXCAVATION AREA
DRAWING NO: Figure 3

Appendix 6
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.

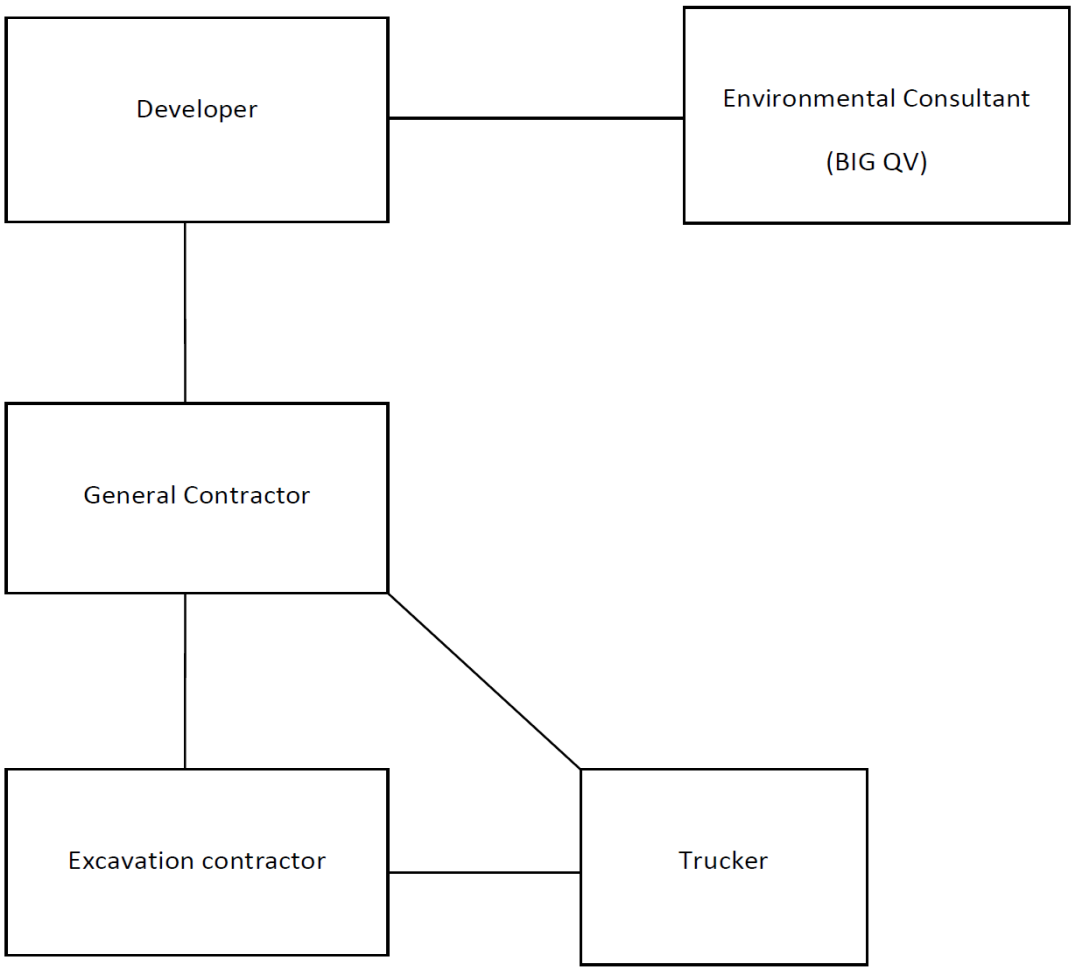
- Its environmental consultant(s) hired to oversee the cleanup must be:
  a. a BIG Qualifed Vendor; and
  b. maintain Professional Liability (PL) insurance of $1M per claim and annual aggregate.

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 7
Daily Report Template

Office of Environmental Remediation

Daily Status Report Template
Version 1.3

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 Or Liquid	Facility # Name Location Type of Waste Solid *Or* Liquid		Facility # Name Location Type of Waste Solid *Or* Liquid		Facility # Name Location Type of Waste Solid *Or* Liquid		Facility # Name Location Type of Waste Solid *Or* Liquid		###### Clean Earth Carteret, NJ petroleum soils Solid	
(Trucks, Cu.Yds. Or Gallons)	Trucks	Cu. Yds. *Or* Gallons	Trucks	Cu. Yds. *Or* Gallons	Trucks	Cu. Yds. *Or* Gallons	Trucks	Cu. Yds. *Or* 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

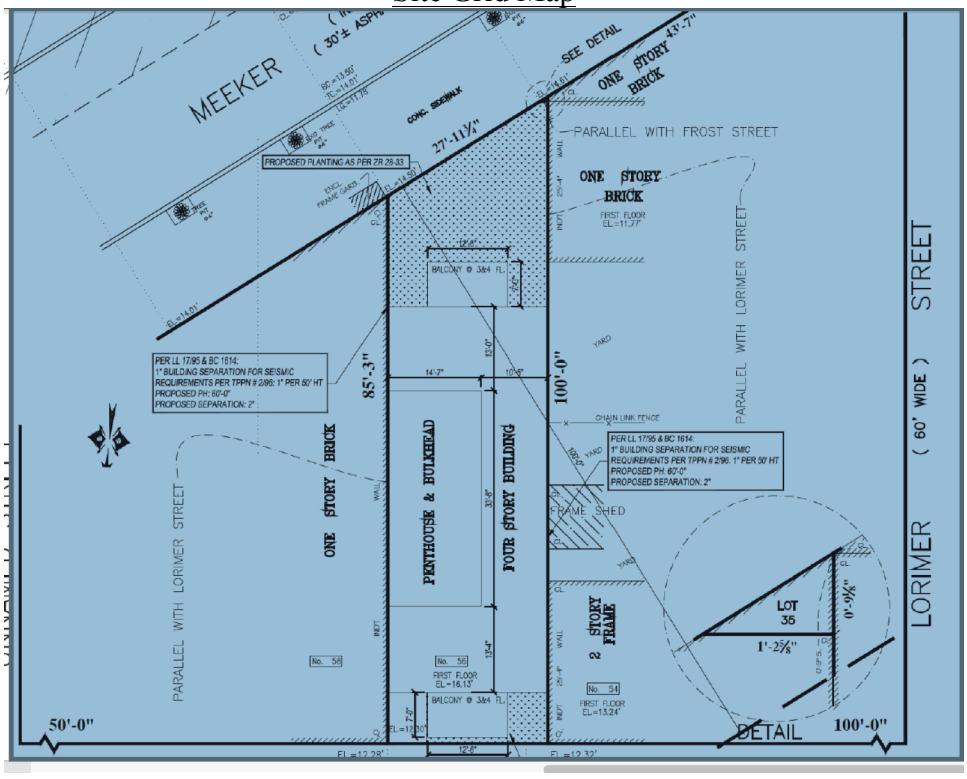


Photo Log

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 8
Monthly Report Template

WEEKLY/MONTHLY STATUS REPORT

Prepared By: Enter Your Name Here

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

Project Name:	Name or Address

Project Updates (Since Last Report):
Provide details about the work activities performed.

Problems Encountered:
No problems encountered or provide details

Planned Activities for the Next three months:
Provide details about the future work activities.

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 9

Soil Disposal and Trucking Log Sheet

Shipment Date	Manifest Number	Transporter Name/Truck Name	License Plate	On-Site Location (approx. depth)	Off-Site Disposal Facility	Tonnage
8/25/2013	66357	ABC Trucking/201	NJ-AP458	WC-1(0-8')	Jones Landfill	32.90

Appendix 10
Vapor Barrier Specifications

Stego® Wrap 20-Mil Vapor Barrier

STEGO INDUSTRIES, LLC

Vapor Retarders
07 26 00, 03 30 00

1. Product Name

Stego Wrap 20-Mil Vapor Barrier

2. Manufacturer

Stego Industries, LLC
216 Avenida Fabricante, Suite 101
San Clemente, CA 92672
Sales, Technical Assistance
Ph: (877) 464-7834
Fx: (949) 257-4113
www.stegoindustries.com

3. Product Description

USES: Stego Wrap 20-Mil Vapor Barrier is used as a below-slab vapor barrier, and as a protection course for below grade waterproofing applications.
COMPOSITION: Stego Wrap 20-Mil Vapor Barrier is a multi-layer plastic extrusion manufactured with only the highest grade of prime, virgin, polyolefin resins.
ENVIRONMENTAL FACTORS:
Stego Wrap 20-Mil Vapor Barrier can be used in systems for the control of soil gases (radon, methane), soil poisons (oil by-products) and sulfates.

5. Installation

UNDER SLAB: Unroll Stego Wrap 20-Mil Vapor Barrier over an aggregate, sand or tamped earth base. Overlap all seams a minimum of six inches and tape using Stego Tape or Crete Claw® Tape. All penetrations must be sealed using a combination of Stego Wrap and Stego accessories.

For additional information, please refer to Stego's complete installation instructions.

6. Availability & Cost

Stego Wrap 20-Mil Vapor Barrier is available nationally via building supply distributors. For current cost information, contact your local Stego Wrap dis-tributor or Stego Industries' sales department.

7. Warranty

Stego Industries, LLC believes to the best of its knowledge, that specifications and recommendations herein are accurate and reliable. However, since site conditions are not within its control, Stego Industries does not guarantee results from the use of the information provided and disclaims all liability from any loss or damage. No warranty, express or implied, is given as to the merchantability, fitness for a particular purpose, or otherwise with respect to the products referred to.

8. Maintenance

None required.

9. Technical Services

Technical advice, custom CAD drawings, and additional information can be obtained by contacting Stego Industries' technical assistance department or via the website.

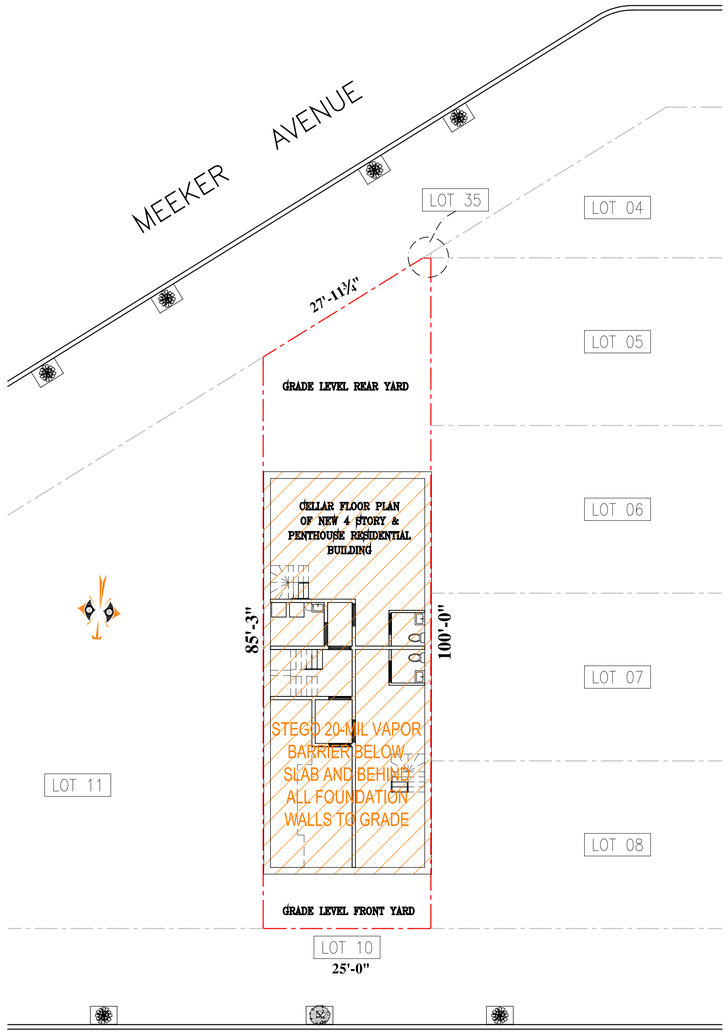
4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGO WRAP 20-MIL VAPOR BARRIER

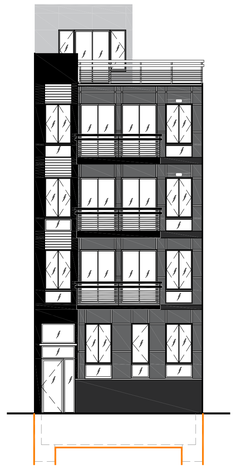
PROPERTY	TEST	RESULTS
Under Slab Vapor Retarders	ASTM E 1745 Class A, B & C – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs	Exceeds Class A, B & C
Water Vapor Permeance	ASTM F 1249 – Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor	0.0071 perms
Puncture Resistance	ASTM D 1709 – Test Methods for Impact Resistance of Plastic Film by Free-Falling Dart Method	3500+ grams*
Tensile Strength	ASTM D 882 – Test Method for Tensile Properties of Thin Plastic Sheeting	97.7 lbf/in.
Permeance After Conditioning (ASTM E 1745 Sections 7.1.2 - 7.1.5)	ASTM E 154 Section 8, F 1249 – Permeance after wetting, drying, and soaking ASTM E 154 Section 11, F 1249 – Permeance after heat conditioning ASTM E 154 Section 12, F 1249 – Permeance after low temperature conditioning ASTM E 154 Section 13, F 1249 – Permeance after soil organism exposure	0.0088 perms 0.0081 perms 0.0084 perms 0.0077 perms
Thickness	ACI 302.1R-04 – Minimum Thickness (10 mils)	20 mils
Roll Dimensions		14 ft. wide x 105 ft. long or 1,470 ft^2
Roll Weight		140 lbs.

Note: perm unit = grains/(ft^2 *hr* in.Hg)

* The material maxed out the testing equipment and did not fail at 3746 grams.



VAPOR BARRIER DETAIL



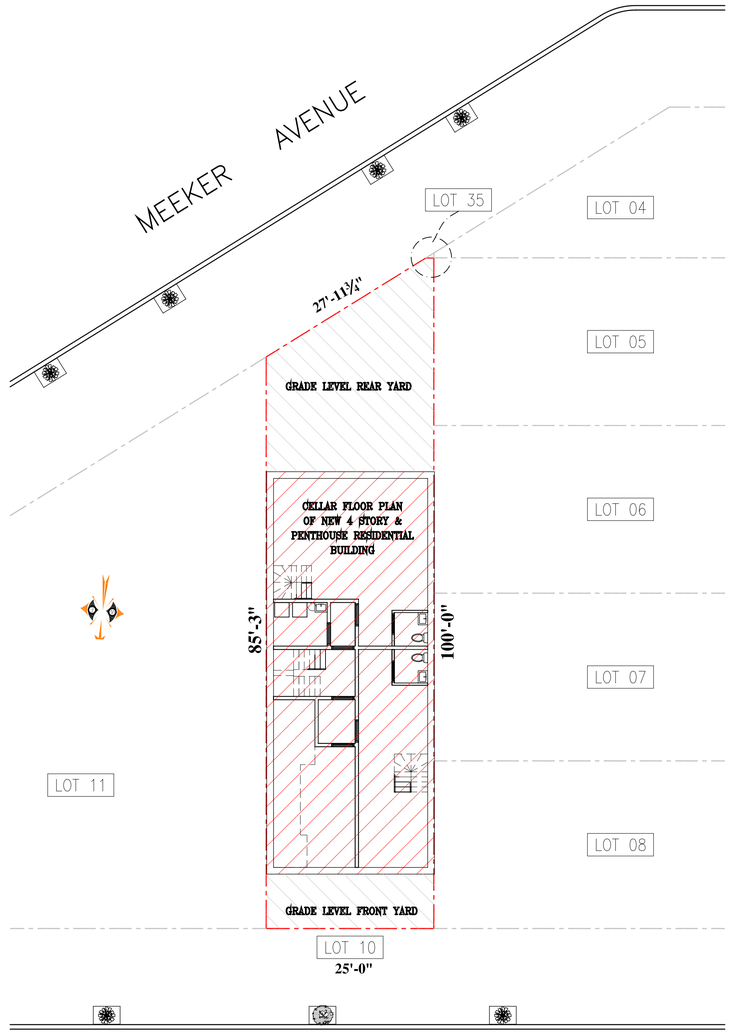
KEY

PROPERTY BOUNDARY

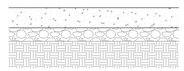
STEGO 20–MIL VAPOR BARRIER OR OER APPROVED EQUILVALENT WITH A 20–MIL THICKNESS

STEGO 20–MIL VAPOR BARRIER OR OER APPROVED EQUILVALENT WITH A 20–MIL THICKNESS

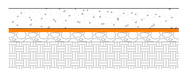
1 VAPOR BARRIER DIAGRAM
SCALE: 3/32"=1'-0"



CAPPING DETAIL FOR FRONT & REAR YARD



CAPPING DETAIL OF BUILDING



2 COMPOSITE COVER DIAGRAM
SCALE: 3/32"=1'-0"

56 FROST STREET

BROOKLYN, NY 11211

Architect
DE-JAN LU, RA
99 Madison Avenue, Suite 5009
New York, NY 10016
646.820.3558

Design Consultant

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718.569.2200

DOB Consultant
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Structural Engineer

Mechanical Engineer
JERRY PITERA P.E. JW FIRE
SPRINKLE DESIGN
5 MEZBISH PLACE UNIT 2001
MONROE, NY 10950
845.234.4599

REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

DIAGRAMS

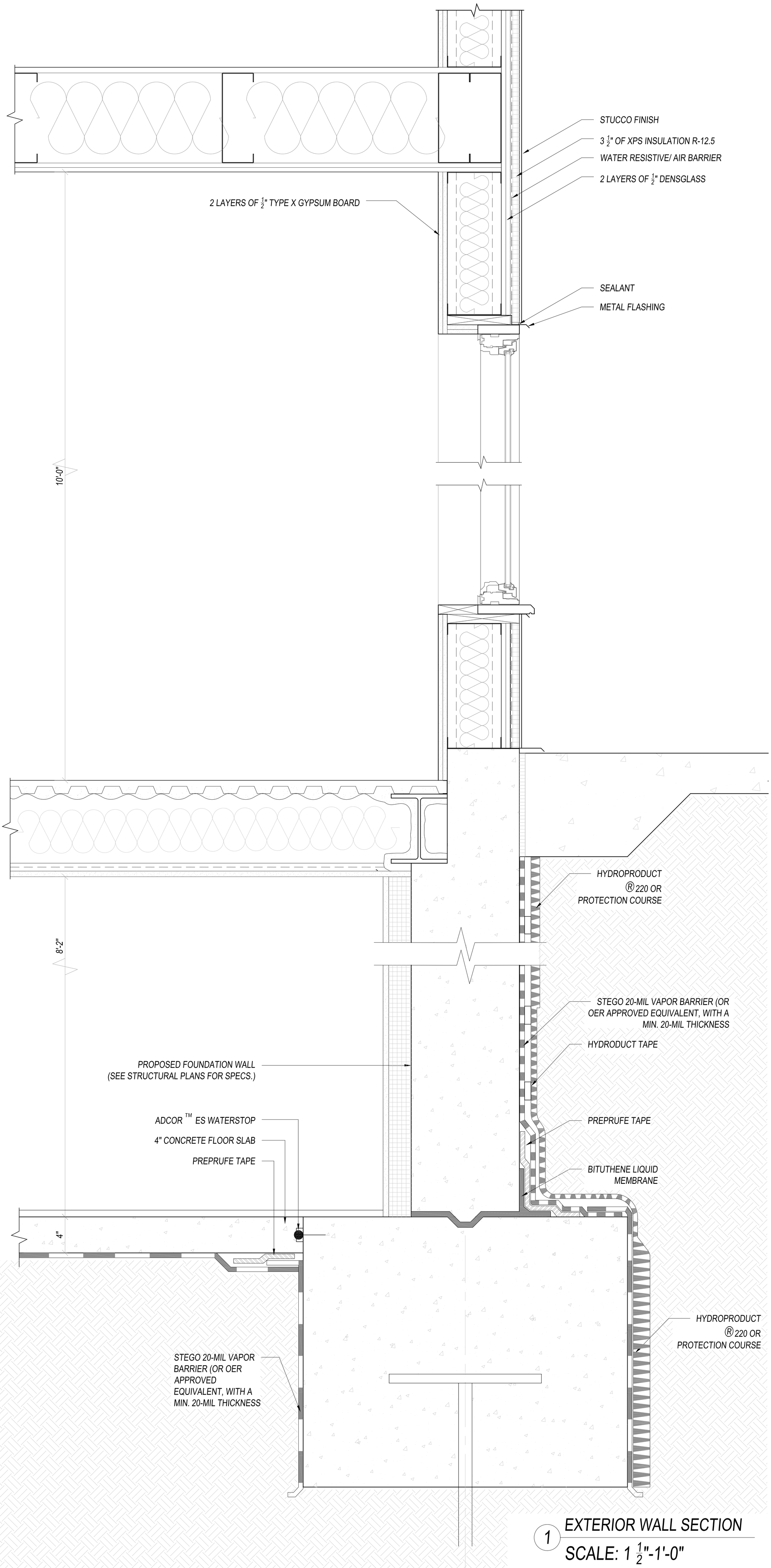
DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

01 OF 01

DOB BSCAN STICKER

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

Appendix 11
Composite Cover Diagram



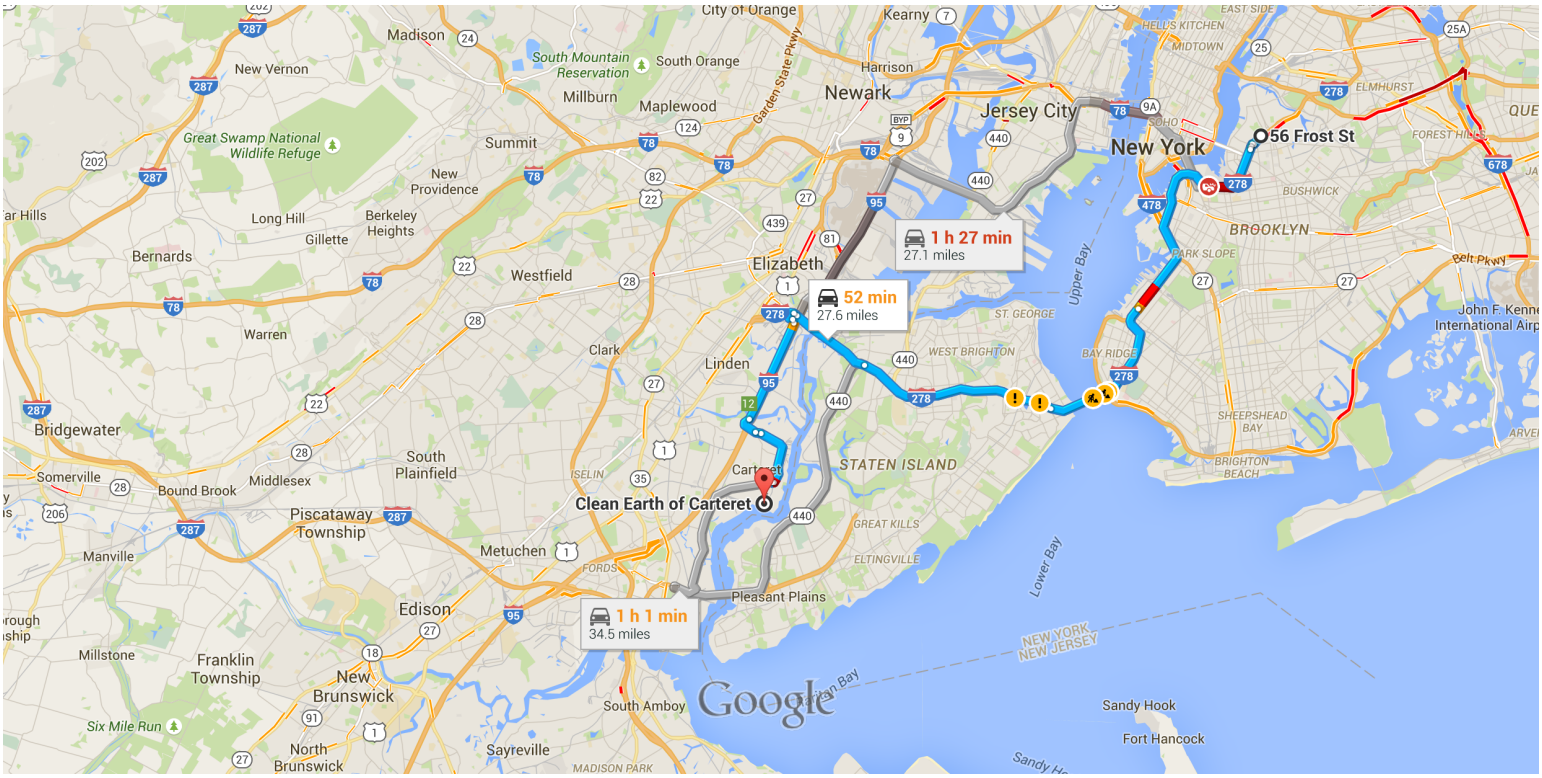
1 EXTERIOR WALL SECTION

SCALE: 1 1/2"-1'-0"

Appendix 12
Truck Route

56 Frost St, Brooklyn, NY 11211 to Clean Earth of Carteret

Drive 27.6 miles, 52 min



Map data ©2015 Google 2 mi

56 Frost St

Brooklyn, NY 11211

Get on I-278 W from Meeker Ave and Marcy Ave

3 min (0.6 mi)

1. Head west on Frost St toward Lorimer St

115 ft

2. Turn left at the 1st cross street onto Lorimer St

180 ft

3. Turn right at the 1st cross street onto Meeker Ave

0.3 mi

4. Turn right onto Metropolitan Ave

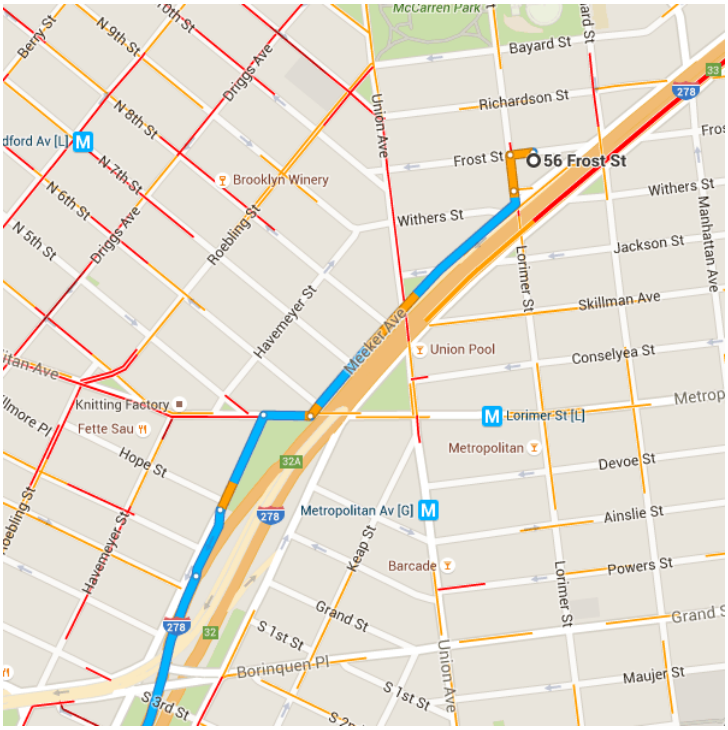
230 ft

5. Turn left onto Marcy Ave

0.1 mi

6. Merge onto I-278 W via the ramp on the left to Bklyn-Qns Expy/Staten Is

351 ft



Follow I-278 W and I-95 S to Peter J Sica Industrial Hwy in Carteret. Take exit 12 from I-95 S

38 min (25.1 mi)

7. Merge onto I-278 W

7.4 mi

8. Keep right at the fork to stay on I-278 W, follow signs for Belt Pkwy

Partial toll road

4.7 mi

9. Keep left to stay on I-278 W

Partial toll road

5.9 mi

10. Keep left to stay on I-278 W

Entering New Jersey

2.5 mi

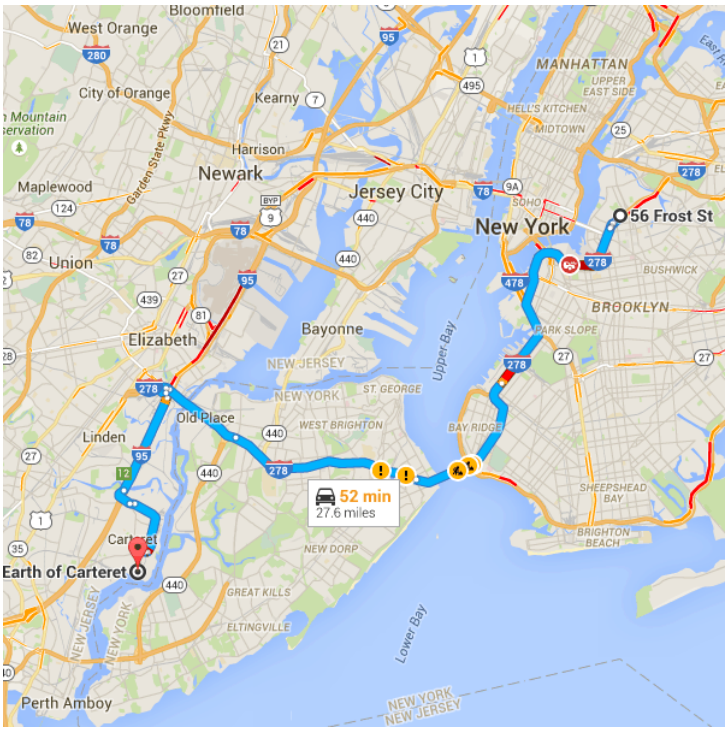
11. Keep left to stay on I-278 W

0.1 mi

12. Take the exit on the left toward I-95 S

Toll road

0.5 mi



13. Keep right at the fork, follow signs for I-95 S/Turnpike S
    Toll road

0.2 mi

14. Keep right at the fork and merge onto I-95 S
    Toll road

3.1 mi

15. Take exit 12 toward Carteret Rahway
    Toll road

0.6 mi

16. Keep left at the fork, follow signs for West Carteret/Rahway/Industrial Hwy
    Toll road

0.2 mi

Follow Peter J Sica Industrial Hwy to Middlesex Ave

4 min (2.0 mi)

17. Continue onto Peter J Sica Industrial Hwy
    Partial toll road

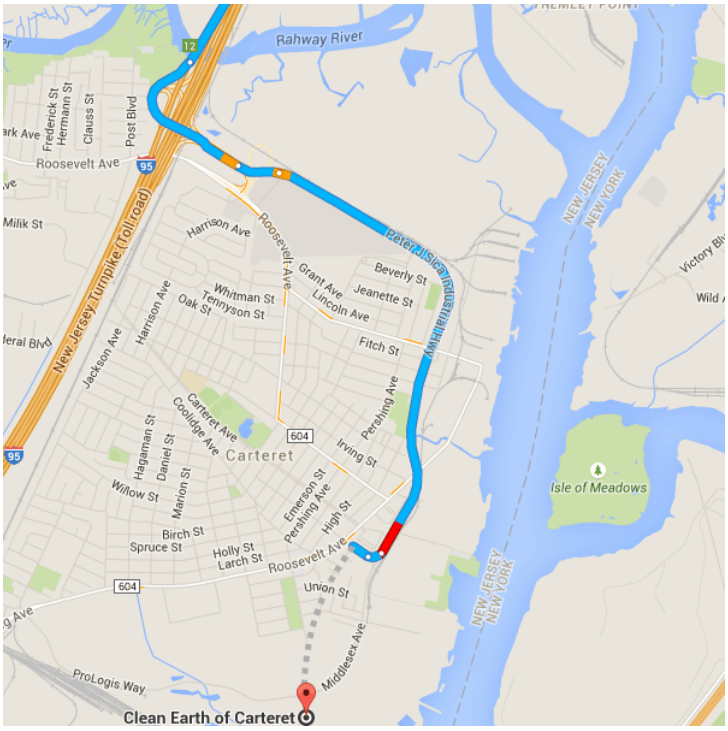
1.8 mi

18. Slight right toward Middlesex Ave

299 ft

19. Slight right onto Middlesex Ave
    Destination will be on the right

344 ft



Clean Earth of Carteret

24 Middlesex Avenue, Carteret, NJ 07008

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Appendix 13
RIR and RAWP Certification Page

CERTIFICATION

I, Matthew Carroll, 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 56 Frost Street site, VCP Site number 16CVCP007K and OER project Number 14EHAZ352K. 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.

Matthew M. Carroll
Name

091629
PE License Number

Signature

8/20/15
Date

PE Stamp

I, Mohamed Ahmed, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 56 Frost Street site, site number 16CVCP007K and OER project Number 14EHAZ352K. 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.

Mohamed Ahmed
QEP Name

Mohamed Ahmed
QEP Signature

8-20-15
Date

Certification by a Professional Engineer is required. Certification by a Qualified Environmental Professional (QEP) is optional unless the PE and QEP work for separate firms.

Appendix 14
Development Plans

PROPOSED 4 STORY AND PENTHOUSE, 8 FAMILY RESIDENTIAL BUILDING AT 56 FROST ST, BROOKLYN, NY 11211

DRAWING INDEX

ARCHITECTURAL DRAWINGS

1	T-000.00	Cover Sheet, Drawing Index, Project Index
2	Z-000.00	Zoning Analysis, Plot Plan,
3	Z-001.00	Zoning Analysis Cont. Legend, Ht., Stbck Diagrams
4	Z-002.00	Floor Area Diagram
5	G-001.00	General Notes
6	G-002.00	Building Code Notes
7	G-003.00	Building Code Tables 503,601,602
8	A-100.00	Proposed Cellar & First Floor Plans
9	A-101.00	Proposed Second, Third & Fourth Floor Plans
10	A-102.00	Proposed Penthouse / Roof & Bulkhead Floor Plans
11	A-103.00	Proposed Reflected Ceiling Plans
12	A-200.00	Proposed Front & Rear Elevation
13	A-201.00	Proposed Side Elevation
14	A-300.00	Longitudinal Section
15	A-400.00	Wall Details
16	A-500.00	Wall Details, Stair Details, Tree Planting Details
17	A-501.00	ADA Compliance Drawing & Notes
18	A-600.00	Window,Door Schedule & Energy Compliance
19	EN-001.00	Energy Compliance
20	EN-002.00	Energy Compliance

PLUMBING DRAWINGS

21	P-700	Plumbing & Gas Riser Diagrams

PROJECT INDEX

ARCHITECTURAL TEAM

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New York, NY 100[illegible]
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OWNER
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Brooklyn, NY 11210

GENERAL CONTRACTOR

STRUCTURAL ENGINEER

MECHANICAL ENGINEER
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Monroe, NY 10950
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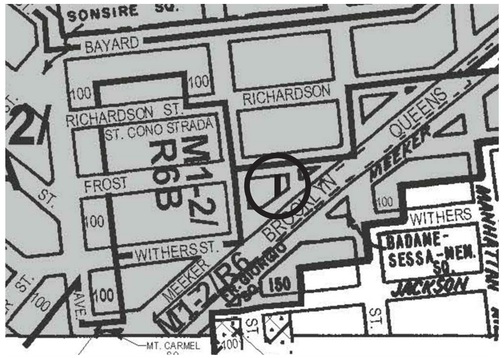
T-000.00

01 OF 21

DOB BSCAN CODE



ZONING ANALYSIS

PROPERTY DATA
ADDRESS: 56 FROST STREET
TAX BLOCK: 2737
TAX LOT: 10
ZONING MAP NO.: 13a
ZONE: M1-2 / R6 / SPECIAL MX-8 MIXED USE DISTRICT
INCLUSIONARY HOUSING DESIGNATED AREA

SCOPE OF WORK
PROPOSED 4 STORY AND PENTHOUSE 8 FAMILY RESIDENTIAL BUILDING.

STRUCTURAL OCCUPANCY CATEGORY: II
SEISMIC DESIGN CATEGORY: B
OCCUPANCY CLASSIFICATION: R-2
CONSTRUCTION CLASSIFICATION: II-A (2008 CODE)
MULTIPLE DWELLING CLASSIFICATION: HAEA

ZR 123-10 GENERAL PROVISIONS
THE PROVISIONS OF THIS CHAPTER SHALL APPLY WITHIN THE SPECIAL MIXED USE DISTRICT. THE REGULATIONS OF ALL OTHER CHAPTERS OF THIS RESOLUTION ARE APPLICABLE, EXCEPT AS SUPERSEDED, SUPPLEMENTED OR MODIFIED BY THE PROVISIONS OF THIS CHAPTER. IN THE EVENT OF A CONFLICT BETWEEN THE PROVISIONS OF THIS CHAPTER AND OTHER REGULATIONS OF THIS RESOLUTION, THE PROVISIONS OF THIS CHAPTER SHALL CONTROL.

ZR 123-20 SPECIAL USE REGULATIONS
IN SPECIAL MIXED USE DISTRICTS, ALL USES PERMITTED IN THE DESIGNATED RESIDENCE DISTRICT AND ALL USES PERMITTED IN THE DESIGNATED M1 DISTRICT, AS SET FORTH IN ANY OTHER PROVISION OF THIS RESOLUTION OTHER THAN SPECIAL PURPOSE DISTRICTS, SHALL BE PERMITTED, EXCEPT AS SUPERSEDED, MODIFIED OR SUPPLEMENTED BY THIS SECTION

ZR 123-32
ENVIRONMENTAL CONDITIONS
IN SPECIAL MIXED USE DISTRICTS, ALL NEW DWELLING UNITS SHALL BE PROVIDED WITH A MINIMUM 35DB(A) OF WINDOW WALL ATTENUATION TO MAINTAIN AN INTERIOR NOISE LEVEL OF 45DB(A) OR LESS, WITH WINDOWS CLOSED, AND SHALL PROVIDE AN ALTERNATE MEANS OF VENTILATION.

USE REGULATION: ZR 123-20 / 22-12
PERMITTED USE GROUP : 2
PROPOSED USE GROUP 2A

LOT AREA: 2,324.55 SF - SEE ARCHITECTURAL SURVEY

SPECIAL BULK REGULATIONS
ZR 123-61 GENERAL PROVISIONS
ALL BUILDINGS ON ZONING LOTS WITHIN THE SPECIAL MIXED USE DISTRICT SHALL COMPLY WITH THE BULK REGULATIONS OF THIS CHAPTER. IN SPECIAL MIXED USE DISTRICTS, THE BULK REGULATIONS SET FORTH IN ARTICLE II, CHAPTER 3, SHALL APPLY TO ALL RESIDENTIAL USES IN A BUILDING OR OTHER STRUCTURE, EXCEPT AS SET FORTH IN SECTIONS 123-60 THROUGH 123-66, INCLUSIVE.

ZR 123-63
MAXIMUM FLOOR AREA RATIO AND LOT COVERAGE REQUIREMENTS FOR ZONING LOTS CONTAINING ONLY RESIDENTIAL BUILDINGS IN R6 DISTRICT
WHERE THE DESIGNATED RESIDENCE DISTRICT IS AN R6 DISTRICT, THE MINIMUM REQUIRED OPEN SPACE RATIO AND MAXIMUM FLOOR AREA RATIO PROVISIONS OF SECTIONS 23-142, 23-143 AND PARAGRAPH (A) OF SECTION 23-147 SHALL NOT APPLY. IN LIEU THEREOF, ALL RESIDENTIAL BUILDINGS, REGARDLESS OF WHETHER THEY ARE REQUIRED TO BE DEVELOPED OR ENLARGED PURSUANT TO THE QUALITY HOUSING PROGRAM, SHALL COMPLY WITH THE MAXIMUM FLOOR AREA RATIO AND LOT COVERAGE REQUIREMENTS SET FORTH FOR THE DESIGNATED DISTRICT IN SECTION 23-145, HOWEVER, IN INCLUSIONARY HOUSING DESIGNATED AREAS, AS LISTED IN THE TABLE IN THIS SECTION, THE MAXIMUM PERMITTED FLOOR AREA RATIO SHALL BE AS SET FORTH IN SECTION 23-952.

ZR 123-63 / ZR 23-952 MAX. RESIDENTIAL F.A.R.: 2.7 (WIDE STREET)
2.7 x 2,324.55 =6,276.29 SF MAX. PERMITTED F.A.

PROPOSED RESIDENTIAL 'GROSS' F.A.:

CELLAR	1,500.00 SF (NOT DEFINED AS F.A. AS PER ZR 12-10)
FIRST FL.	1,500.00 SF
SECOND FL.	1,500.00 SF
THIRD FL.	1,500.00 SF
FOURTH FL.	1,500.00 SF
PENTHOUSE FL.	374.30 SF
TOTAL PRO. 'GROSS' F.A. = 6,374.30 SF	

(SEE DIAGRAMS ON SHEET Z-002)

TOTAL PROPOSED FLOOR AREA = 6,374.30 SF
TOTAL F.A. DEDUCTIONS: 175.07 SF
6,388.89 SF - 175.07 SF = 6,199.23 SF
(SEE DIAGRAMS ON SHEET Z-002)

TOTAL 'NET' F.A. = 6,199.23 SF
6,199.23 SF / 2,324.55 (LOT AREA) =**2.67 F.A.R.** (OK)

LOT COVERAGE
(ZR 23-145) MAX. L.C.: 65%
PROPOSED L.C.
1,500 / 2,324.55 (LOT AREA) = 64.5% (OK)

(ZR 23-132) BALCONIES IN R6 THROUGH R10 DISTRICTS
IN THE DISTRICTS INDICATED, BALCONIES MAY PROJECT INTO OR OVER ANY REQUIRED OPEN AREA WITHIN A PUBLICLY ACCESSIBLE OPEN AREA, A REAR YARD, AN INITIAL SETBACK DISTANCE, ANY OPEN AREAS NOT OCCUPIED BY TOWERS, ANY REQUIRED SIDE OR REAR SETBACKS, OR ANY REQUIRED OPEN SPACE, PROVIDED THAT SUCH BALCONY SHALL:
(A) NOT PROJECT BY A DISTANCE GREATER THAN SEVEN FEET AS MEASURED FROM THE PLANE SURFACE OF THE BUILDING WALL FROM WHICH IT PROJECTS;
(B) NOT PROJECT INTO THE MINIMUM REQUIRED DISTANCE BETWEEN BUILDINGS ON THE SAME ZONING LOT;
(C) NOT COVER MORE THAN TEN PERCENT OF THE AREA DESIGNATED AS OUTDOOR RECREATION SPACE PURSUANT TO SECTION 28-30
(D) BE UNENCLOSED EXCEPT FOR A PARAPET NOT EXCEEDING 3 FEET, 8 INCHES IN HEIGHT OR A RAILING NOT LESS THAN 50 PERCENT OPEN AND NOT EXCEEDING 4 FEET, 6 INCHES IN HEIGHT.
(E) BE LOCATED AT OR HIGHER THAN THE FLOOR LEVEL OF THE THIRD STORY OF A BUILDING OR AT LEAST 20 FEET ABOVE CURB LEVEL
(F) HAVE AN AGGREGATE WIDTH, AT THE LEVEL OF ANY STORY, NOT EXCEEDING 50 PERCENT OF THE WIDTH AT THAT LEVEL OF THE PLANE SURFACE OF THE BUILDING WALL FROM WHICH IT PROJECTS.
PROPOSED BALCONIES AT third & fourth FLOORS ARE IN COMPLIANCE WITH SECTION NOTED ABOVE:
25'-0" X 50% = 12'-6" PERMITTED
TOTAL AGGREGATE WIDTH OF ALL BALCONIES = 12'-6" = 12'-6" (OK)

DENSITY
(ZR 23-22) DENSITY FACTOR: 2,199.23 X 2.7 / 680 = 9 D.U. PERMITTED.
PROPOSED : 8 D.U. (OK).

YARDS : ZR 123-651
SPECIAL YARD REGULATIONS FOR RESIDENTIAL BUILDINGS
NO FRONT YARDS OR SIDE YARDS ARE REQUIRED IN SPECIAL MIXED USE DISTRICTS. HOWEVER, FOR RESIDENTIAL BUILDINGS OTHER THAN SINGLE OR TWO-FAMILY RESIDENCES, IF ANY OPEN AREA EXTENDING ALONG A SIDE LOT LINE IS PROVIDED AT ANY LEVEL, SUCH OPEN AREA SHALL HAVE A MINIMUM WIDTH OF EIGHT FEET.

1 FRONT YARD OF FROST ST 8'-0", 2ND ON MEEKER AVE 24'-8"

NO SIDE YARD PROPOSED

23-531 EXCEPTED THROUGH LOTS R1 - R10
(A) IN ALL DISTRICTS, AS INDICATED, NO REAR YARD REGULATIONS SHALL APPLY TO ANY THROUGH LOTS THAT EXTEND LESS THAN 110 FEET IN MAXIMUM DEPTH FROM STREET TO STREET.

ZR 123-66 HEIGHT AND SETBACK REGULATIONS
THE HEIGHT OF ALL BUILDINGS OR OTHER STRUCTURES IN SPECIAL MIXED USE DISTRICTS SHALL BE MEASURED FROM THE BASE PLANE.

BASE PLANE CALCULATION
BASE PLANE EL.: (12.28' + 12.32') / 2 = 12.30'
ZR 123-662 ALL BUILDINGS IN SPECIAL MIXED USE DISTRICTS WITH R6 DISTRICT DESIGNATIONS
IN SPECIAL MIXED USE DISTRICTS WHERE THE DESIGNATED RESIDENCE DISTRICT IS AN R6 DISTRICT, THE HEIGHT AND SETBACK REGULATIONS OF SECTIONS 23-60 AND 43-40 SHALL NOT APPLY. IN LIEU THEREOF, ALL BUILDINGS SHALL COMPLY WITH THE HEIGHT AND SETBACK REGULATIONS OF THIS SECTION.

(A) MEDIUM AND HIGH DENSITY NON-CONTEXTUAL DISTRICTS
(1)IN SPECIAL MIXED USE DISTRICTS WHERE THE DESIGNATED RESIDENCE DISTRICT IS AN R6, R7, R8, R9 OR R10 DISTRICT, THE HEIGHT OF A BUILDING OR OTHER STRUCTURE,OR PORTION THEREOF, LOCATED WITHIN 10 FEET OF A WIDE STREET OR 15 FEET OF A NARROW STREET,MAY NOT EXCEED THE MAXIMUM BASE HEIGHT SPECIFIED IN TABLE A OF THIS SECTION,BEYOND 10 FEET OF A WIDE STREET AND 15 FEET OF A NARROW STREET, THE HEIGHT OF A BUILDING OR OTHER STRUCTURE SHALL NOT EXCEED THE MAXIMUM BUILDING HEIGHT SPECIFIED IN TABLE A.

MAXIMUM BASE HEIGHT: 60'
MAXIMUM BUILDING HEIGHT: 110'-0"
REQUIRED SETBACK ABOVE MAX BASE HEIGHT: 10' - WIDE STREET
15' - NARROW STREET

PROPOSED BASE HEIGHT = 49'-2" (OK)
PROPOSED BUILDING HEIGHT = 60'-0" (OK)
PROPOSED SETBACK = 8'-0" (OK)

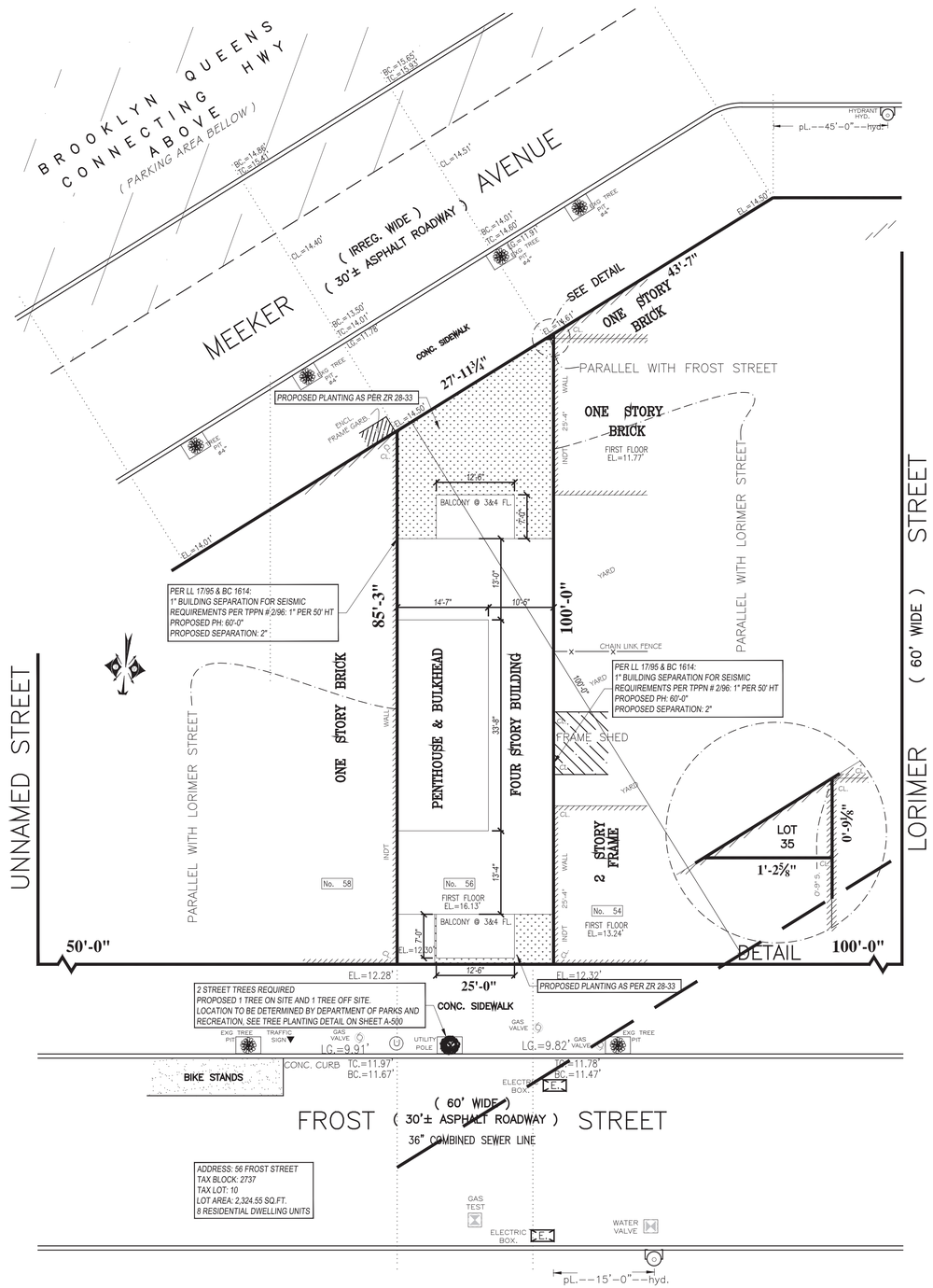
PLANTING
(ZR 23-03) REQ'D ONE TREE FOR EVERY 25'-0" OF STREET FRONTAGE OF THE ZONING LOT.
LOT FRONTAGE: (25'-0" + 27'-11 3/4") = 52'-11 3/4" / 25' = 2 TREE REQUIRED.
PROPOSED 1 TREE ON SITE AND 1 TREE OFF SITE. (OK)

QUALITY HOUSING REGULATIONS
(ZR 28-01, ZR 28-11) PROPOSED BUILDING IS DESIGNED WITH THE BULK REGULATIONS OF QUALITY HOUSING PROGRAM IN ARTICLE 2 CHAPTER 3 AND SHALL COMPLY WITH THE QUALITY HOUSING REGULATIONS OF ARTICLE 2 CHAPTER 8.

(ZR28-21) MIN. UNIT SIZE REQUIRED =400 S.F. PER D.U.
PROPOSED MIN. UNIT SIZE: 429.96 S.F. ON FIRST FLOOR UNIT 1A > 400 S.F. (OK.

(ZR28-22) ALL WINDOWS SHALL BE DOUBLE GLAZED. SEE WINDOW SCHEDULE ON SHEET A-600.

ZONING ANALYSIS CONTINUED ON SHEET Z-001-00



1 PLOT PLAN
SCALE: 3/32"=1'-0"

56 FROST STREET
BROOKLYN, NY 11211

Architect
DE-JAN LU, RA
99 Madison Avenue, Suite 5009
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Structural Engineer

Mechanical Engineer
JERRY PITERA P.E. JW FIRE
SPRINKLE DESIGN
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845.234.4599

REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU STATE OF NEW YORK 034322

ZONING ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

Z-000.00
02 OF 21
DOB BSCAN STICKER

PLUMBING | ELECTRICAL | MECHANICAL | STRUCTURAL | ARCHITECTURAL

(ZR28-23) REQUIRED REFUSE STORAGE FOR BLD'G WITH 9 D.U. OR MORE.
PROPOSED 8 D.U. : NOT REQUIRED (OK)

((ZR 28-25) DAYLIGHT IN CORRIDORS
50% OF THE SQUARE FOOTAGE OF A CORRIDOR MAY BE EXCLUDED FROM THE DEFINITION OF FLOOR AREA IF A WINDOW WITH A CLEAR, NON-TINTED, GLAZED AREA OF AT LEAST 20 SQUARE FEET IS PROVIDED IN SUCH CORRIDOR,
(SEE DEDUCTION DIAGRAM ON SHEET Z-002)

(ZR28-31) 3.3% OF THE TOTAL AMOUNT OF RESIDENTIAL F.A. IS REQUIRED FOR RECREATIONAL SPACE FOR BLD'G WITH 9 D.U. OR MORE.
PROPOSED TOTAL 8 D.U. NOT REQUIRED (OK)

(ZR 28-33) THE AREA OF THE ZONING LOT BETWEEN THE STREET LINE AND THE STREET WALL SHALL BE PLANTED AT GROUND LEVEL. (OK)

(ZR 28-41) DENSITY PER CORRIDOR
50% OF CORRIDORS MAY BE DEDUCTED FROM F.A. WHEN CORRIDOR HAS LESS THEN 11 D.U. PER FLOOR IN R-6 ZONES.
(SEE DEDUCTION DIAGRAM ON SHEET Z-002).

(ZR 28-53) LOCATION OF ACCESSORY PARKING
ON-SITE ACCESSORY OFF-STREET PARKING SHALL NOT BE PERMITTED BETWEEN THE STREET LINE AND THE STREET WALL OF A BUILDING OR ITS PROLONGATION.

SPECIAL INSPECTION ITEMS

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

- STRUCTURAL STEEL - WELDING	BC 1704.3.1
- STRUCTURAL STEEL - ERECTION & BOLTING	BC 1704.3.2
	BC 1704.3.3
- CONCRETE CAST IN PLACE	BC 1704.4
- MASONRY	BC 1704.5
- SOILS - SITE PREPARATION	BC 1704.7.1
- SOILS - INVESTIGATIONS (BORINGS/TEST PITS)	BC 1704.7.4
- UNDERPINNING	BC 1704.9.1
- MECHANICAL SYSTEMS	BC 1704.15
- STRUCTURAL SAFETY- STRUCTURAL STABILITY	BC 1704.19
- EXCAVATION- SHEETING, SHORING AND BRACING	BC 1704.19 BC 3304.4.1
- SITE STORM DRAINAGE DISPOSAL AND DETENTION SYSTEM INSTALLATION	BC 1704.20
- SPRINKLER SYSTEMS	BC 1704.21
- HEATING SYSTEMS	BC 1704.23
- FIRESTOP, DRAFTSTOP, AND FIREBLOCK SYSTEMS	BC 1704.25
- CONCRETE TEST CYLINDERS	BC 1905.6
- CONCRETE DESIGN MIX	BC 1905.3
- FOOTING AND FOUNDATION	BC 109.3.1
- FRAME INSPECTION	BC 109.3.3
- ENERGY CODE COMPLIANCE INSPECTION	BC 109.3.5
- FIRE-RESISTANCE RATED CONSTRUCTION	BC 109.3.4

FIRE STOPPING NOTES:

BATHROOM OR KITCHEN PARTITIONS, CHASE SPACES CONTAINING PIPES OR DUCTS TO FILLED WITH MINERAL WOOL OR NON COMBUSTIBLE MATERIAL (ROCKWOOL) FULL HEIGHTS AND ALL VOIDS BETWEEN FLOORS.

DOCUMENTS TO BE FILED SUBSEQUENTLY UNDER THIS APPLICATION

- STRUCTURAL, FOUNDATION / EXCAVATION PLAN
- SPRINKLER PLAN

SEPARATE APPLICATIONS TO BE FILED

- FIRE ALARM
- SD 1 & 2
- BPP (321007744)
- DEMO (320967879)

DRAWING LEGEND AND ABBREVIATIONS

AD	AREA DRAIN
AL	ALUMINUM
EX	EXISTING
FAI	FRESH AIR INTAKE
FD	FLOOR DRAIN
FPSC	FIRE PROOF SELF-CLOSING
GL	GLASS
HM	HOLLOW METAL
MC	MEDICINE CABINET
MIN	MINIMUM
MTL	METAL
MV	MECHANICAL VENTILATION MIN 50 CFM IN TOILETS, BATHS MIN 75 CFM IN LAUNDRY AREA
PK	PASSOVER KITCHEN
PROV	PROVIDED
RD	ROOF DRAIN
TYP	TYPICAL
WD	WOOD
ZD	ZIP DRAIN

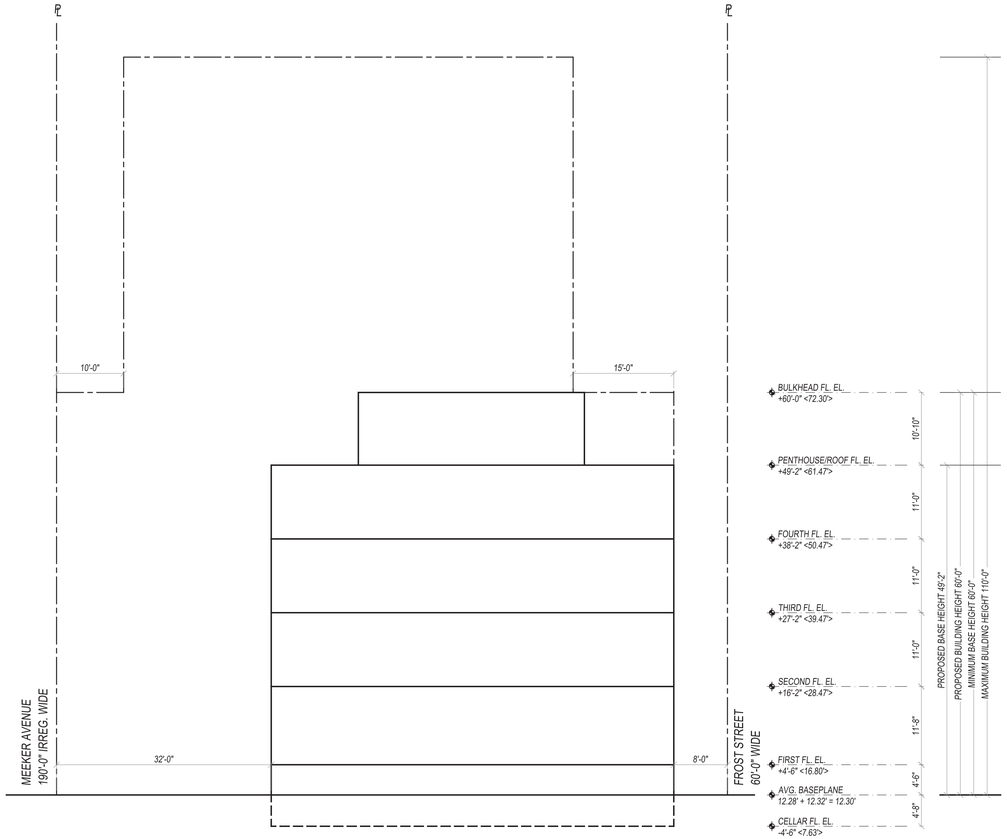
MV (see abbreviations)

SD/CM — HARDWIRED SMOKE DETECTOR/ CARBON MONOXIDE DETECTOR

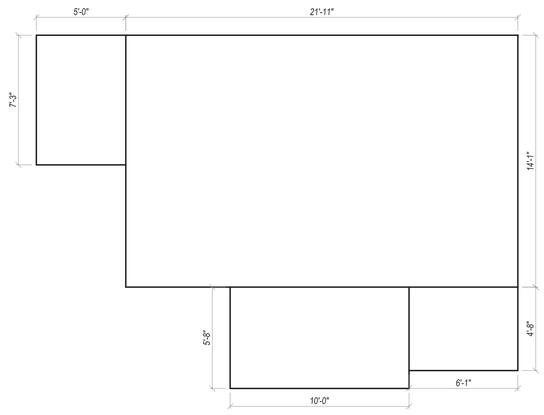
EXIT — EXIT SIGN SHOWING EGRESS DIRECTION

EXIT SIGN (ILLUM.)

X / XX.XX — DETAIL OR REFERENCE SHEET #



1 BUILDING HEIGHT AND SETBACK
SCALE: 3/32"=1'-0"



1 MINIMUM SIZE APT
SCALE: 1/4"=1'-0"

MINIMUM UNIT SIZE
UNIT A ON FIRST FLOOR

A	5'-0" x 7'-3"	36.25 SF
B	21'-11" x 14'-1"	308.66 SF
C	6'-1" x 4'-8"	28.39 SF
D	5'-8" x 10'-0"	56.66 SF
TOTAL		429.96 SF

56 FROST STREET

BROOKLYN, NY 11211

Architect
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99 Madison Avenue, Suite 5009
New York, NY 10016
646.820.3558

Design Consultant
J FRANKL ASSOCIATES
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Structural Engineer

Mechanical Engineer
JERRY PITERA P.E. JW FIRE
SPRINKLE DESIGN
5 MEZBISH PLACE UNIT 2001
MONROE, NY 10950
845.234.4599

REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU STATE OF NEW YORK 034322

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

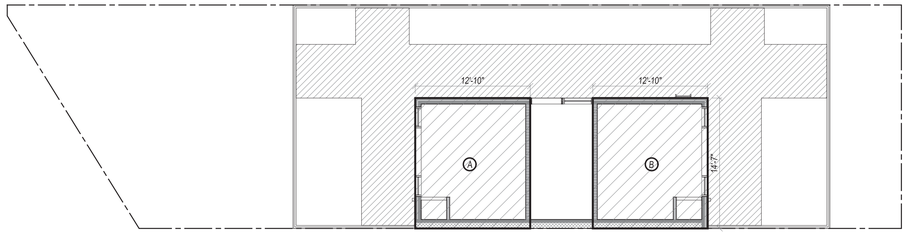
ZONING ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

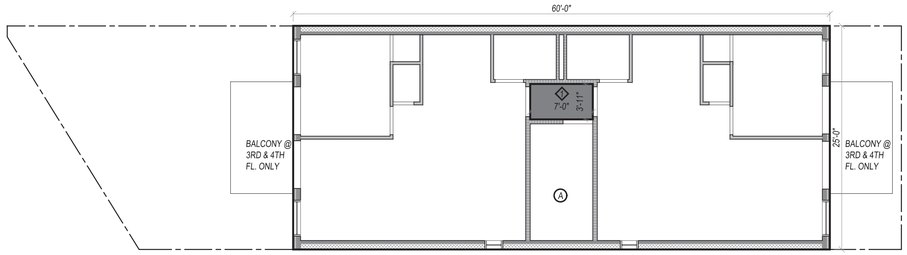
Z-001.00

03 OF 21

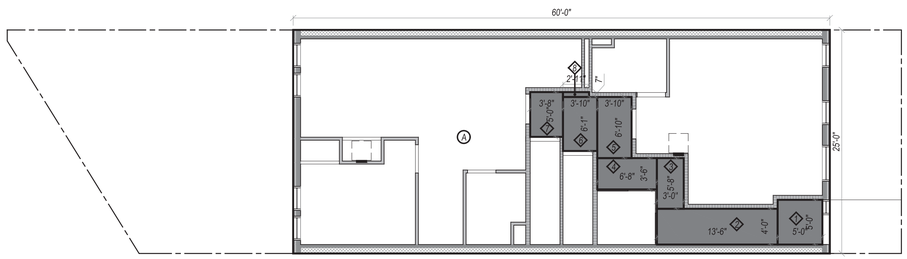
DOB BSCAN STICKER



3 PROPOSED PENTHOUSE /ROOF PLAN
SCALE: 1/8"=1'-0"



2 PROPOSED TYP. SECOND - FOURTH FLOOR PLAN
SCALE: 1/8"=1'-0"



1 PROPOSED FIRST FLOOR PLAN
SCALE: 1/8"=1'-0"

FROST STREET
60'-0" WIDE

THE PREMISES IS CURRENTLY LOCATED IN A ZONE X PER EFFECTIVE FIRM. THE APPLICANT HAS BEEN ADVISED BY THE DOB AND ACKNOWLEDGES THAT THE PREMISES IS LOCATED IN A ZONE X PER FEMA ADVISORY FLOOD MAPS RELEASED IN 2013.

GROSS FLOOR AREA
PROPOSED PENTHOUSE FLOOR

A	12'-10" X 14'-7"	187.15 SF
B	12'-10" X 14'-7"	187.15 SF
TOTAL		374.30 SF

GROSS FLOOR AREA
PROPOSED SECOND - FOURTH FLOOR

A	60'-0" X 25'-0"	1,500 SF
TOTAL		1,500 SF

FLOOR AREA DEDUCTIONS
PROPOSED SECOND - FOURTH FLOOR

1	7'-0" x 3'-11" x 50%	13.71 SF	CORRIDOR
TOTAL		13.71 SF	

GROSS FLOOR AREA
PROPOSED FIRST FLOOR

A	60'-0" X 25'-0"	1,500 SF
TOTAL		1,500 SF

FLOOR AREA DEDUCTIONS
PROPOSED FIRST FLOOR

1	5'-0" x 5'-0"	25 SF	CORRIDOR
2	13'-6" x 4'-0"	54 SF	CORRIDOR
3	3'-0" x 5'-8"	17 SF	CORRIDOR
4	6'-8" x 3'-6"	23.33 SF	CORRIDOR
5	3'-10" x 6'-10"	26.19 SF	CORRIDOR
6	3'-10" x 6'-1"	23.32 SF	CORRIDOR
7	3'-8" x 5'-0"	18.33 SF	CORRIDOR
8	2'-11" x 7"	1.70 SF	CORRIDOR
TOTAL		188.87 SF	

AREA CALCULATION FOR CORRIDOR DAYLIGHT DEDUCTION PER 28-25:
79 X 50% = 39.5 SF
AREA CALCULATION FOR CORRIDOR DENSITY DEDUCTION PER ZR 28-41:
188.87 x 50% = 94.44 SF
TOTAL CORRIDOR DEDUCTIONS: 94.44 + 39.5 = 133.94 SF

OVERALL CALCULATIONS

LEVEL	GROSS F.A.		DEDUCTIONS	NET F.A.
	EXISTING	PROPOSED		
1ST FL.		1,500 SF	133.94 SF	1,366.06 SF
2ND FL.		1,500 SF	13.71 SF	1,486.29 SF
3RD FL.		1,500 SF	13.71 SF	1,486.29 SF
4TH FL.		1,500 SF	13.71 SF	1,486.29 SF
PENT FL.		374.30 SF		374.30 SF
TOTAL		6,374.30 SF	175.07 SF	6,199.23 SF

56 FROST STREET
BROOKLYN, NY 11211

Architect
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DRAWN BY	ME
SCALE	AS NOTED

Z-002.00

04 OF 21

DOB BSCAN STICKER

GENERAL NOTES

1. THESE NOTES ARE PART OF THE PLANS AND SPECIFICATIONS AND ARE TO BE COMPLIED WITH IN ALL RESPECTS. MORE RESTRICTIVE NOTES MENTIONED ELSEWHERE ARE TO TAKE PRECEDENCE OVER THE FOLLOWING.

2. THE CONTRACTOR SHALL DIRECT AND SUPERVISE THE WORK. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, PROCEDURES, AND SHALL COORDINATE THE WORK.

3. THE CONTRACTOR SHALL BE HELD TO HAVE VISITED THE SITE SO THAT HE MAY DETERMINE THE DIFFICULTIES HE MAY ENCOUNTER DURING CONSTRUCTION.

4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS IN THE FIELD PRIOR TO COMMENCING WORK, AND SHALL IMMEDIATELY REPORT ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS TO THE ARCHITECT.

5. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FILE ALL REQUIRED CERTIFICATES OF INSURANCE WITH THE DEPARTMENT OF BUILDINGS, OBTAIN ALL REQUIRED PERMITS AND PAY ALL FEES REQUIRED BY GOVERNING NEW YORK CITY AGENCIES.

6. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE, FIRE DEPARTMENT REGULATIONS, DEPARTMENT OF HIGHWAYS, UTILITY COMPANY AND THE BEST TRADE PRACTICES.

7. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR PROPER CONSTRUCTION OF ANY PART OF THE WORK SHALL BE INCLUDED AS THEY WERE INDICATED IN THE DRAWINGS.

8. THE CONTRACTOR SHALL COORDINATE ALL WORK PROCEDURES WITH REQUIREMENTS OF LOCAL AUTHORITIES AND BUILDING MANAGEMENT.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL CONDITIONS AND MATERIALS WITHIN THE PROPOSED CONSTRUCTION AREA. THE CONTRACTOR SHALL DESIGN AND INSTALL ADEQUATE SHORING AND BRACING FOR ALL STRUCTURAL OR REMOVAL TRADES. THE CONTRACTOR SHALL HAVE SOLE RESPONSIBILITY FOR ANY DAMAGE OR INJURIES CAUSED BY OR DURING THE EXECUTION OF THE WORK.

10. THE CONTRACTOR SHALL LAY OUT HIS OWN WORK, AND SHALL PROVIDE ALL DIMENSIONS REQUIRED FOR OTHER TRADES (PLUMBING, ELECTRICAL, ETC.).

11. PLUMBING AND ELECTRICAL WORK SHALL BE PERFORMED BY PERSONS LICENSED IN THEIR TRADES, HWO SHALL ARRANGE FOR AND OBTAIN INSPECTIONS AND REQUIRED SIGN-OFFS.

12. THE CONTRACTOR SHALL DO ALL CUTTING, PATCHING, REPAIRING AS REQUIRED TO PERFORM ALL OF THE WORK INDICATED ON THE DRAWINGS, AND ALL OTHER WORK THAT MAY BE REQUIRED TO COMPLETE THE JOB.

13. ALL PIPING AND WIRING SHALL BE REMOVED TO A POINT OF CONNECTION AND SHALL BE PROPERLY CAPPED OR PLUGGED.

14. THE CONTRACTOR, UPON COMPLETION OF THE WORK, SHALL ARRANGE FOR DEPARTMENT OF BUILDINGS INSPECTIONS AND SIGN-OFFS REQUIRED TO COMPLETE THE JOB AND PROVIDE ALL CONTROLLED INSPECTIONS AS REQUIRED BY THE BUILDING DEPARTMENT FOR THIS PROJECT.

15. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING LAYOUT, PROFILES, METHODS OF JOINING AND ANCHORAGE DETAILS, INCLUDING MAJOR FINISHING AND TRIM UNITS. PROVIDE LAYOUTS AT 1/4" SCALE AND DETAILS AT 3" SCALE.

16. DIMENSIONS GOVERN - DRAWINGS ARE NOT TO BE SCALED.

GENERAL SAFETY PLAN NOTES

1. CONTRACTOR TO KEEP NOISE FACTOR TO A MINIMUM.

2. CONTRACTOR NOT TO BLOCK OR SEAL ANY MEANS OF EGRESS FROM OR TO BUILDING.

3. CONTRACTOR TO MAINTAIN SAFETY FACTOR FOR FLOOR LOADS & NOT TO OVERLOAD.

4. CONTRACTOR TO MAINTAIN ALL FACILITIES FOR UTILITIES.

5. CONTRACTORS TO MAINTAIN PROPER WORKING HOURS PER OWNER.

6. NO WORK TO BE DONE EXCEPT AS NOTED ON THIS APPLICATION.

N Y STATE ENERGY CODE NOTES

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

ALL PERTINENT DATA & DESIGN CRITERIA REGARDING THE FOLLOWINGSHALL CONFORM WITH THE NYC BUILDING CODE HWICHEVER IS MORE RESTRICTIVE.

1. "U" VALUE OF ENVELOPE SUB-SYSTEM.

2. DESIGN INSIDE AIR TEMPERATURE OF EACH ROOM THAT IS TO BE HEATED / AND OR COOLED.

3. DESIGN OUTDOOR AIR TEMPERATURE

4. DESIGN HEAT / LOSS GAIN THROUGH EACH EXTERIOR FACADE BTU / HR

5. "R" VALUE OF INSULATING MATERIALS.

6. SIZE AND TYPE OF APPARATUS/ EQUIPMENT SYSTEM, CONTROLS, & OTHER PERTINENT DATA TO INDICATE CONFORMANCE TO CODE.

7. ELECTRICAL LIGHTING & POWER DESIGN DATA.

8. FIRE PROTECTION CONSTRUCTION REQUIREMENTS, INCLUDING BUILDING CODE LIMITATIONS REGARDING USE AND INSULATION OF EQUIPMENT, AND WHAT THE CONTRACTOR OR AUTHORIZED REPRESENTATIVE WILL OBTAIN ALL NECESSARY APPROVALS FOR ELECTRICAL WORK FROM BUREAU OF GAS AND ELECTRICITY.

9. DESIGN OF INSIDE AIR TEMPERATURE OF EACH ROOM THJAT IS HEATED OR COOLED:
   HEATED 70 DEGREES F. NYC (70DEG NYS)
   COOLED 78 DEGREES F. NYS

10. DESIGN OF OUTSSIDE AIR TEMPERATURE (BASED ON 5,000 DEGREE DAYS):
   NYC WINTER 0 DEG F.
   NYC SUMMER 89 DEG F.

SECTION NOTES

1. FIRE RETARD ALL WOOD JOIST CEILINGS WITH 5/8" SHEETROCK FIRE-CODE "X" ONE HOUR RATED).

2. ALL FOOTINGS TO BE CARRIED DOWN A MINIMUM OF 4'-0" BELOW ADJACENT GRADE AND BEAR ON UNDISTURBED SOIL HAVING A MINIMUM BEARING CAPACITY OF TWO (2) TONS PER SQUARE FOOT.

3. PROVIDE DOUBLE WOOD JOISTS UNDER PARTITIONS RUNNING PARALLEL TO FLOOR BEAMS.

4. PROVIDE TRIPLE-HEADERS AND TRIMMERS AROUND STAIRWELL OPENING UNLESS OTHERWISE NEEDED.

5. INSTALLATION OF INSULATION AND CONSTRUCTION OF WINDOWS AND EXTERIOR DOORS TO COMPLY WITH NEW YORK STATE ENERGY CODE.
(A) ROOF INSULATION: MINIMUM 6" ROCKWOOL INSULATION.
(B) EXTERIOR WALLS: MINIMUM 4" ROCKWOOL INSULATION.

6. CHIMNEY TO BE ENCLOSED WITH ONE (1) HOUR RATED CONSTRUCTION.

7. ALL WOOD HEADERS AND TRIMMERS TO BE SIZED AS NOTED ON PLANS.

8. WATERPROOF NEW FOUNDATION AND FOOTINGS WITH 1/4" THICK TROWELLED ON MASTIC WATERPROOFING.

9. NEW WOOD STAIRS:
(A) CONTRACTORS SHALL CHECK AND VERIFY STORY HEIGHTS PRIOR TO FABRICATION AND INSTALLATION OF STAIRS.
(B) MAXIMUM RISER 7 3/4" MINIMUM TREAD; 9 1/2" + 1 1/4" NOSING. THE SUM OF TWO RISERS PLUS ONE TREAD SHALL NOT BE LESS THAT 24" NOR MORE THAN 25 1/2".
(C) UPPER SURFACE OF EVERY BALUSTRADE OR RAILING SHALL BE AT LEAST 2'-6"
AND MAXIMUM OF 2'-8" ABOVE THE FRONT EDGE OF THE STAIR TREADS AND 2'-8" MINIMUM, 3'-0" MAXIMUM ABOVE LEVEL OF LANDING.
(D) SOFFIT OF STAIR TO BE COVERED WITH 5/8" SHEETROCK TYPE "X".

10. EXTERIOR METAL RAILINGS:
(A) EXTERIOR METAL RAILINGS SHALL BE A TYPE THAT WILL PREVENT CHILDREN FROM CRAWLING THROUGH OR OVER THEM.
(B) STRUCTURAL DESIGN OF RAILING TO COMPLY WITH SECTION 27-558 (b).

11. ALL CONCRETE FOOTING TO BE CARRIED DOWN BELOW THE LEVEL OF THE HOUSE SEWER WHERE HOUSE SEWER PASSES THROUGH FOUNDATION WALL.

12. ALL CONCRETE TO BE REINFORCED UNLESS OTHERWISE NOTED.

13. REFER TO DETAIL FOR REINFORCING OF CONCRETE FOUNDATION WALLS AND FOOTINGS.

SMOKE DETECTOR/CARBON MONOXIDE NOTES

1. EACH DWELLING UNIT SHALL BE EQUIPPED WITH AN APPROVED TYPE CARBON MONOXIDE & SMOKE DETECTOR DEVICE RECEIVING PRIMARY POWER FROM THE BUILDING WIRING WITH NO SWITCH IN THE CIRCUIT OTHER THAN THE OVER-CURRENT DEVICE PROTECTING THE BRANCH CIRCUIT AS PER SEC. BC 28-908.7.1.1.

2. SUCH SMOKE DETECTORS MUST BE EITHER THE IONIZATION CHAMBER TYPE OR PHOTOELECTRIC DETECTOR TYPE AS PER SEC. BC 28-907.2.10.1.1

3. ALL SMOKE/ CARBON MONIXIDE DETECTORS MUST BE INSTALL WITHIN 15'-0" OF THE ENTRANCE TO ANY SLEEPING ROOMS, WALL OR CEILING MOUNTED, AND INDICATED ON PLAN AS PER NFPA # 78/80.

TENANT SAFETY NOTES

1. CONSTRUCTION WORK SHALL BE DEFINED TO THE APARTMENT INTERIOR, AND WILL NOT CREATE DUST,DIRT, OR OTHER INCONVENIENCES TO OTHER APARTMENT UNITS WITHIN THE BUILDING.

2. CONSTRUCTION OPERATION SHALL NOT BLOCK HALLWAYS OR MEANS OF EGRESS FOR TENANTS OF THE BUILDING.

3. CONSTRUCTION OPERATIONS SHALL NOT INVOLVE INTERRUPTION OF HEATING, WATER OR ELECTRICAL SERVICES TO OTHER TENANTS OF THE BUILDING.

4. CONSTRUCTION OPERATIONS SHALL BE CONFINED TO NORMAL WORKING HOURS: 8 A.M. TO 5 P.M. MONDAYS THROUGH FRIDAYS, EXCEPT ON LEGAL HOLIDAYS.

5. THERE SHALL BE NO ONE OCCUPYING THE APARTMENT TO BE RENOVATED DURING THE COURSE OF CONSTRUCTION WORK.

GENERAL STRUCTURAL NOTES

1. ALL STRUCTURAL WORK, INCLUDING MATERIALS, FIRE RATING AND METHODS OF CONSTRUCTION SHALL CONFORM TO THE BUILDING CODE OF THE CITY OF NEW YORK, LATEST EDITION.

2. THE CONTRACTOR SHALL PROPERLY SHORE, BRACE AND MAKE SAFE ALL FLOORS, RAILS, WALL AND ADJACENT PROPERTY AS JOB CONDITIONS

3. THE CONTRACTOR SHALL COORDINATE ALL STRUCTURAL WORK WITH REQUIRE. THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS.

4. ALL DIMENSIONS INDICATED ON THE DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO ORDERING OR FABRICATING MATERIAL.

MULTIPLE DWELLING LAW NOTES

M.D.L. CLASSIFICATION HAEA, NYS MDL ARTICLE 3 AND 5

TITLE 1 - FIRE PROTECTION
1. EVERY SUCH DWELLING EXCEEDING SIX STORIES OR SEVENTY-FIVE FEET IN HEIGHT SHALL BE FIREPROOF AS PER SECTION.101.1 M.D.L.

2. EXCEPT AS OTHERWISE SPECIFICALLY PROVIDED IN SUBDIVISIONS THREE AND FOUR AND IN PARAGRAPHS B TO J INCLUSIVE OF SUBDIVISION SIX, EVERY MULTIPLE DWELLING WHICH EXCEEDS TWO STORIES IN HEIGHT FROM THE ENTRANCE STORY TO THE ROOF AND BE EQUIPPED WITH FIREPROOF SELF-CLOSING DOORS GLAZED WITH WIRE GLASS AND WITHOUT TRANSOMS AS PER SECTION 102.1 M.D.L.

3. EXCEPT AS PROVIDED IN PARAGRPH B OF THIS SUBDIVISION, THERE SHALL BE AT LEAST ONE MEANS OF EGRESS FROM EACH APARTMENT ON EACH AND EVERY STORY OF SUCH APARTMENT, AND A SECOND MEANS OF EGRESS IF THE FIRST MEANS IS NOT WITHIN FIFTY FEET OF EVERY LIVING ROOM IN SUCH APARTMENT ON SUCH STORY. WHEN TWO MEANS OF EGRESS ARE REQUIRED, THEY SHALL OPEN FROM DIFFERENT ROOMS AS PER SECTION 103.1.A. M.D.L.

4. EVERY STAIR, FIRE-STAIR AND FIRE-TOWER REQUIRED BY THIS CHAPTER TO EXTEND TO THE LEVEL OF THE ROOF OR TO ANY TERRACE FORMED BY A SETBACK SHALL EXTEND TO THE THROUGH A FIREPROOF BULKHEAD OR OTHER FIREPROOF ENCLOSURE IN SUCH ROOF OR TERRACE APPROVED BY THE DEPARTMENT AS PER SECTION 104.1 M.D.L.

5. IN A DWELLING IN WHICH ONE OR MORE PASSENGER ELEVAORS ARE MAINTAINED AND OPERATED OPENING UPON A PUBLIC HALL AT EVERY STORY, ALL STAIRSM FIRE-STAIRS AND FIRE-TOWERS SHALL BE COMPLETELY SEPERATED FROM ONE ANOTHER AND FROM EVERY ELEVATOR SHAFT BY FIREPROOF WALLS AS PER SECTION 105.1 M.D.L.

6. A CELLAR OR BASEMENT STAIR MAY BE LOCATED INSIDE THE DWELLING, BUT SHALL NOT BE LOCATED UNDERNEATH STAIR LEADING TO THE UPPER STORIES UNLESS IT IS A BASEMENT STAIR LEADING UPWARD FROM A BASEMENT WHICH IS THE MAIN ENTRANCE STORY OF THE DWELLING, OR UNLESS IT IS A STAIR LEADING DOWNWARD FROM THE ENTRANCE STORY WHICH IS SEPERATED BY A FIREPROOF ARCH FROM THE STAIR LEADING UPWARD FROM THE ENTRANCE STORY AS PER SECTION 106 M.D.L.

7. EVERY PUBLIC STAIR ENCLOSURE OR OTHER PUBLIC HALL SHALL COMPLY EITHER WITH THE PROVISIONS OF SECTION ONE HUNDRED FORTY-NINE FOR NON-FIREPROOF MULTIPLE DWELLINGS, SO FAR AS APPLICABLE, OR WITH THE PROVISIONS OF SUBDIVISION TWO OF THIS SECTION, EXCEPT THAT THE PROVISIONS AS TO VEENTILATION SHALL NOT APPLY TO ANY PART OF AN ENTRANCE HALL WITHIN SIXTY FEET IN A STRAIGHT LINE FROM AN ENTRANCE DOOR AS PER SECTION 107.1 MON OF THE FLOOR OR ROOF ABOVE AS PER SECTION 108 M.D.L.

8. ALL PARTITIONS HSALL REST DIRECTLY UPON THE FIREPROOF FLOOR CONSTRUCTION AND NEVER UPON ANY WOOD FLOORING, AND SHALL EXTEND TO THE FIREPROOF CONSTRUCTION M.D.L.

9. PROVIDE EXTERIOR LIGHTS AS PER SEC 26 & 35 M.D.L.

10. ALL BUILDING ENTRANCE DOORS TO BE SELF-CLOSING, SELF LOCKING DEVICES AS PER SEC 50(a) M.D.L.

11. WATER SUPPLY TO BE AS PER SEC 75 M.D.L.

12. CENTRAL HEATING AND HOT WATER SUPPLY TO BE AS PER 79 M.D.L.

13. NIGHT LIGHT IN PUBLIC HALL AND STAIR HALL TO BE AS PER SEC 37, 217 M.D.L.

14. MAILSERVICE TO BE AS PER SEC 57 M.D.L.

15. PROVIDE FLOOR SIGNS AND HOUSE NUMBER.

16. FIRE RATED WITHIN ONE FOOT OF COOKING APPARATUS AND MAINTAIN TWO FOOT CLEARANCE ABOVE WITH 3/16" ASBESTOS AND 26 GA METAL OVER AS PER SEC 33.3(b) M.D.L.

17. REGISTER BUILDING AS PER SEC 325 M.D.L.

18. ALL APARTMENT DOORS TO BE SELF-CLOSING.

19. PROVIDE FOR APARTMENT DOORS HEAVY DUTY LATCHSET AND HEAVY DUTY DEAD BOLT AND DOOR CHAIN GUARD.

AIR RESOURCES NOTES

1. THE APPLICANT IS AWARE OF DISCREPANCIES BETWEEN THE RULES AND REGULATIONS OF THE DEPARTMENT OF AIR RESOURCES AND THE BUILDING CODE AND REFERENCE STANDARDS.

2. INSTALLATIONS APPROVED BY THIS DEPARTMENT OR EQUIPMENT APPROVAL BY THE BOARD OF STANDARDS AND APPEALS OR ACCEPTED BY THE M.E.A. DIVISION MAY NOT BE IN CONFORMANCE WITH SAID RULES OR REGULATIONS.

3. APPROVAL BY THE DEPT. OF BLDGS. SHALL NOT BE PRESUMED TO BE AND INDICATION OF COMPLIANCE WITH THE ABOVE MENTIONED RULES AND REGULATIONS.

4. THE OWNER HAS BEEN MADE AWARE OF THESE DIFFERING REQUIREMENTS AND OF THE NEED TO OBTAIN NECESSARY APPROVALS AND PERMITS FROM THE DEPT. OF AIR RESOURCES.

5. IT IS UNDERSTOOD THAT ISSUANCE OF PERMITS BY THIS DEPARTMENT IS NOT TO BE CONSTRUED AS EVIDENCE OF COMPLIANCE WITH DEPARTMENT OF AIR RESOUCES RULES AND REGULATIONS AND WILL NOT PREVENT THE DEPT. OF AIR RESOURCES FROM ISSUING VIOLATIONS OR FROM PREVENTING THE USE OF NON-COMPIYING, FUEL BURNING EQUIPMENT - SEE B.D. MEMO DATED

HOUSING MAINTENANCE CODE

1. D26-11 MAINTAIN IN CLEAN CONDITION ROOF, YARDS, COURTS, OPEN SPACES AND INTERIOR PUBLIC SPACES.

2. D26-12 REPAINT OR RECOVER WALLS AND CEILINGS WITH WALLPAPER EVERY THREE YEARS (FOR MDs) AND KEEP RECORDS OF SUCH. ALSO REPAINT WINDOW FRAMES AND SASHES EVERY FIVE YEARS.

3. D26-13 KEEP PREMISES FREE FROM RODENTS AND INSECT INFESTATION.

4. D26-14 MAINTAIN METAL CANS (2 MINIMUM) SUFFICIENT TO CONTAIN WASTE FOR 72 HOURS AND PLACE NOTICE OF HOURS AND METHODS OF COLLECTION.

5. D26-15 PROVIDE AND MAINTAIN SUPPLY OF WATER TO KEEP PLUMBING FIXTURES ADEQUATELY SUPPLIED.

6. D26-16 PROPERLY MAINTAIN AND KEEP IN GOOD REPAIR PLUMBING AND DRAINAGE SYSTEM. ALSO MAINTAIN UNOBSTRUCTED DRAINAGE OF OPEN SPACES, ROOFS, TERRACES, ETC.

7. D26-17 MAINTAIN CENTRAL HEATING BETWEEN 10/1 TO 5/31 AT 68aF BETWEEN 6 a.m. AND 10 p.m. WHEN OUTSIDE TEMPERATURE FALLS BELOW 55aF; AT 55aF BETWEEN 10 p.m. AND 6 a.m. HWEN OUTSIDE TEMPERATURE FALLS BELOW 40aF.

8. D26-19 EQUIP EACH DWELLING FOR ELECTRIC LIGHTING IN PUBLIC SPACES (10 WATTS PER 25 S.F. AT 60 WATTS PER FIXTURE), AT ENTRANCES (100 WATTS), IN COURTS AND YARDS (40 WATTS). LIGHTS SHALL BE TURNED ON IN PUBLIC HALLS AND STAIRS FROM SUNSET AND CONTINUOUSLY IN FIRESTAIRS OR IN WINDOWLESS HALLS AND STAIRS.

9. D26-20 PROVIDE PEEPHOLES IN DOORS; MIRRORS IN ELEVATORS (TO ENABLE VIEWING OF INTERIOR PRIOR TO ENTERING) AND A KEY LOCK IN EACH DOOR. FOR OLTs UP TO BASEMENT AND THREE STORIES IN HEIGHT, DOORS TO PUBLIC AREAS ARE TO BE SELF CLOSING AND CEILING OF LOWEST STORY IS TO BE FIRE-RETARDED.

10. D26-21 MAINTAIN MAIL RECEPTACLES AND DIRECTORIES, FLOOR SIGNS AND HOUSE NUMBERS VISIBLE FROM THE SIDEWALK.

11. D26-22 PROVIDE JANITORIAL SERVICES.

12. D26-32 PROVIDE EVERY KITCHEN OR KITCHENETTE WITH GAS OR ELECTRICITY FOR COOKINGAND A SINK WITH RUNNING WATER, EQUIPPED WITH A WASTE AND TRAP AT LEAST TWO INCHES IN DIAMETER.

13. D26-40 FOR MULTIPLE DWELLING, FILE REGISTRATION STATEMENT.

56 FROST STREET

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REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT
DE-JAN LU
STATE OF NEW YORK
034327

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

ZONING ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

G-001.00

05 OF 21

DOB BSCAN STICKER

The following are primary sections that subject application is subject to but not limited to the following under the provisions of the 2008 New York City Building Code

CHAPTER 3 USE AND OCCUPANCY CLASSIFICATION
BC 302 CLASSIFICATION
302.1 R-2
BC 310 RESIDENTIAL GROUP R
310.1.2 Group R-2. This occupancy shall include buildings or portions thereof containing sleeping units or more than two dwelling units that are occupied, as a rule, for shelter and sleeping accommodation on a long-term basis for a month or more at a time.

CHAPTER 5 GENERAL BUILDING HEIGHTS AND AREAS; SEPARATION OF OCCUPANCIES
501.2 Premises identification should be provided in accordance with BC 501.2
501.3 Fire Department access.
501.3.1 Frontage Total Frontage proposed adjoining the street: 25'
501.3.2 Building access.
501.3.2.1 Above grade. Above grade access is provided via windows at front faced
501.3.2.2 Below grade. Below grade access provided via stairs
BC 503 GENERAL HEIGHT AND AREA LIMITATIONS

TABLE 503 ALLOWABLE HEIGHT AND BUILDING AREAS CONSTRUCTION TYPE IB
Hgt (feet) 65
GROUP R-2 Hgt(S) 65

BC 508 INCIDENTAL USE AREAS AND MIXED OCCUPANCIES
508.2 Incidental use areas. The following spaces are to be identified as incidental use areas and are to be provided with the required separation per Table 508.2
508.2.1 Occupancy classification. All incidental use areas are to be classified under the occupancy which they are incidental to R-2
508.2.1.1 Fire protection requirements. fire protection requirements in Chapter 9 for an incidental use area shall be based upon the occupancy classification of the area's main occupancy
508.2.1.2 Allowable area and height. The actual floor area of an incidental use area shall be treated as being in the same occupancy group as its main occupancy for the purposes of calculating allowable height and area in accordance with Section 503.1.
508.2.2 Separation. Incidental use areas shall be separated or protected, or both, from all other occupancies in accordance with Table 508.2.
TABLE 508.2 INCIDENTAL USE AREAS ROOM OR AREA SEPARATION
Furnace room where any piece of equipment is 400,000 1 hour or provide automatic sprinkler system b
Btu per hour input or less, except in R-3 occupancy
Rooms with any boiler 15 psi or less and 10 horsepower or less, except in R-3 occupancy 1 hour or provide automatic sprinkler system
Mechanical and/or electrical equipment room, except in R-3 occupancy 1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet, except within dwelling units 1 hour or provide automatic sprinkler system
Storage rooms over 100 square feet, except in R-3 occupancy 1 hour or provide automatic sprinkler system
509.9 Separation of different tenancies. Spaces or dwelling units occupied by different tenants shall be separated by fire barriers having at least 1-hour fire-resistance ratings.
CHAPTER 6 TYPES OF CONSTRUCTION
602.2 Types I and II. Type I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials. Table 601 BUILDING ELEMENT TYPE I-B
Structural frame including columns, girders, trusses 2hr.
Bearing walls Exterior, 2hr.
Bearing walls Interior 2 hr.
Nonbearing walls and partitions Exterior See Table 602
Nonbearing walls and partitions Interior 0 hr.
Floor construction Including supporting beams and joists 2 hr.
Roof construction Including supporting beams and joists 1 hr.
Table 602. fire-resistance rating requirements for exterior walls based on fire separation distance FIRE SEPARATION OCCUPANCY

GROUP R-2
5' 1 hr.
5' to 10' 1 hr.
10' to 30' 1 hr.
30 0 hr.

SECTION BC 603 COMBUSTIBLE MATERIAL IN TYPE I AND II CONSTRUCTION
603.1 Allowable materials. Combustible materials shall only be used in accordance with BC 603.1

CHAPTER 7 FIRE-RESISTANCE-RATED CONSTRUCTION
BC 703 FIRE-RESISTANCE RATINGS AND FIRE TESTS
703.2 Fire-resistance ratings. all fire-resistance rating of building elements are determined in accordance with the test procedures set forth in ASTM E 119 or in accordance with Section 703.3.
BC 704 EXTERIOR WALLS
704.1 General . all required rated Exterior walls under table 601 & 602 are to be fire-resistance rated and have opening protection as required by this section. Exterior wall construction shall comply with the provisions of Chapter 14 and Appendix D of the 2008 BC where applicable.
704.11 Parapets. Parapets shall be provided on exterior walls of buildings.
704.11.1 Parapet construction . Parapets shall have the same fire-resistance rating as that required for the supporting wall, and on any side adjacent to a roof surface, shall have noncombustible faces for the uppermost 18 inches (457 mm), including counter flashing and coping materials. The height of the parapet shall not be less than 30 inche
BC 706 FIRE BARRIERS
706.3 Fire-resistance rating. The fire-resistance rating and assembly required of the walls and floor assemblies required for fire barriers shall fully comply with required ratings and assembly as described in BC 706 and all applicable provisions.
BC 707 SHAFT ENCLOSURES.
707.1 General. The provisions of section BC 707 in its entirety shall apply to all vertical shafts where such shafts are required to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies
707.2 Shaft enclosure required. Openings through a floor/ceiling assembly shall be protected by a shaft enclosure complying with this section.
707.4 Fire-resistance rating. Shaft enclosures shall have a fire-resistance rating of not less than 2 hours where penetrating three stories or more and not less than 1 hour where penetrating fewer than three stories.
BC 708 FIRE PARTITIONS
708.1 General. The fire-resistance rating and assembly required of the walls and floor assemblies required for fire partition shall fully comply with required ratings and assembly as described in BC 708 and all applicable provisions.
708.3 Fire-resistance rating. The fire-resistance rating of the walls shall be 1 hour.
SECTION BC 709 SMOKE BARRIERS
709.1 General. The fire-resistance rating and assembly required of the walls and floor assemblies required for Smoke Barriers shall fully comply with required ratings and assembly as described in BC 709 and all applicable provisions.
709.3 Fire-resistance rating. A1-hour fire-resistance rating is required for smoke barriers.
BC 710 SMOKE PARTITIONS
710.1 General. The fire-resistance rating and assembly required of the walls and floor assemblies required for Smoke Partitions shall fully comply with required ratings and assembly as described in BC 710 and all applicable provisions.
710.3 Fire-resistance rating. Unless required elsewhere in the code, smoke partitions are not required to have a fire-resistance rating.
BC 711 HORIZONTAL ASSEMBLIES
711.1 General. Floor and roof assemblies required to have a fire-resistance rating shall comply with this BC 711 and all applicable provisions.
711.2 Materials. The floor and roof assemblies shall be of materials permitted by the building type of construction and Horizontal floor or roof assemblies shall be of noncombustible materials when such assemblies serve as a horizontal offset to a fire wall or fire barrier that is required to be noncombustible.
711.3 Fire-resistance rating. The fire-resistance rating of floor and roof assemblies shall not be less than that required by the building type of construction and any other applicable provision.

CHAPTER 9 FIRE PROTECTION SYSTEMS
BC 903 AUTOMATIC SPRINKLER SYSTEMS
903.2.7 Group R. An automatic sprinkler system shall be installed in Group R fire areas. An automatic sprinkler system shall be installed throughout buildings with a main use or dominant occupancy of Group R-2

SECTION BC 907 FIRE ALARM AND DETECTION SYSTEMS
907.2.6.2.3 Smoke detectors. An approved automatic smoke detection system shall be installed throughout resident housing areas, including sleeping areas and contiguous day rooms, group activity spaces and other common spaces normally accessible to residents. Exceptions: 1. Other approved smoke detection arrangements providing equivalent protection including, but not limited to, placing detectors in exhaust ducts from cells or behind protective guards listed for the purpose are allowed when necessary to prevent damage or tampering. 2. Sleeping units in Use Conditions 2 and 3. 3. Smoke detectors are not required in sleeping units with four or fewer occupants in smoke compartments that are equipped throughout with an approved automatic sprinkler system.
907.2.9 Group R-2. An automatic fire alarm system without alarm notification appliances shall be provided in accordance with this section in Group R-2 occupancies, other than student apartments,

where such occupancy satisfies any one of the following conditions: *1. Any dwelling unit is located three or more stories above the lowest level of exit discharge, including dwelling units in penthouses of any area; 2. Any dwelling unit is located more than one story below the highest level of exit discharge of exits serving the dwelling unit; or 3.* The building contains more than 16 dwelling units. *Actuation of smoke detectors shall not initiate a signal to alarm notification appliances. The activation of any detector required by this section shall initiate a signal at a central station or a constantly attended location. Smoke detectors shall be located as follows: 1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room, greater than 75 square feet (6.96 m2) in area. 2. In air distribution systems in accordance with Section 606 of the New York City Mechanical Code. 3. In elevator machine rooms and in elevator lobbies.*

SECTION BC 908 EMERGENCY ALARM SYSTEMS
908.7 Carbon monoxide alarms and detectors. Carbon monoxide alarms and detectors shall be provided and installed in accordance with Sections 908.7.1 through 908.7.3.
908.7 Carbon monoxide alarms and detectors. Carbon monoxide alarms and detectors shall be provided and installed in accordance with Sections 908.7.1 through 908.7.3.‡
908.7.1 Group R occupancies. Listed carbon monoxide alarms or detectors shall be installed as follows: 2. Groups R-2. Carbon monoxide alarms shall be installed in affected dwelling units as per Section 908.7.1.1. of the 2008 NYC BC

908.7.1.1 Affected dwelling units. Carbon monoxide alarms or detectors shall be required within the following dwelling units: 1. Units on the same story where carbon monoxideproducing equipment or enclosed parking is located. 2. Units on the stories above and below the floor where carbon monoxide-producing equipment or enclosed parking is located. 3. Units in a building containing a carbon monoxideproducing furnace, boiler, or water heater as part of a central system. 4. Units in a building served by a carbon monoxideproducing furnace, boiler, or water heater as part of a central system that is located in an adjoining or attached building.
908.7.1.1.1 Required locations within dwelling units. Carbon monoxide alarms or detectors shall be located within dwelling units as follows: 1. Outside of any room used for sleeping purposes, within 15 feet (4572 mm) of the entrance to such room. 2. In any room used for sleeping purposes. 3. On any story within a dwelling unit, including below-grade stories and penthouses of any area, but not including crawl spaces and uninhabitable attics.
908.7.1.1.2 Installation requirements. Carbon monoxide alarms or detectors shall comply with the power source, interconnection, and acceptance testing requirements as required for smoke alarms in accordance with Sections 907.2.10.2 through 907.2.10.4. of the 2008 NYC BC
CHAPTER 10 MEANS OF EGRESS

SECTION BC 1004 OCCUPANT LOAD
1004.1 Design occupant load. In determining means of egress requirements, the number of occupants for whom means of egress facilities shall be provided shall be established by the largest number computed in accordance with Sections 1004.1.1 through 1004.1.3.
1004.1.2 Number by Table 1004.1.2. The number of occupants computed at the rate of one occupant per unit of area as prescribed in Table 1004.1.2. TABLE 1004.1.2 - MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

Residential 200 gross within dwelling units

SECTION BC 1005 EGRESS WIDTH
1005.1 Minimum required egress width. The means of egress width shall not be less than that required by this section. The total width of means of egress in inches (mm) shall not be less than the total occupant load served by the means of egress multiplied by the factors in Table 1005.1 and not less than specified elsewhere in this code. Multiple means of egress shall be sized such that the loss of any one means of egress shall not reduce the available capacity to less than 50 percent of the required capacity. The maximum capacity required from any story of a building shall be maintained to the termination of the means of egress.
TABLE 1005.1 - EGRESS WIDTH PER OCCUPANT SERVED
OCCUPANCY STAIRWAYS (inches per occupant) OTHER COMPONENTS (inches per occupant) R 0.3 0.2
SECTION BC 1008 DOORS, GATES AND TURNSTILES
1008.1.1.1 Door width. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 32 inches (813 mm).

SECTION BC 1009 STAIRWAYS AND HANDRAILS
1009.1 Stairway width. The width of stairways shall be determined as specified in Section 1005.1, but such width shall not be less than 44 inches (1118 mm). See Section 1007.3 for accessible means of egress stairways. Exceptions: 1. A width of not less than 36 inches (914 mm) shall be permitted in: 1.1. A stairway that serves an occupant load of 50 or less cumulative for all stories; or 1.2. A stairway that provides egress to the exit discharge solely for the use of Group R-2 occupancies, provided the building it serves is 125 feet (38 100 mm) or less in height, and provided such a stairway serves not more than 30 occupants per floor.
1013.2 Egress through intervening spaces Egress from a room or space shall not pass through adjoining or intervening rooms or areas, except where such adjoining rooms or areas are accessory to the area served; are not a high-hazard occupancy and provide a discernible path of egress travel to an exit. Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes. An exit access shall not pass through a room that can be locked to prevent egress. Means of egress from dwelling units or sleeping areas shall not lead through other sleeping areas, toilet rooms or bathrooms.

1013.3 Common path of egress travel. In occupancies other than Groups H-1, H-2 and H-3, the common path of egress travel shall not exceed 75 feet (22 860mm). In occupancies in Groups H-1, H-2, and H-3, the common path of egress travel shall not exceed 25 feet (7620mm).
1013.6 Exit access in R-2 occupancies. In buildings in occupancy Group R-2 exceeding three stories or more in height or occupied by more than two dwelling units on any story, a door from a dwelling unit shall open into an intervening public hall. Such public hall shall be constructed as a public corridor in accordance with Section 1016. Where two or more exits are required, such public hall shall provide access to at least two exits.

SECTION BC 1014 EXIT AND EXIT ACCESS DOORWAYS
1014.1 Exit or exit access doorways required. Two exits or exit access doorways from any space shall be provided where one of the following conditions exists: 1. The occupant load of the space exceeds the values in Table 1014.1.
TABLE 1014.1 SPACES WITH ONE MEANS OF EGRESS
OCCUPANCY MAXIMUM OCCUPANT LOAD
R2 20

SECTION BC 1015 EXIT ACCESS TRAVEL DISTANCE
1015.1 Travel distance limitations. Exits shall be so located on each story such that the maximum length of exit access travel, measured from the most remote point within a story to the entrance to an exit along the natural and unobstructed path of egress travel, shall not exceed the distances given in Table 1015.1.
TABLE 1015.1 EXIT ACCESS TRAVEL DISTANCE
OCCUPANCY WITH SPRINKLER SYSTEM (feet)
R2 200b

1016.1.2 Public corridors. Public corridors shall be fire-resistance rated in accordance with Table 1016.1.2.
TABLE 1016.1.2 PUBLIC CORRIDOR FIRE-RESISTANCE RATING
OCCUPANCY REQUIRED FIRE-RESISTANCE RATING (hours)
R2 (Nonaccessible) 1
1016.2 Corridor width. The minimum corridor width shall be as determined in Section 1005.1, but not less than 44 inches (1118 mm). Exceptions: 1. Twenty-four inches (610 mm)—For access to and utilization of electrical, mechanical or plumbing systems or equipment. 2. Thirty-six inches (914 mm)—With a required occupant capacity of 50 or less, except as otherwise required by Chapter 11. 4. Thirty inches (762 mm) —Within a dwelling unit in Occupancy Groups R-2 and R-3, except as otherwise required by Section 1107.
1016.3 Dead ends. Where more than one exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors more than 20 feet (6096 mm) in length. 4. In occupancies in Group R-2, the dead end in a corridor shall not exceed 40 feet (12 192 mm). However, where the corridors are completely enclosed in construction having a 2-hour fire-resistance rating with all doors opening into thecorridor being self-closing and having a fire-resistance rating of 1 1/2 hours, the length of dead-end corridor shall not exceed 60 feet (24 384 mm).

SECTION BC 1018 NUMBER OF EXITS AND CONTINUITY
1018.1 Minimum number of exits All rooms and spaces within each story shall be provided with and have access to the minimum number of approved independent exits as required by Table 1018.1 based on the occupant load of such story, except as modified in Section1018.2. For the purposes of this chapter, occupied roofs shall be provided with exits as required for stories. The required number of exits from any story, basement or individual space shall be maintained until arrival at grade or the public way.
1018.2 Buildings with one exit. Only one exit shall be required in buildings as described below: 5. Buildings of Group R-2 occupancy of construction Type I or II not exceeding six stories and not exceeding 2,000 square feet (186 m2) per story.

SECTION BC 1019 VERTICAL EXIT ENCLOSURES
1019.1 Enclosures required. Interior exit stairways and interior exit ramps shall be enclosed with fire barriers. Exit enclosures shall have a fire-resistance rating of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the shaft enclosure shall include any basements but not any mezzanines. An exit enclosure shall not be used for any purpose other than means of egress. Enclosures shall be constructed as fire barriers in accordance with Section 706. Exceptions: 10. In Group R-1 and R-2 occupancies, where exit enclosures are required to have a fire-resistance rating of 2 hours, such enclosures shall be constructed of masonry or masonry equivalent. Wall assemblies constituting masonry equivalent shall be constructed in accordance with department rules.

SECTION BC 1023 EXIT DISCHARGE
1023.1 General. Exits shall discharge directly to the exterior of the building. The exit discharge shall be at grade or shall provide direct access to grade. The exit discharge shall not reenter a building.

CHAPTER 11 ACCESSIBILITY
BC 1105 ACCESSIBLE ENTRANCES
1105.1 Public entrances. In addition to accessible entrances required by Sections 1105.1.1 through 1105.1.6, all public entrances shall be accessible.
1105.1.6 Tenant spaces. All entrances to tenant spaces that are required to be accessible shall be accessible entrances.
1105.1.6.1 Dwelling units and sleeping units. Doors and doorways at entrance(s) to Accessible units, including hardware, shall comply with Section 404 (Doors and doorways) of ICC A117.1. Doors and doorways, including hardware, at entrance(s) to Type B units shall comply with Section 1003.5 (Doors and doorways) of ICC A117.1. Exceptions: 1. An accessible entrance is not required to dwelling units and sleeping units that are not required to be Accessible units or Type B units. 2. Entrances to multistory dwelling or sleeping units in R-2 occupancy as provided in Section 1107.2.5

that are not on the primary entry story to the unit and are not part of the accessible route required in Exception 1 of Section 1107.2.5 shall not be required to be accessible.

SECTION BC 1107 DWELLING UNITS AND SLEEPING UNITS
1107.1 General. In addition to the other requirements of this chapter, occupancies having dwelling units or sleeping units shall be provided with accessible features in accordance with this section.
1107.2 Design. Dwelling units and sleeping units which are required to be Accessible units or Type B units shall comply with this code including Appendix P where applicable, and the applicable provisions of Chapter 10 of ICC A117.1. In addition, Type B units in R-2 occupancies shall comply with Sections 1107.2.1 through 1107.2.8. Units required to be Type B units are permitted to be designed and constructed as Accessible units.
1107.2.5 Type B multistory units in R-2 occupancy. Multistory dwelling or sleeping units shall comply with the following: 1. One of the stories with an accessible entrance shall be designated as the primary entry story to the unit. 2. All rooms, spaces and doors on the primary entry story shall comply with Section 1107.2; and 3. Rooms, spaces or doors located on other than the primary entry story, and interior routes thereto, need not comply with Section 1107.2 where the primary entry story contains equivalent functional facilities.

CHAPTER 12 INTERIOR ENVIRONMENT

BC 1203 VENTILATION
1203.4 Natural ventilation. Natural ventilation of occupy-able and habitable space shall be through openings to the outdoors. The openings shall be of a type permitted under Sections 1203.4.1.1, 1203.4.1.2, 1203.4.1.3 and 1203.4.1.4. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants.
1203.4.1 Ventilation area required. Ventilation areas shall be as set forth in Sections 1203.4.1.1 through 1203.4.1.4.
1203.4.1.1 Occupy-able spaces. Where occupy-able spaces are not required to be provided with mechanical ventilation in accordance with the New York City Mechanical Code, natural ventilation shall be provided in accordance with Section 1203.4.1.1. Openings providing required natural ventilation to occupy-able spaces shall be windows, doors, louvers, skylights or other similar ventilating openings. Exceptions: 1. Bathrooms and toilet rooms in R or I-1 occupancies shall comply with Section 1203.4.1.3. 2. Kitchenettes in R or I-1 occupancies shall comply with Section 1203.4.1.4.
1203.4.1.2 Habitable spaces. All habitable spaces shall be provided with natural ventilation in accordance with Section 1203.4.1.2. Openings providing required natural ventilation to habitable spaces shall be windows and/or glazed doors.

1203.4.1.2.1 Minimum opening. The minimum open-able area to the outdoors shall be 5 percent of the floor area of the habitable space being ventilated. Every opening providing required natural ventilation shall be at least 12 square feet (1.1 m2) of glazed area, providing a minimum of 6 square feet (0.56 m2) of open-able area.
1203.4.1.2.4 Maximum depth of room. No part of any room shall be more than 30 feet (9144 mm) from a window opening onto a street or yard unless such room also opens onto a court complying with Section 1206. Exception: In dwelling units containing more than three habitable rooms in Group R-1 or R-2 occupancies in buildings of Type I or II construction, rooms may be greater than 30 feet (9144 mm) in depth provided that all other requirements of Section 1203.4.1.2 are met and that the required windows are so located as to properly light all portions of the room in accordance with Section 1205. 1203.4.1.3 Bathrooms and toilet rooms in R and I-1 occupancies. Bathrooms or toilet rooms in R or I-1 occupancies shall be provided with natural ventilation in accordance with Section 1203.4.1.3, unless provided with exhaust ventilation in accordance with the New York City Mechanical Code. Openings providing required natural ventilation shall be windows.
1203.4.1.4. Kitchenettes in R and I-1 occupancies. Kitchenettes in R or I-1 occupancies shall be provided with natural ventilation in accordance with Section 1203.4.1.4, unless provided with exhaust ventilation in accordance with the New York City Mechanical Code. Openings providing required natural ventilation shall be windows.

SECTION BC 1205 LIGHTING
1205.1 General. Every room and space in every building shall be provided with artificial light in accordance with Section 1205.3. Every habitable room and space shall also be provided with natural light by means of exterior glazed openings in accordance with Section 1205.2 Natural light. Every opening providing required natural light shall be so located so as to properly light all portions of the room. Openings providing required natural light shall be windows and/or glazed doors.
1205.2.1 Minimum opening. The minimum net glazed area shall not be less than 10 percent of the floor area of the room served. Every opening providing required natural light shall be at least 12 square feet (1.1 m2) of glazed area.
1205.2.4 Maximum depth of room. No part of any room shall be more than 30 feet (9144 mm) from a window opening on a street or yard unless such room also opens onto a legal court. Exception: In dwelling units containing more than three habitable rooms in R-1 or R-2 occupancies in buildings of Type I or II construction, rooms may be greater than 30 feet (9144 mm) in depth provided that all other requirements of Section 1205.2 are met and that the required windows are located so as to properly light all portions of the room.

SECTION BC 1207 SOUND TRANSMISSION
1207.1 Scope. This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units, between dwelling units and adjacent mechanical equipment spaces, or between dwelling units and adjacent public areas such as halls, corridors, stairs or service areas
1207.2 Air-borne sound. Walls, partitions and floor/ceiling assemblies separating dwelling units from each other, from public or service areas, from stairs or from mechanical equipment spaces, including boiler rooms, or elevator or other shafts shall have a sound transmission class (STC) for air-borne noise of not less than 50 based upon laboratory measurements made in accordance with ASTM E 90, or not less than 45 if field tested in accordance with ASTME 336. Dwelling unit entrancedoors shall be installed of assemblies having an STC of not less than 35 based upon laboratory measurements made in accordance with ASTM E 1408. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings.
1207.2.1 Machine and equipment rooms. Elevator machine rooms and machinery spaces containing equipment totaling more than 75 rated h.p. shall not be located vertically or horizontally adjacent to dwelling units unless the total sound power level output of all the equipment in the machine room or space is certified not to exceed the maximum sound power levels of Table 1207.2.1 in any octave band.
1207.3 Structure-borne sound. Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area stair, exterior mechanical equipment, or other mechanical equipment space, including boiler rooms, shall be constructed of assemblies having an impact insulation class (IIC) rating of not less than 50 based upon laboratory measurements made in accordance with ASTM E 492, or not less than 45 if field tested in accordance with ASTM E 1007 in completed construction. See Chapter 30 for additional sound control requirements for elevator machinery.
1207.3.1 Refuse chutes. Metal refuse chutes, metal chute supports, and/or metal chute bracing shall be free of direct contact with the shaft enclosure and the openings provided in the floor construction. Metal chutes shall be resiliently supported at each structural support location. Isolators shall provide a minimum static deflection of 0.3 inches (7.62 mm). All chutes shall be plumb.

BC 1208 INTERIOR SPACE DIMENSIONS
1208.1 Minimum room widths. Habitable spaces, other than a kitchen, shall not be less than 8 feet (2438 mm) in any plan dimension. Kitchens and kitchenettes shall have a clear passageway of not less than 3 feet (914 mm) between counter fronts and appliances or counter fronts and walls. Exceptions: 1. A room that complies with the requirements for natural light and natural ventilation and in addition has an unobstructed opening of not less than 60 square feet (5.6m2) into an immediately adjoining room shall not be less than 7 feet (2134 mm)in any plan dimension. 2. A habitable dining space that complies with the requirements for natural light and natural ventilation may be less than 8 feet (2438 mm) in any plan dimension. 3. One-half the number of bedrooms in a dwelling unit containing three or more bedrooms shall not be less than 7 feet (2134 mm) in any plan dimension. 4. Aroom in a Group R-1 dwelling or sleeping unit shall not be less than 6 feet (1829 mm) in any plan dimension.
1208.2 Minimum ceiling heights. Habitable rooms and spaces shall have a ceiling height of not less than 8 feet (2438 mm). Occupy-able spaces and corridors shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). Bathrooms, toilet rooms, kitchens in other than I-1 and R occupancies, kitchenettes in I-1 or R occupancies, storage rooms and laundry rooms shall be permitted to have a ceiling height of not less than 7 feet (2134 mm). All measurements shall be taken from the finished floor to the finished underside of the ceiling or ceiling beams.
1208.3 Room area. Minimum net floor areas of rooms shall be in accordance with Sections 1208.3.1 and 1208.3.2.
1208.3.1 Habitable rooms and spaces. Every habitable room or space shall have not less than 80 square feet (7.4m2) in net floor area.
1208.3.2 Dwelling units. In a dwelling unit, at least one habitable room shall have not less than 150 square feet (13.9 m2) of net floor area.

SECTION BC 1210 SURROUNDING MATERIALS
1210.1 Floors. Toilet and bathing room floors shall have a smooth, hard, nonabsorbent surface that extends upward onto the walls at least 6 inches (152 mm).
1210.2 Walls. Walls within 2 feet (610 mm) of urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of 4 feet (1219 mm) above the floor, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture. Exceptions: 1. Dwelling units. 2. Toilet rooms that are not accessible to the public and which have not more than one water closet. Accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture.
1210.3 Showers. Shower compartments and walls above bathtubs with installed shower heads shall be finished with a smooth, nonabsorbent surface to a height not less than 70 inches (1778 mm) above the drain inlet.
1210.4 Waterproof joints. Builtin tubs with showers shall have waterproof joints between the tub and adjacent wall.
1210.5 Toilet rooms. Toilet rooms shall not open directly into a room used for the preparation of food for service to the public. In multiple dwellings no toilet room or bathroom shall open onto any kitchen or kitchenette

SECTION BC 1211 KITCHENS AND KITCHENETTES
1211.1 Sleeping. No kitchen or kitchenette shall be occupied for sleeping purposes.
1211.2 Kitchenettes in multiple dwellings. Except at entrances thereto, every kitchenette in a multiple dwelling shall be surrounded by partitions extending from floor to ceiling, and/or by a soffit dropped 1 foot (305 mm) from the ceiling

SECTION BC 1213 REFUSE AND RECYCLABLE STORAGE
1213.1 General. Multiple dwellings shall comply with Section 81 of the New York State Multiple Dwelling Law and Section 27-2021 of the New York City Housing Maintenance Code. Where a room is provided for the storage of refuse and recyclables in a building, such room shall be completely enclosed by construction that has a fire-resistance rating of not less than 2 hours, with self-closing opening protective having a fire protection rating of not less than 1 1/2 hours. The location of such refuse storage room shall be identified on the construction documents.

CHAPTER 13 ENERGY EFFICIENCY
1301.1.1 Criteria. Buildings shall be designed and constructed in accordance with the Energy Conservation Construction Code of New York State.

SECTION BC 1614 EARTHQUAKE LOADS—GENERAL
1614.1 Scope. Every structure, and portion thereof, shall at a minimum, be designed and constructed to resist the effects of earthquake motions and assigned a seismic design category as set forth in Section 1616.3.
Exceptions: 1. Structures designed in accordance with the provisions of Sections 9.1 through 9.6, 9.13 and 9.14 of ASCE 7 shall be permitted.
2. One- and two-family dwellings not more than three stories in height are exempt from the requirements of Sections 1613 through 1622.
3. The seismic-force-resisting system of wood frame buildings that conform to the provisions of Section
2308 are not required to be analyzed as specified in Section 1616.1.
4. Agricultural storage structures intended only for incidental human occupancy are exempt from the requirements of Sections 1613 through 1623
1614.4 Quality assurance. A quality assurance plan shall be provided where required by Chapter 17.
1614.5 Seismic and wind. When the code-prescribed wind design produces greater effects, the wind design shall govern, but detailing requirements and limitations prescribed in this and referenced sections shall be followed

CHAPTER 17 STRUCTURAL TESTS AND SPECIAL INSPECTIONS
SECTION BC 1704 SPECIAL INSPECTIONS
1704.1 General. Where application is made for construction as described in this section, one or more special inspectors shall be employed by the owner to provide inspections during construction on the types of work listed under Section 1704 and elsewhere in this code. The special inspector shall be acceptable to the registered design professional of record The following special inspections should be required under subject application

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General Contractor

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No.	Date	Description

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MECHANICAL
STRUCTURAL
ARCHITECTURAL

ZONING ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

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TABLE 503—continued
ALLOWABLE HEIGHT AND BUILDINGAREAS [a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area,building,"per floor.

GROUP	Hgt (feet) Hgt(S)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
		UL	160e	65	55	65	55	65	50	40
R–1	S	UL	UL	6	NP	6	NP	6	NP	NP
	A	UL	UL	UL	NP	24,000	NP	20,500	NP	NP
R–2	S	UL	UL	6	NP	6	3	6	NP	NP
	A	UL	UL	UL	NP	24,000	5,600	20,500	NP	NP
R–3	S	UL	UL	6	3	6	3	6	3	3
	A	UL	UL	17,500	10,500	14,700	5,600	30,000	8,400	5,500
S–1	S	UL	6	5	3	4	3	4	3	2
	A	UL	48,000	12,000	7,500	7,500	7,500	7,500	5,000	1,000
S–2[b,c]	S	UL	UL	6	3	6	4	6	3	2
	A	UL	UL	15,000	10,000	10,000	8,500	10,000	8,400	5,500
U[c]	S	UL	5	4	2	3	2	4	2	1
	A	UL	35,000	19,000	8,500	14,000	8,500	18,000	9,000	5,500

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A[D]	B	A[D]	B	HT	A[D]	B
STRUCTURAL FRAME INCLUDING COLUMNS, GIRDERS, TRUSSES	3[D]	2[D]	1	0	1	0	HT	1	0
BEARING WALLS EXTERIOR	3	2	1	0	2	2	HT	1	0
BEARING WALLS INTERIOR	3[D]	2[D]	1	0	1	0	1/HT	1	0
NONBEARING WALLS AND PARTITIONS EXTERIOR	SEE TABLE 602								
NONBEARING WALLS AND PARTITIONS INTERIOR	0	0	0	0	0	0	SEE SECTION 602.4.6	0	0
FLOOR CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	2	2	1	0	1	0	HT	1	0
ROOF CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	1 1/2[C]	1[C]	1[C]	0[C]	1[C]	0	HT	1[C]	0

TABLE 602
FIRE - RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE

FIRE SEPARATION DISTANCE (FEET)	TYPE OF CONSTRUCTION	GROUP H	GROUP F-1, M, S-1	GROUP A,B,E,F-2,I,R,S-2,U[A,B]
< 5[C]	All	3	2	1
≥ 5	IA	3	2	1
< 10	OTHERS	2	1	1
≥ 10	IA, IB	2	1	1
< 30	IIB, VB	1	0	0
	OTHERS	1	1	1
≥ 30	All	0	0	0

* SEE WALL DETAILS ON SHEETS A-400, A-500 FOR FIRE RATING COMPLIANCE

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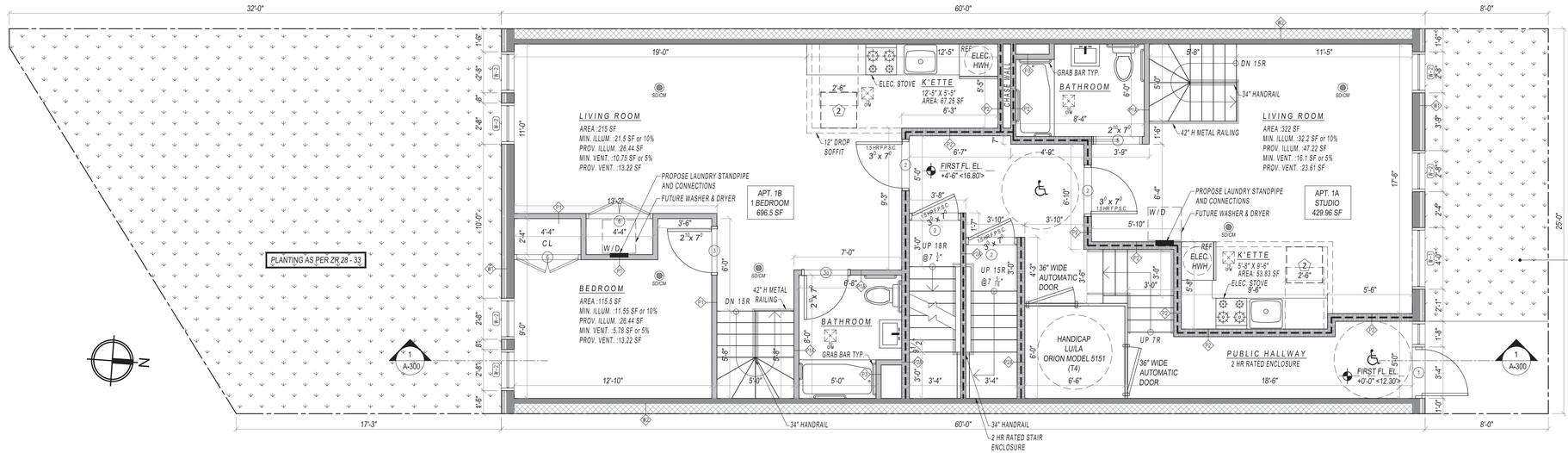


2 PROPOSED FIRST FLOOR PLAN
SCALE: 1/4"=1'-0"

ENTIRE BLDG TO BE FIRE PROTECTED WITH SPRINKLERS PER ALL REGULATIONS SEE FIRE PROTECTION DWGS FILED SEPARATELY

PER BC 908.7, 907.2.9, 907.2.10.1.1
HARDWIRED CARBON MONOXIDE AND SMOKE DETECTORS SHALL COMPLY WITH LL 7/04 27-981.21
RCNY 28-02, BC28-903.2.7

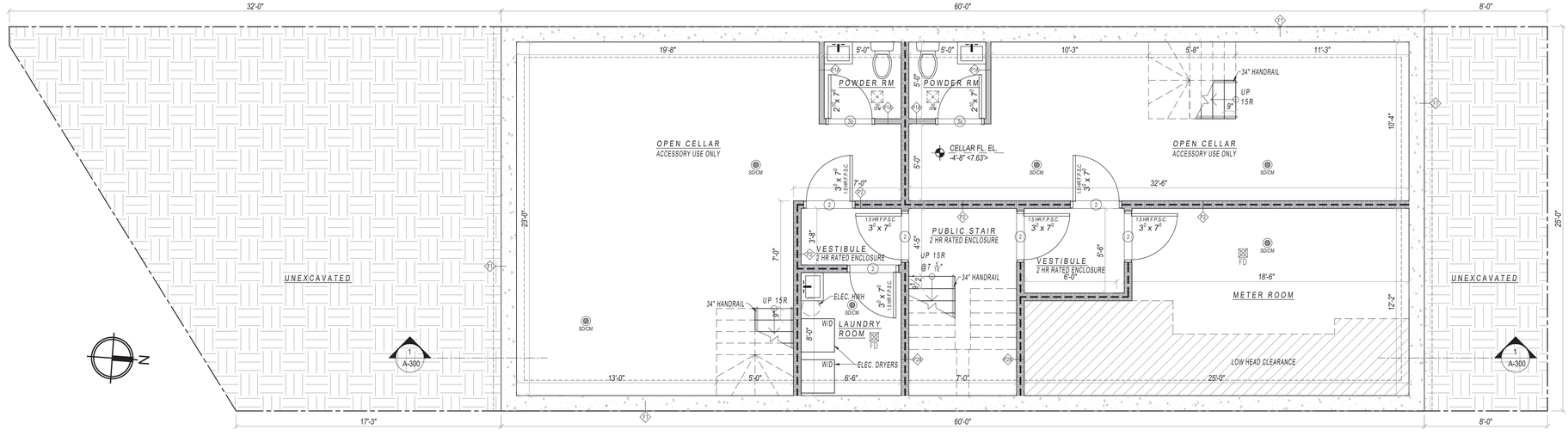
STRUCTURAL DRAWINGS FILED SEPARATELY

HEAT FOR ENTIRE BUILDING TO BE PROVIDED BY SPLIT-SYSTEM UNITS
NO BOILER ROOM PROPOSED

ENTRY DOOR
- TO PROVIDE MIN. 20 SF OF NON-TINTED GLAZED SURFACE
- TEMPERED CUSTOM GLASS DOOR & SIDELIGHT
- ALUMINUM HARDWARE

PLANTING AS PER ZR 28 - 33

2 TREES REQUIRED
1 OFF SITE AND 1 ON SITE.
LOCATION TO BE DETERMINED BY DEPARTMENT OF PARKS AND RECREATION, SEE TREE PLANTING DETAIL ON SHEET A-500



1 PROPOSED CELLAR FLOOR PLAN
SCALE: 1/4"=1'-0"

DRAWING LEGEND

	STEEL STUD WALL
	CONCRETE MASONRY
	CAST IN PLACE CONCRETE
	2HR FIRE SEPARATION
SP	SPRINKLER HEAD
SD/CM	SMOKE/CARBON MONOXIDE DETECTOR*
X	WALL TAG
6	DOOR TAG
W-1	WINDOW TAG
4	EQUIPMENT TAG

*HARDWIRED CARBON MONOXIDE AND SMOKE DETECTOR SHALL COMPLY WITH LL 7/04 27-981.21 RCNY 28-02, BC 907.2.10.1.1

EQUIPMENT LEGEND

1 — HWH : A.O.SMITH
MODEL # ECL-30 30 GALLON

2 — MITSUBISHI ELECTRIC AIR HANDLING INDOOR UNITS : PEFY-P12NMAU
HWH — NOTE: ALL HWH CLOSETS TO BE P1 WALLS & DOOR WITH 1 1/2" FIRE RATED
NOTE: SEPARATION ON ALL HWH CLOSETS IN ACCORDANCE WITH BC TABLE 508.2

3 — MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS : PUZ-A24NHA4

3 — MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS FOR DUPLEX UNITS: PUMU-P36NHMU

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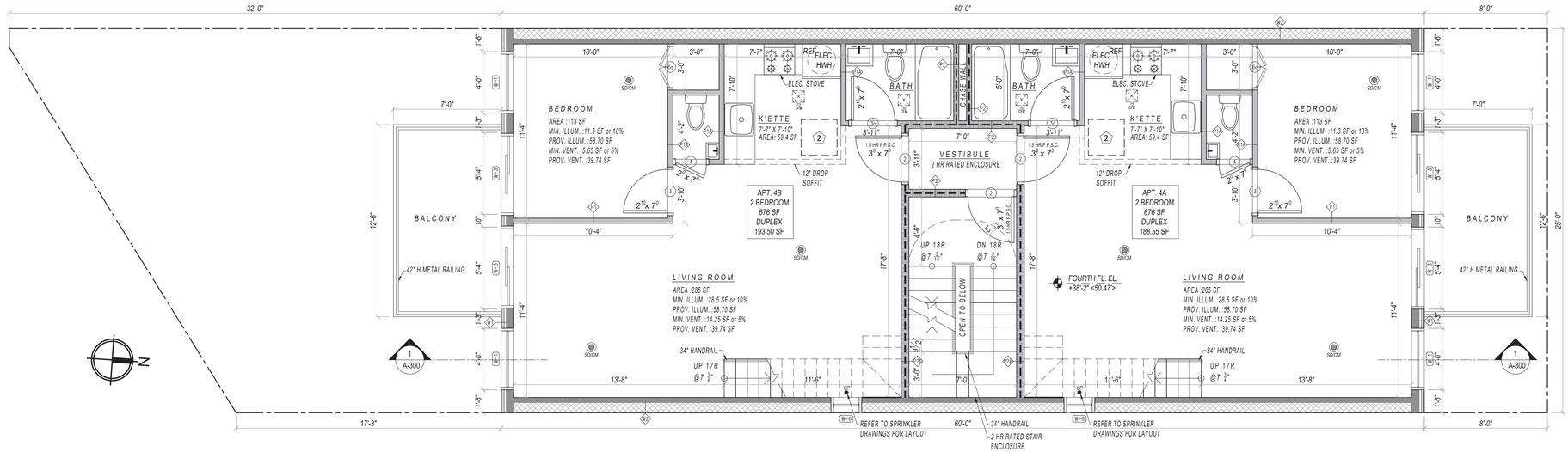
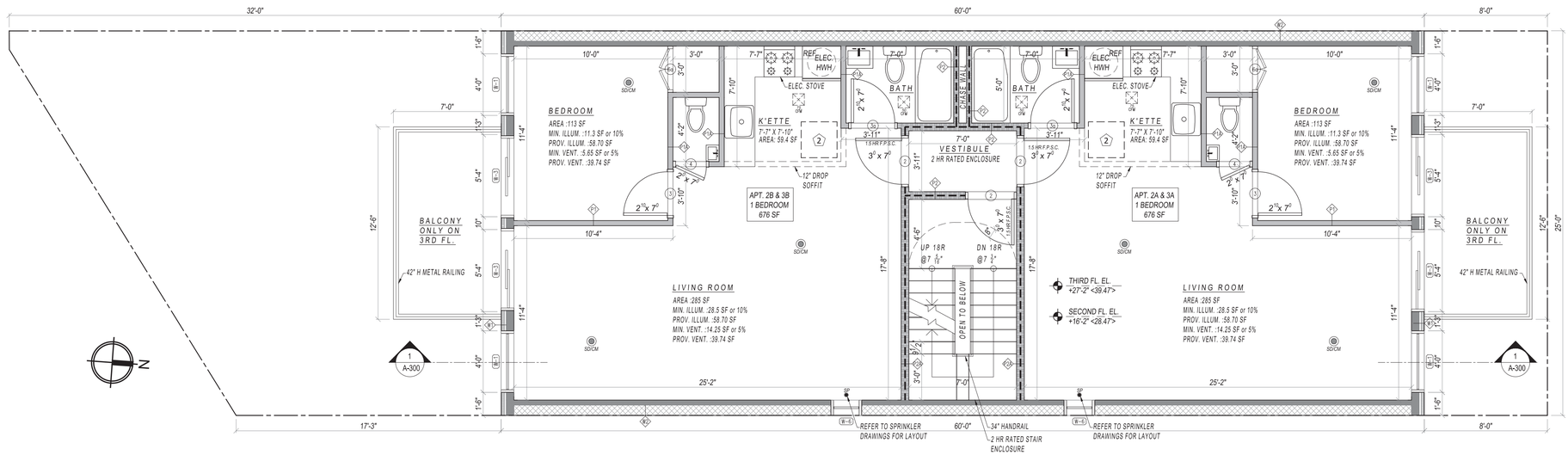


2 *PROPOSED FOURTH FLOOR PLAN*
SCALE: 1/4"=1'-0"



1 *PROPOSED TYPICAL SECOND AND THIRD FLOOR PLAN*
SCALE: 1/4"=1'-0"

DRAWING LEGEND

	STEEL STUD WALL
	CONCRETE MASONRY
	CAST IN PLACE CONCRETE
	2HR FIRE SEPARATION
SP	SPRINKLER HEAD
SD/CM	SMOKE/CARBON MONOXIDE DETECTOR*
X	WALL TAG
6	DOOR TAG
W-1	WINDOW TAG
4	EQUIPMENT TAG

*HARDWIRED CARBON MONOXIDE AND SMOKE DETECTOR SHALL COMPLY WITH LL 7/04 27-981.21 RCNY 28-02, BC 907.2.10.1.1

EQUIPMENT LEGEND

1	HWH : A.O.SMITH MODEL # ECL-30 30 GALLON
2	MITSUBISHI ELECTRIC AIR HANDLING INDOOR UNITS : PEFY-P12NMAU NOTE: ALL HWH CLOSETS TO BE P1 WALLS & DOOR WITH 1 1/2" FIRE RATED NOTE: SEPARATION ON ALL HWH CLOSETS IN ACCORDANCE WITH BC TABLE 508.2
HWH	
3	MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS : PUZ-A24NHA4
3	MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS FOR DUPLEX UNITS: PUMU-P36NHMU

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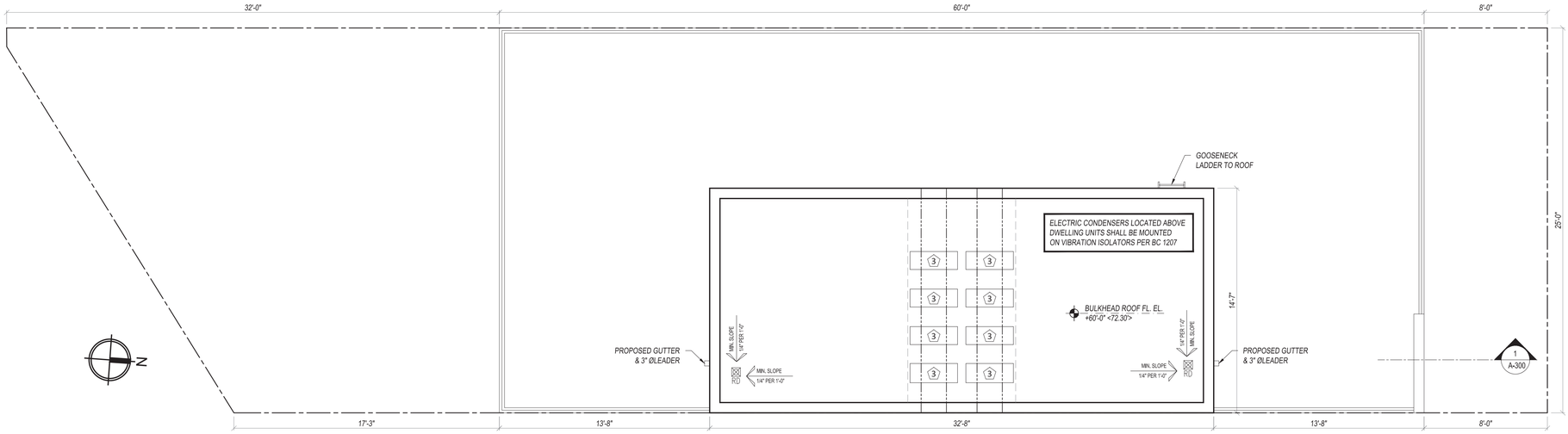
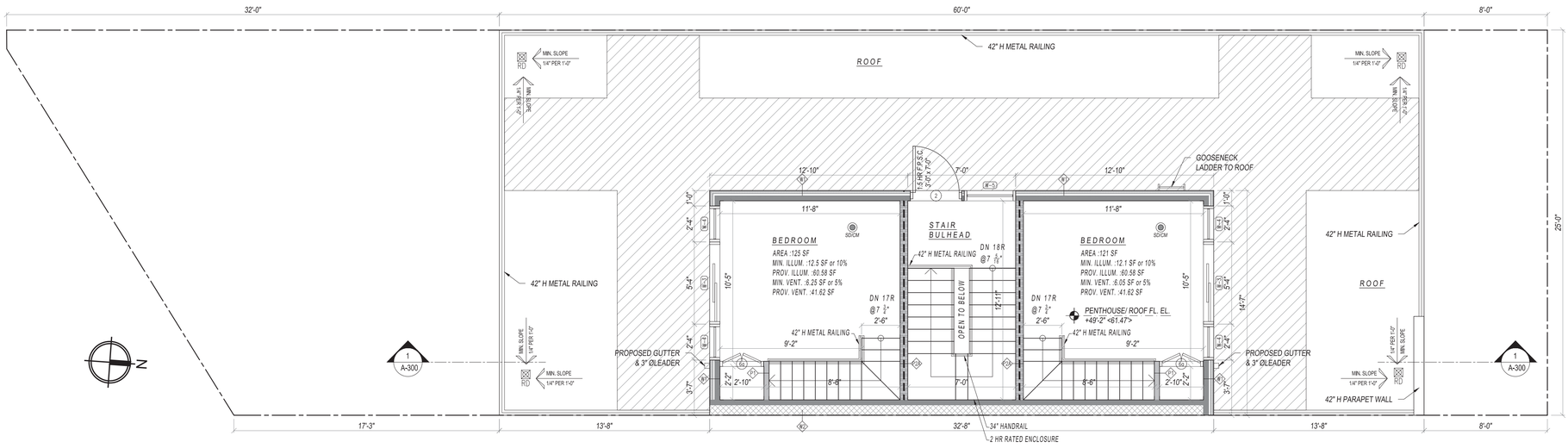


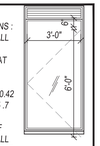
2 *PROPOSED BULKHEAD FLOOR PLAN*
SCALE: 1/4"=1'-0"



1 *PROPOSED PENTHOUSE/ROOF FLOOR PLAN*
SCALE: 1/4"=1'-0"

BC 504.3 ROOFTOP STRUCTURES. ROOFTOP STRUCTURES SHALL NOT BE INCLUDED IN THE HEIGHT OF THE BUILDING OR CONSIDERED AN ADDITIONAL STORY UNLESS THE AGGREGATE AREA OF ALL SUCH STRUCTURES EXCEEDS 33 1/3 PERCENT OF THE AREA OF THE ROOF OF THE BUILDING UPON WHICH THEY ARE ERECTED.
PROPOSED ROOF 1,500 SF X 33.33% = 499.95 SF
PROPOSED BULKHEAD = 102.08 SF
PROPOSED PENTHOUSE = 374.30 SF
PROPOSED RAILING = 22.55 SF
TOTAL ROOF STRUCTURES: 498.93 < 499.95 SF

BC 910.5.2:
SMOKE VENT DIMENSIONS : THE VENTING AREA SHALL BE MIN. 3.5% OF THE MAXIMUM SHAFT AREA AT ANY LEVEL.
MAX SHAFT AREA :
STAIR = 7'-0" x 12'-11" = 90.42 SF x 3.5% = 3.16 SF = 455 .7 SI REQ.
AT LEAST ONE-THIRD OF THE VENTING AREA SHALL BE CLEAR OPENING TO THE EXTERIOR IN THE FORM OF FIXED LOUVERS, RIDGE VENTS, OR HOODED OR GOOSENECKED OPENINGS. THE REMAINING PORTION OF THE REQUIRED VENT AREA MAY BE A WINDOW OR SKYLIGHT GLAZED WITH PLAIN GLASS NOT MORE THAN 0.125-INCH (3.2 MM) THICK OR WITH PLASTIC GLAZING.
STAIR:
PROPOSED LOUVER SIZE:
455.7 SI / 3 = 151.9 SI
3'-0" X 6" = 1.5 SF = 216 SI > 151.9 SI
PROPOSED WINDOW PORTION:
72" X 36" = 2592 SI



DRAWING LEGEND

	STEEL STUD WALL
	CONCRETE MASONRY
	CAST IN PLACE CONCRETE
	2HR FIRE SEPARATION
SP	SPRINKLER HEAD
SD/CM	SMOKE/CARBON MONOXIDE DETECTOR*
X	WALL TAG
6	DOOR TAG
W-1	WINDOW TAG
4	EQUIPMENT TAG

**HARDWIRED CARBON MONOXIDE AND SMOKE DETECTOR SHALL COMPLY WITH LL 7/04 27-981.21 RCNY 28-02, BC 907.2.10.1.1*

EQUIPMENT LEGEND

1	*HWH : A.O.SMITH MODEL # ECL-30 30 GALLON*
2 HWH	*MITSUBISHI ELECTRIC AIR HANDLING INDOOR UNITS : PEFY-P12NMAU* *NOTE: ALL HWH CLOSETS TO BE P1 WALLS & DOOR WITH 1 1/2" FIRE RATED* *NOTE: SEPARATION ON ALL HWH CLOSETS IN ACCORDANCE WITH BC TABLE 508.2*
3	*MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS : PUZ-A24NHA4*
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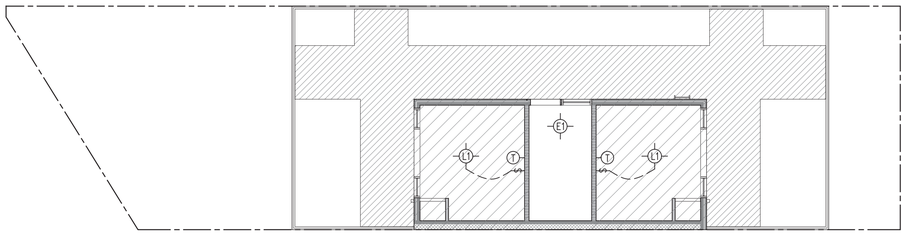
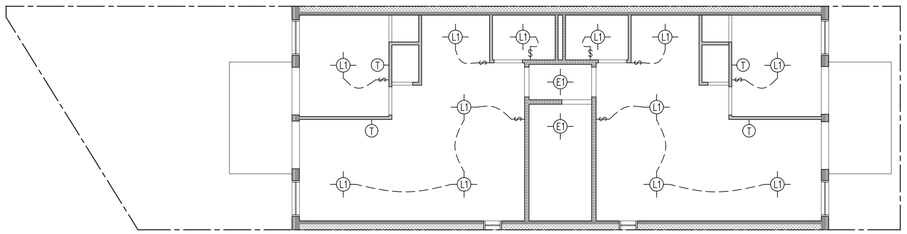
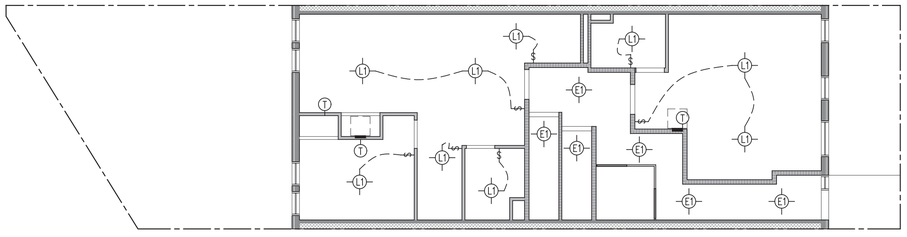


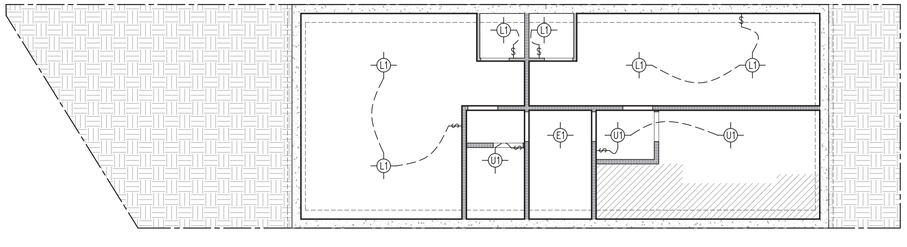
4 PROPOSED PENTHOUSE/ ROOF REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"



3 PROPOSED TYPICAL FLOOR REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"



2 PROPOSED FIRST FLOOR REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"



1 PROPOSED CELLAR REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"

LIGHTING POWER DENSITY CALCULATION
PROPOSED SECOND AND THIRD FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
CORRIDOR	27.42 SF	E1 X 1	13 W	13 / 27.42 = .47
STAIR	91.6 SF	E1 X 1	13 W	13 / 91.6 = .14
TOTAL WATTS/ SF = 26 W / 119.02 SF = 0.22 W/SF < .07 W/SF				

LIGHTING POWER DENSITY CALCULATION
PROPOSED SECOND AND THIRD FLOOR RESIDENTIAL AREA

APT	SPACE	AREA	LIGHTING POWER		WATT/SF
A	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 182 W / 571.9 SF = 0.32 W/SF < .07 W/SF					
B	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 182 W / 571.9 SF = 0.32 W/SF < .07 W/SF					

LIGHTING POWER DENSITY CALCULATION
PROPOSED FIRST FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
CORRIDOR	134 SF	E1 X 4	52 W	52 / 134 = .39
STAIR	75.5 SF	E1 X 2	26 W	26 / 75.5 = .34
TOTAL WATTS/ SF = 78 W / 209.5 SF = 0.37 W/SF < .07 W/SF				

LIGHTING POWER DENSITY CALCULATION
PROPOSED FIRST FLOOR- RESIDENTIAL AREA

APT	SPACE	AREA	LIGHTING POWER		WATT/SF
A	STUDIO	322 SF	L1 X 2	52 W	52 / 322 = .16
	BATHROOM	47.5 SF	L1 X 1	26 W	26 / 47.5 = .55
	ACCESSORY	307 SF	L1 X 2	52 W	52 / 307 = .17
	BATHROOM	25 SF	L1 X 1	26 W	26 / 25 = 1.04
TOTAL WATTS/ SF = 156 W / 701.5 SF = 0.22 W/SF < .07 W/SF					
B	LIVING ROOM	333 SF	L1 X 3	78 W	78 / 333 = .23
	BATHROOM	49 SF	L1 X 1	26 W	26 / 49 = .53
	BEDROOM	123.6 SF	L1 X 1	26 W	26 / 123.6 = .21
	KITCHENETTE	67.25 SF	L1 X 1	26 W	26 / 67.25 = .39
	ACCESSORY	457.7 SF	L1 X 2	52 W	52 / 457.7 = .11
	BATHROOM	25 SF	L1 X 1	26 W	26 / 25 = 1.04
TOTAL WATTS/ SF = 234 W / 1,055.55 SF = 0.22 W/SF < .07 W/SF					

LIGHTING POWER DENSITY CALCULATION
PROPOSED CELLAR FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
STAIR	85 SF	E1 X 1	13 W	13 / 85 = .15
MECHANICAL ROOM	304 SF	U1 X 2	46 W	46 / 304 = .15
LAUNDRY ROOM	79 SF	E1 X 1	13 W	13 / 79 = .16
TOTAL WATTS/ SF = 72 W / 468 SF = 0.15 W/SF < .07 W/SF				

LIGHTING SCHEDULE

SYMBOL	MANUFACTURER	MODEL #	TYPE	WATTAGE
L1	SEA GULL LIGHTING	79364BLE15	COMPACT FLUORESCENT 2- SELF- BALLASTED	26 WATTS (120 W EQUIV.)
E1	SEA GULL LIGHTING	5901BLE15	COMPACT FLUORESCENT 1- SELF- BALLASTED	13 WATTS (60 W EQUIV.)
U1	APPLETON LIGHTING	NT800B	COMPACT FLUORESCENT 1- SELF- BALLASTED	23 WATTS (100 W EQUIV.)
S1	PHILIPS STONCO LIGHTING	VWXL26HFL1	COMPACT FLUORESCENT 1- SELF- BALLASTED	26 WATTS (100 W EQUIV.)

LIGHTING CONTROL NOTE

1. Recessed luminaires installed in the building thermal envelope shall be sealed to maximum air leakage 2cfm.
2. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identified the lights served and indicated their status.
3. Each area that is required to have a manual control shall also allow the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern by at least 50 percent. Lighting reduction shall be achieved by one of the following or other approved method:
   - Controlling all lamps or luminaires;
   - Dual switching of alternate rows of luminaires, alternate luminaires or alternate lamps;
   - Switching the middle luminaire lamps independently of the outer lamps; or
   - Switching each luminaire or each lamp.
4. Buildings larger than 5,000 square feet (465 m2) shall be equipped with an automatic control device to shut off lighting in those areas. This automatic control device shall function on either:
   - A scheduled basis, using time-of-day, with an independent program schedule that controls the interior lighting in areas that do not exceed 25,000 square feet (2323 m2) and are not more than one floor; or
   - An occupant sensor that shall turn lighting off within 30 minutes of an occupant leaving a space; or
   - A signal from another control or alarm system that indicates the area is unoccupied.
5. In addition, for classrooms, conference rooms, employee lunch rooms and offices smaller than 200 sf, sensor and controls, including an occupant sensor, shall be installed that only enable lighting to be turned on by manual control, that automatically turn lighting off within a maximum of 30 minutes If all occupants leaving a space, and that enable lighting to be turned off by manual control. Such sensors and controls shall not have an override switch that converts from manual-on to automatic-on functionality. The occupant sensor may have a grace period of up to 30 seconds to turn on the lighting automatically after the sensor has turned off the lighting if occupancy is detected.
6. Automatic time switch control device shall incorporate an over-ride switching device that is readily accessible, is located so that a person using the device can see the lights or the area controlled by that switch, or so that the area being lit is annunciated, is manually operated, allows the lighting to remain on for no more than 2 hours when an override is initiated, and controls area not exceeding 5000 sf.
7. Automatic time switch control device shall incorporate an automatic holiday scheduling feature that turns off all loads for at least 24 hours, then resume the normally scheduled operation.
8. Daylight zones, shall be provided with individual controls that control the lights independent of general area lighting. Daylight zone near vertical fenestration is 15 feet deep from window. Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration.
9. Sleeping units in hotels, motels, boarding houses or similar buildings shall have at least one master switch at the main entry door that controls all permanently wired luminaries and switched receptacles, except those in the bathrooms. Suites shall have a control meeting these requirements at the entry to each room or at the primary entry to the suite.
10. Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photo sensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photo sensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hrs.
11. The following luminaires located within the same area shall be tandem wired:
    - Fluorescent luminaires equipped with one, three or odd-numbered lamp configurations, that are recess-mounted within 10 ft center-to- center of each other.
    - Fluorescent luminaires equipped with one, three or any other odd numbered lamp configuration, that are pendant- or surface-mounted within 1 ft edge-to-edge of each other.
12. Internally illuminated exit signs shall not exceed 5 watts per side.
13. Install separate electrical meters required for separate dwelling units.
14. In cases of substitution, lighting within dwelling units shall have a minimum of 50 percent of the permanently installed interior light fixtures fitted with high-efficacy lamps. For lamps with less than 15 watts, minimum efficacy is 40 lumen / watt, for lamps with 15-40 watts, minimum efficacy is 50 lumen / watt, for lamps with more than 40 watts, minimum efficacy is 60 lumen / watt.

LIGHTING POWER DENSITY CALCULATION
PROPOSED FOURTH & PENTHOUSE FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
CORRIDOR	27.42 SF	E1 X 1	13 W	13 / 27.42 = .47
STAIR	90.4 SF	E1 X 1	13 W	13 / 90.4 = .14
STAIR	91.6 SF	E1 X 1	13 W	13 / 91.6 = .14
TOTAL WATTS/ SF = 39 W / 209.42 SF = 0.19 W/SF < .07 W/SF				

LIGHTING POWER DENSITY CALCULATION
PROPOSED FOURTH & PENTHOUSE FLOOR RESIDENTIAL AREA

APT	SPACE	AREA	LIGHTING POWER		WATT/SF
A	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	PENTHOUSE	146 SF	L1 X 1	26 W	26 / 146 = .18
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 208 W / 717.9 SF = 0.29 W/SF < .07 W/SF					
B	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	PENTHOUSE	150 SF	L1 X 1	26 W	26 / 150 = 17
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 208 W / 721.9 SF = 0.29 W/SF < .07 W/SF					

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Structural Engineer

Mechanical Engineer
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SPRINKLE DESIGN
5 MEZBISH PLACE UNIT 2001
MONROE, NY 10950
845.234.4599

REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

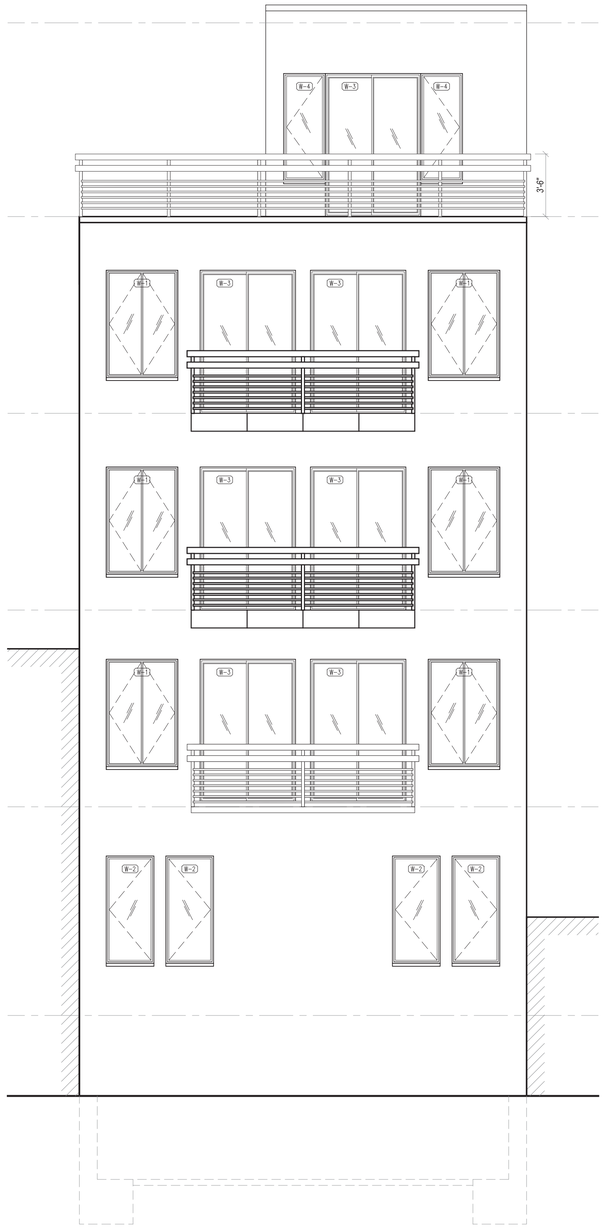
REGISTERED ARCHITECT DE-JAN LU STATE OF NEW YORK 034322

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

REFLECTED CEILING PLANS

DOB JOB #	
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-103.00
11 OF 21
DOB BSCAN STICKER



1 PROPOSED REAR ELEVATION
SCALE: 1/4"=1'-0"

2 PROPOSED FRONT ELEVATION
SCALE: 1/4"=1'-0"

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PROPOSED ELEVATIONS

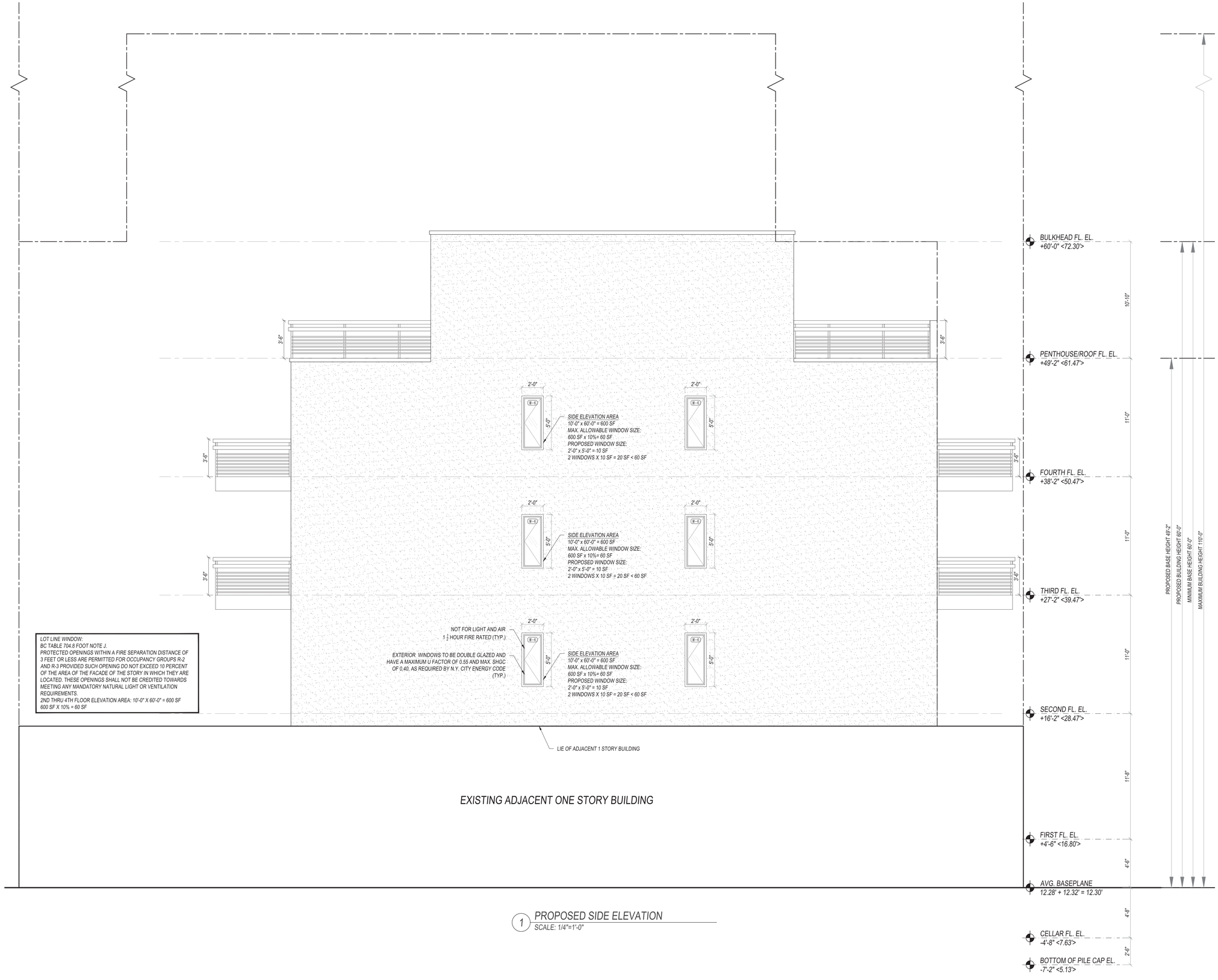
DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-200.00

12 OF 21

DOB BSCAN STICKER

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL



1 PROPOSED SIDE ELEVATION
SCALE: 1/4"=1'-0"

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MECHANICAL
STRUCTURAL
ARCHITECTURAL

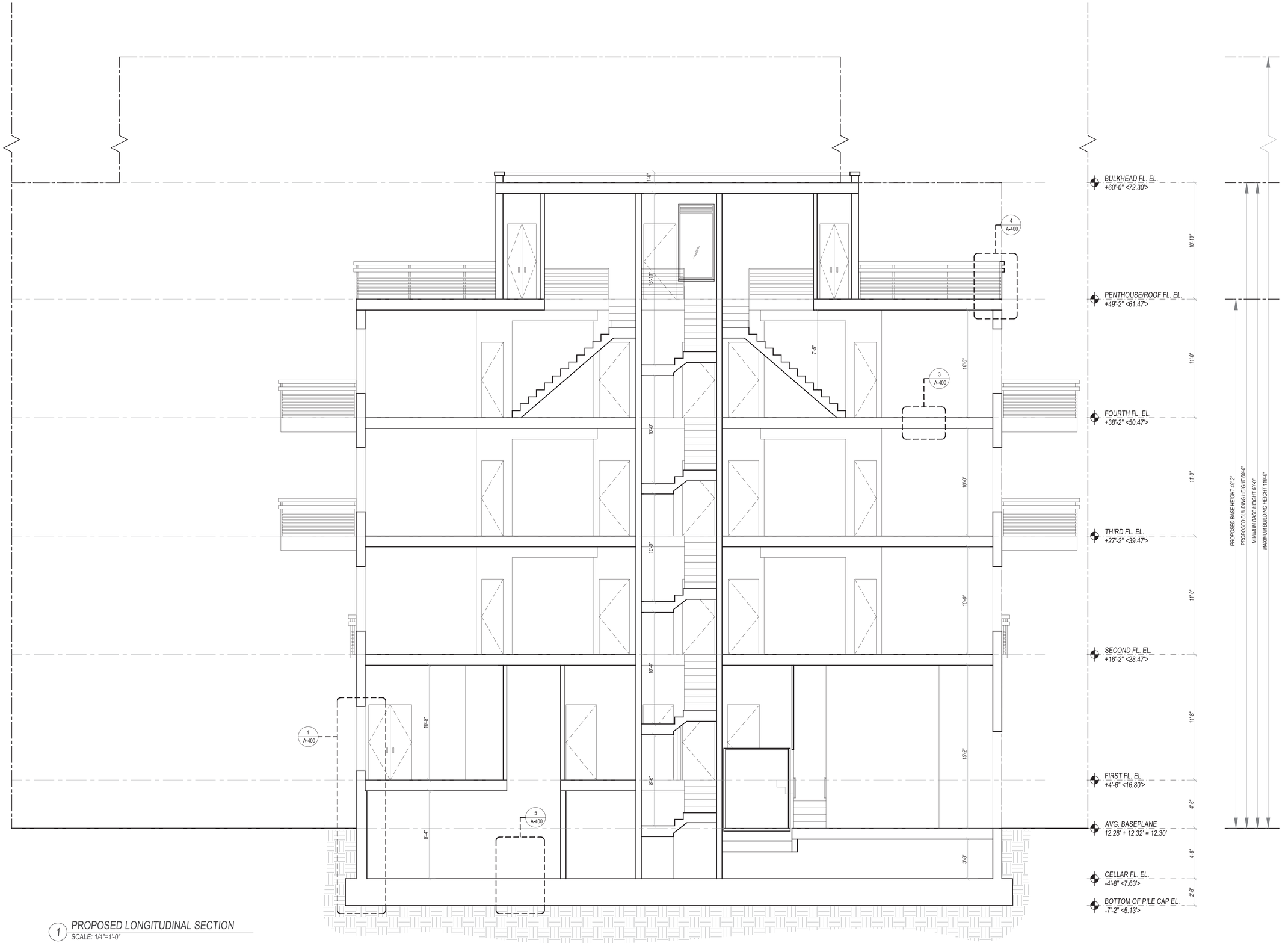
PROPOSED ELEVATIONS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-201.00

13 OF 21

DOB BSCAN STICKER



1 PROPOSED LONGITUDINAL SECTION
SCALE: 1/4"=1'-0"

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General Contractor

REGISTERED ARCHITECT
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034322
STATE OF NEW YORK

PROPOSED SECTIONS

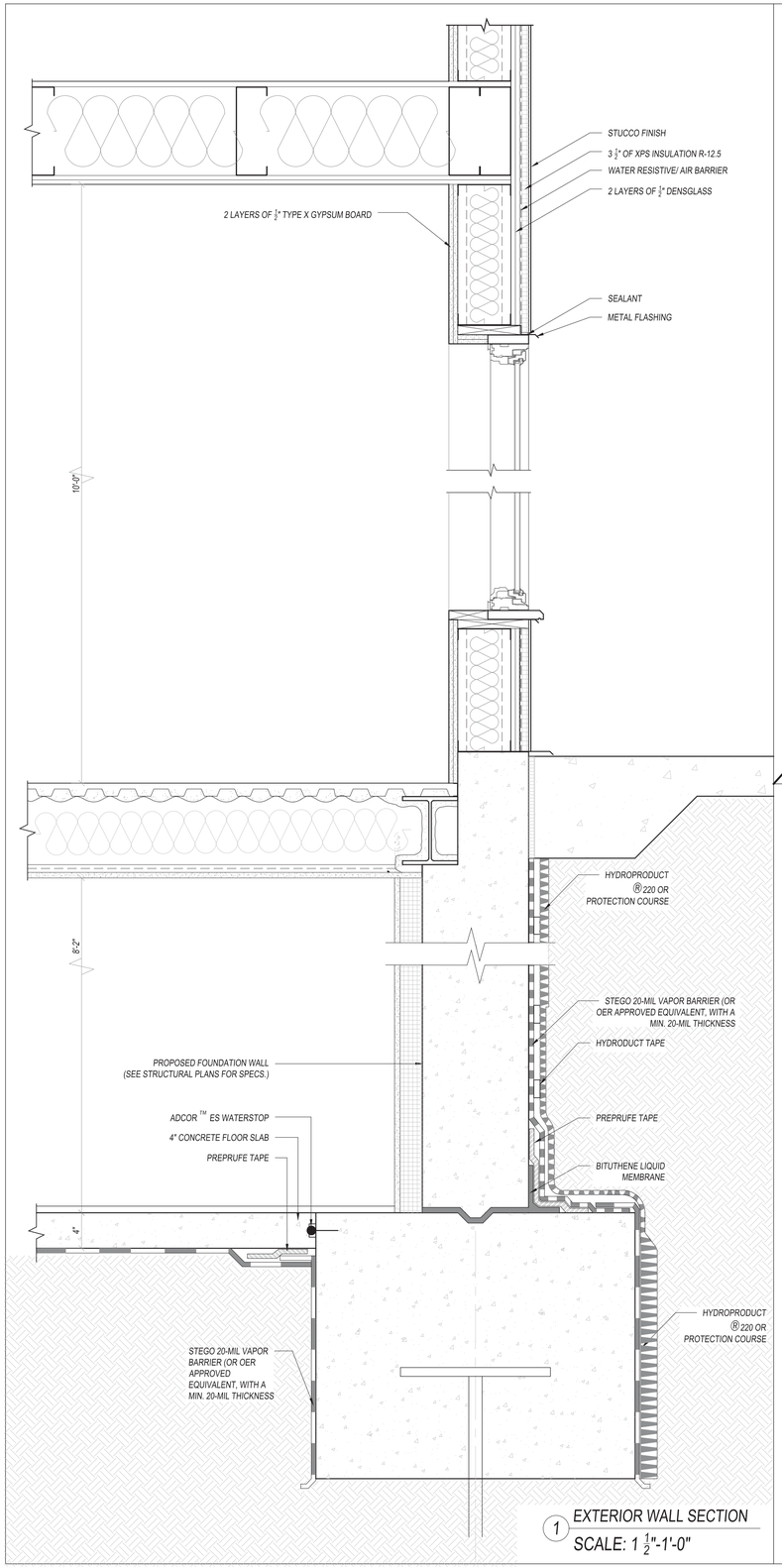
DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-300.00

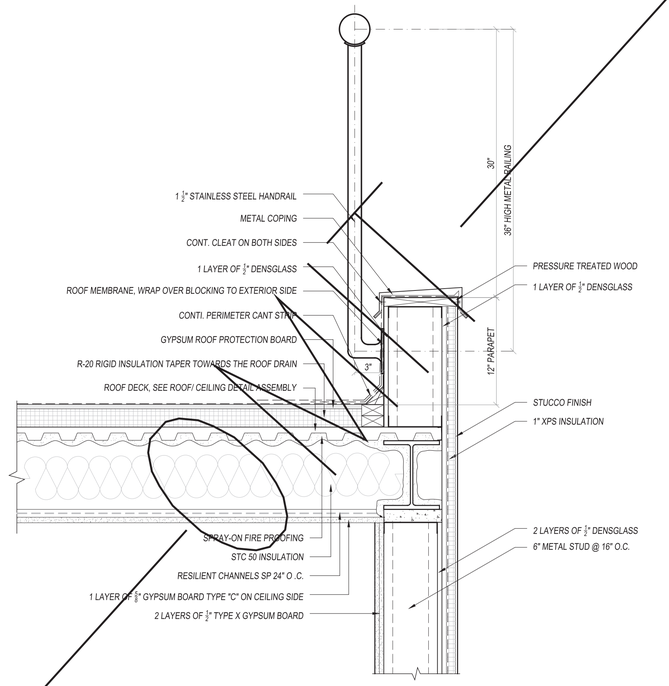
14 OF 21

DOB BSCAN STICKER

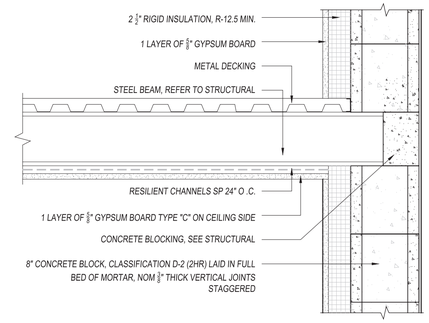
PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL



1 EXTERIOR WALL SECTION
SCALE: 1 ½"-1'-0"



2 ROOF/ BULKHEAD PARAPET DETAIL
SCALE: 1 ½"-1'-0"



3 FLOOR ASSEMBLY DETAIL
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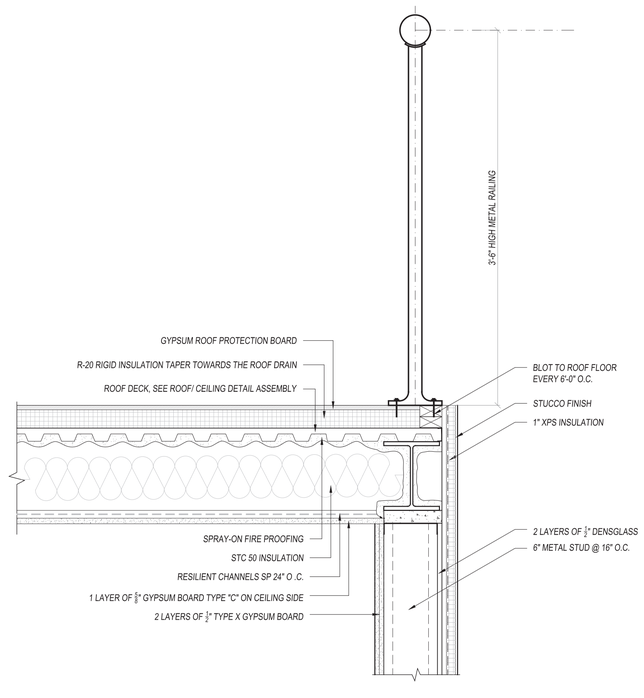

4 ROOF/ BULKHEAD PARAPET DETAIL
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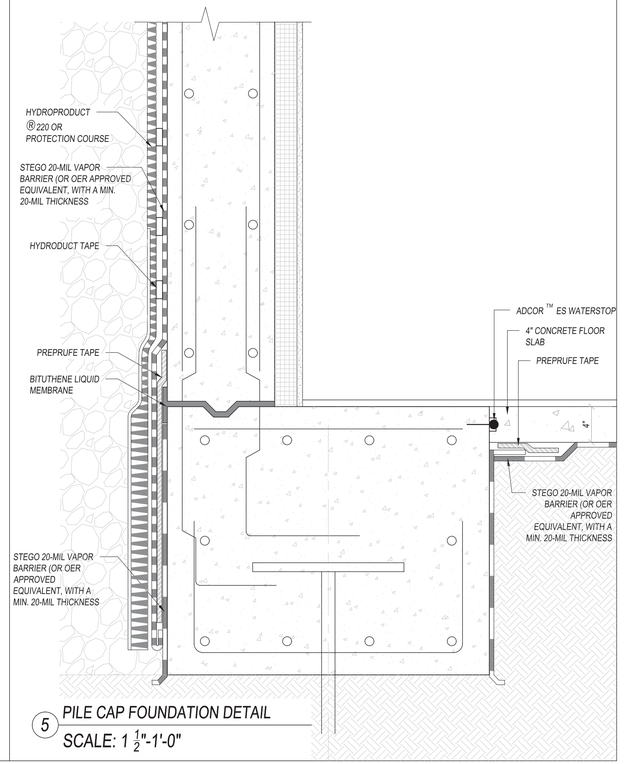

5 PILE CAP FOUNDATION DETAIL
SCALE: 1 ½"-1'-0"

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Owner
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REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

WALL DETAILS

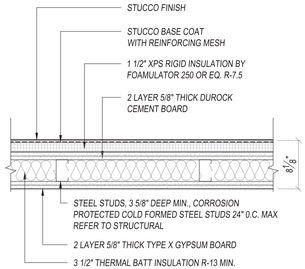
DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-400.00

15 OF 21

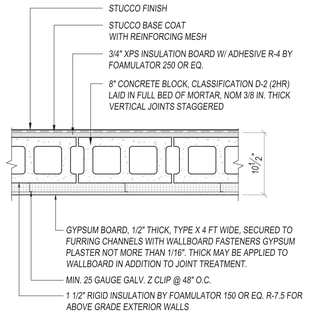
DOB BSCAN STICKER

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL



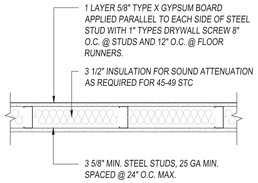
UL DESIGN NO. U404 GA FILE WP 1417

W1 — EXTERIOR STUD WALL WITH EIFS
2 HR FIRE RATED
R-13 + R-7.5 CI FOR COMMERCIAL & GROUP R



UL DESIGN NO. U912

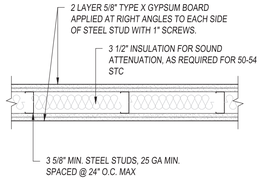
W2 — FURRED CMU WALL W/ EIFS
3 HR FIRE RATED
R-11.5 CI FOR COMMERCIAL & GROUP R



UL DESIGN NO. U465
GA FILE NO. WP 1081, 45-49 STC

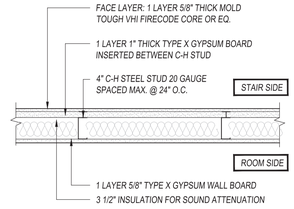
P1 — INTERIOR WALL ASSEMBLIES
1 HR FIRE RATED

P1A — 4" NON-RATED INTERIOR PARTITION FOR WET AREAS
USE 5/8 " WATER RESISTANT GYPSUM PANEL ON WET AREA SIDE



UL DESIGN NO. U419
GA FILE NO. WP 1561, 50-54 STC

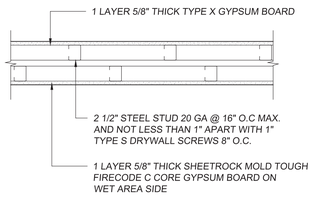
P2 — INTERIOR WALL ASSEMBLIES - NON BEARING
2 HR FIRE RATED



NOTE: USE "J" SHAPED, 4" WIDE, 20 GA GALV.
STEEL RUNNERS @ FLOOR AND CEILING

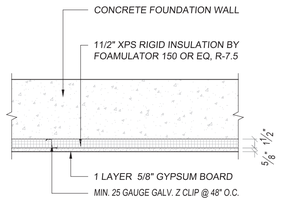
UL DESIGN NO. U467
GA WP 7068, 45-49 STC

P2A — STAIR SHAFT ENCLOSURE (MASONRY EQUIV.)
2 HR FIRE RATED

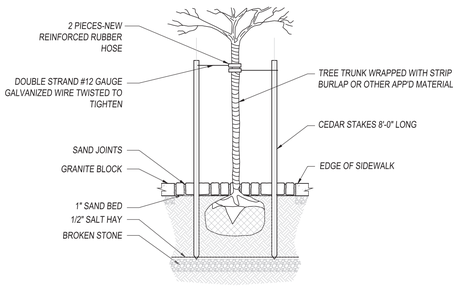


UL DESIGN NO. U493 GA FILE WP 5006

P3 — 1 HR CHASE WALL
1 HR FIRE RATED



F1 — CONCRETE FOUNDATION WALL
R-7.5 CI FOR GROUP R APPLICATION



TREE SECTION DETAIL
N.T.S.

TREE PLANTING NOTES

1. ALL MATERIALS AND CONSTRUCTION METHODS USED ARE TO CONFORM TO SECTION # 4.16 OF THE BUREAU OF HIGHWAY OPERATIONS SPECIFICATIONS, LATEST EDITION.

2. PRIOR TO THE START OF WORK, THE CONTRACTOR SHALL OBTAIN THE NECESSARY PERMIT FROM THE DEPT. OF PARKS AND RECREATION FOR THE REMOVAL AND PLANTING OF TREES.

3. TREE PITS SHOULD BE LOCATED TWO (2) FEET MINIMUM FROM OIL OR WATER BOXES.

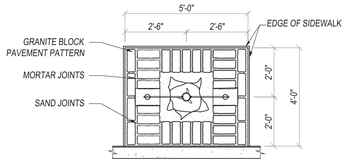
4. TREE STAKES ARE TO BE REMOVED BY THE TREE SUBCONTRACTOR NOT LESS THAN ONE YEAR AFTER PLANTING OF SAID TREES AND PRIOR TO THE FINAL ACCEPTANCE OF THE WORK.

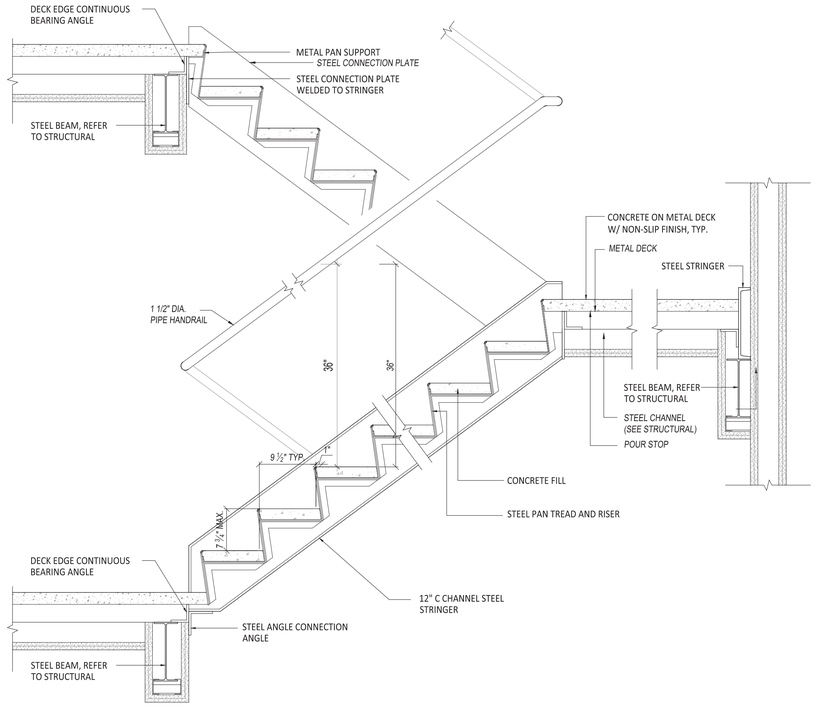
5. USE OF SIDEWALK PAVEMENT MATERIALS OTHER THAN GRANITE BLOCK MUST BE SPECIFICALLY APPROVED, IN WRITING, BY THE BUREAU OF HIGHWAY OPERATIONS.

6. GRANITE BLOCK IN TREE PIT SHALL BE PAID FOR UNDER ITEM NO. 6.06.

7. WRITTEN NOTIFICATION WILL BE MADE TO THE DEPARTMENT OF PARKS AND RECREATION PRIOR TO COMMENCEMENT OF SUCH WORK.

8. NO DELETERIOUS, CAUSTIC OR ACID MATERIALS SHALL BE DUMPED OR MIXED WITHIN 10 FEET OF SUCH TREE.





STAIR DETAIL
N.T.S.

STAIR NOTES

1. PRIOR TO THE ERECTION OF STAIR, STAIR FABRICATOR SHALL CHECK AND VERIFY STORY HEIGHT, DISTANCE FROM LANDING TO FINISH FLOOR AND MINIMUM REQUIRED HEAD CLEARANCES.

2. STAIRWAYS SHALL HAVE A MINIMUM HEADROOM CLEARANCE OF 80 INCHES.

3. THE SUM OF TWO RISERS PLUS ONE TREAD EXCLUSIVE OF NOSING SHALL BE NOT LESS THAN 24 INCHES NOR MORE THAN 25-1/2 INCHES.
MAX. RISER = 7-3/4"
MIN. TREAD DEPTH = 9-1/2" + NOSING
NOSING NOT LESS THAN 3/4 INCH (19 MM) NOT MORE THAN 11/4 INCHES.

4. STAIRWAYS SHALL HAVE HANDRAILS ON EACH SIDE. HANDRAIL HEIGHT, MEASURED ABOVE STAIR TREAD NOSINGS, OR FINISH SURFACE OF RAMP SLOPE, SHALL BE UNIFORM, NOT LESS THAN 34 INCHES AND NOT MORE THAN 38 INCHES.

5. STAIR CONSTRUCTION SHALL HAVE A STRENGTH TO SUSTAIN A MINIMUM LIVE LOAD OF 100 LBS. PER SF.

SUB-ARTICLE 4
REQUIRED STAIRWAYS C26-292.0

(6.4.1.7.1) G. CONSTRUCTION OF REQUIRED STAIRWAYS.
1. MATERIALS FOR REQUIRED STAIRWAYS. STAIRS AND STAIRWAYS SERVING AN EXIST SHALL BE CONSTRUCTED OF INCOMBUSTIBLE MATERIAL OR ASSEMBLIES THROUGHOUT. EXCEPT IN FRAME AND NON-FIREPROOF STRUCTURES FORTY FEET OR LESS IN HEIGHT AND OCCUPIED BY FIFTY OR LESS PERSONS ABOVE THE FIRST STORY. THE TREADS AND LANDINGS SHALL BE CONSTRUCTED AND MAINTAINED IN SUCH MANNER AS TO PREVENT PERSONS FROM SLIPPING THEREON.

6.4.1.7.2) 2. STRENGTH OF REQUIRED STAIRWAYS. STAIRS, PLATFORMS, LANDINGS AND STAIR HALLS SHALL BE OF SUFFICIENT STRENGTH TO SUSTAIN A SAFELY LIVE LOAD OF AT LEAST ONE HUNDRED POUNDS PER SQUARE FOOT.

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Mechanical Engineer
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5 MEZBISH PLACE UNIT 2001
MONROE, NY 10950
845.234.4599

REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT
DE-JAN LU
STATE OF NEW YORK
034322

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

WALL DETAILS CONTINUE

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-500.00

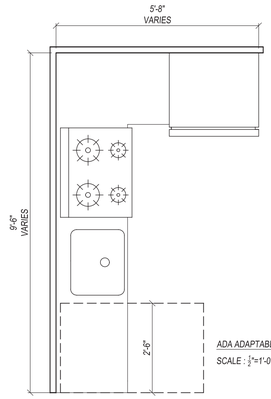
16 OF 21

DOB BSCAN STICKER

ADAPTABLE KITCHENETTE (CAPABLE OF POSSIBLE FUTURE CONVERSION TO ACCESSIBLE KITCHEN)

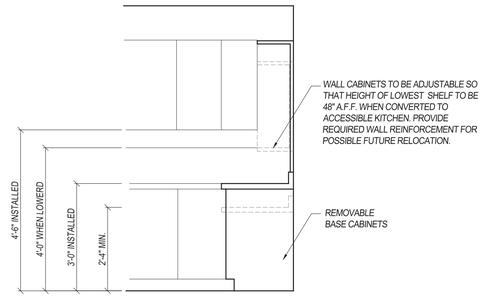
GENERAL NOTES

1. *ONE LOWERABLE WORK SURFACE,30" WIDE IS REQUIRED, WITH REMOVAEIBLE BASE CABINETS. HEIGHT TO BE ADJUSTABLE BETWEEN 28" AND 36" AFF TO COUNTERTOP.*
2. *ONE LOWERABLE SINK SURFACE,30" WIDE IS REQUIRED, WITH REMOVAEIBLE BASE CABINETS. HEIGHT TO BE ADJUSTABLE BETWEEN 28" AND 36" AFF TO COUNTERTOP.*
3. *OVENS ARE ASSUMED TO BE SELF-CLEANING TYPE. IF OTHERWISE , PROVIDE A MINIMUM 30" ADJUSTABLE COUNTER SPACE WITH REMOVABLE BASE CABINETS NEXT TO OVEN.*
4. *A MINIMUM 36" TURNAROUND SPACE UNDER THE COUNTER WITH REMOVABLE BASE CABINETS SHALL BE PROVIDED IN DEEP CLOSED ENDED GALLERY KITCHENS AND OTHER U-SHAPED KITCHENS WHERE THE CLEARANCE BETWEEN CABINETS IS LESS THAN 5'-0" THE MINIMUM CLEARANCE BETWEEN CABINETS SHALL BE 40"*
5. *48" A.F.F. WHEN CONVERTED TO ACCESSIBLE KITCHEN. PROVIDE REQUIRED WALL REINFORCEMENT FOR POSSIBLE FUTURE RELOCATION.*



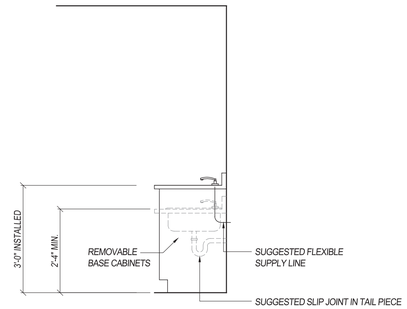
ADA ADAPTABLE KITCHEN CABINETS

SCALE : $\frac{1}{4}$"=1'-0"



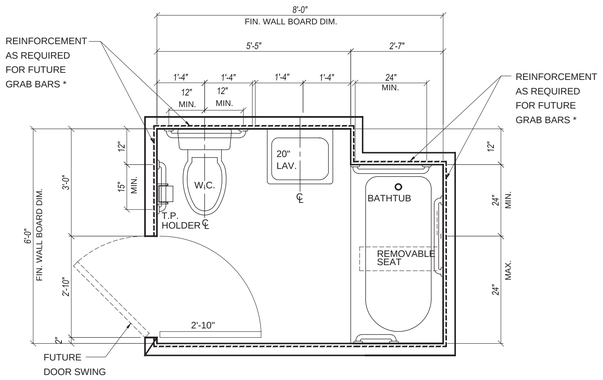
ADAPTABLE KITCHEN LOWERABLE WORK

SCALE : $\frac{1}{4}$"=1'-0"



ADAPTABLE KITCHEN LOWERABLE SINK COUNTER

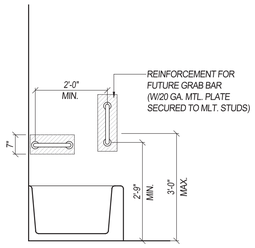
SCALE : $\frac{1}{4}$"=1'-0"



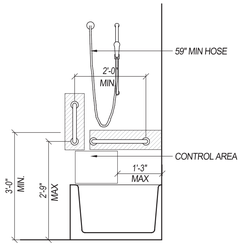
TOILET,BATHTUB,LAVATORY AND TO BE REPLACEABLE WITH ACCESSIBLE TYPE FIXTURES AND FITTINGS WHEN BATHROOM MAY BE CONVERTED TO ACCESSIBLE TYPE. SEE DETAILS OF EACH FIXTURE FOR REQUIRED WALL REINFORCEMENT FOR POSSIBLE FUTURE ATTACHMENT OF GRAB BARS.

ADAPTABLE BATHROOM TYPE A MINIMUM SIZE

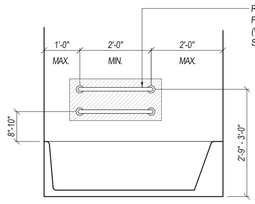
SCALE : $\frac{1}{4}$"=1'-0"



HEAD END WALL



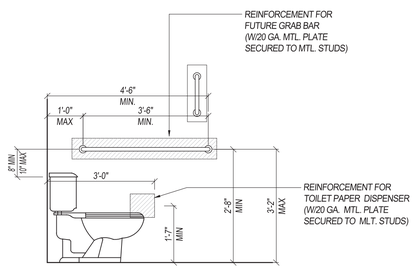
CONTROL END WALL



BACK WALL

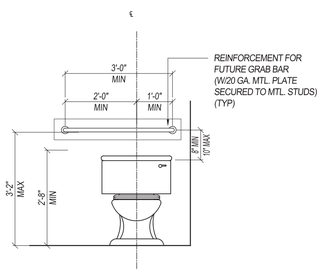
ADAPTABLE BATHTUB

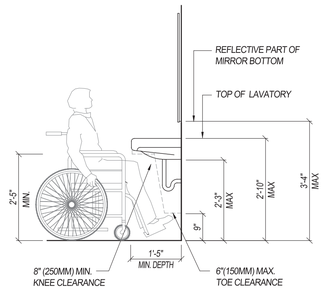
SCALE : $\frac{1}{4}$"=1'-0"



ADAPTABLE TOILET

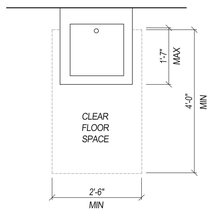
SCALE : $\frac{1}{4}$"=1'-0"





HEIGHT OF LAVATORIES AND SINKS

SCALE : $\frac{1}{4}$"=1'-0"



OPTIONAL ACCESSIBLE LAVATORY

SCALE : $\frac{1}{4}$"=1'-0"

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ADA COMPLIANCE DWG & NOTES

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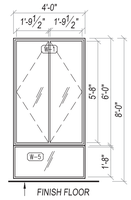
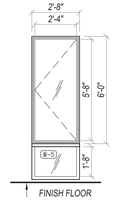
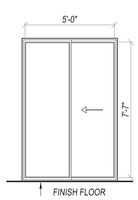
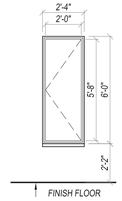
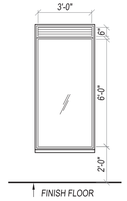
17 OF 21

DOB BSCAN STICKER

WINDOW SCHEDULE (ALL WINDOWS SHALL BE DOUBLE GLAZED)

TAG	W-1	W-2	W-3	W-4	W-5
ELEVATION					
TYPE	CASEMENT WINDOW	CASEMENT WINDOW	SLIDING DOOR	CASEMENT WINDOW	WINDOW / VENT
U-FACTOR	0.28	0.28	0.28	0.28	0.28
SHGC	0.29	0.29	0.29	0.29	0.29
GLAZED AREA	20.77 SF	13.22 SF	37.92 SF	11.33 SF	18 SF
OPENABLE AREA	20.77 SF	13.22 SF	18.96 SF	11.33 SF	216 SI
CONDITION:	PROPOSED	PROPOSED	PROPOSED	PROPOSED	PROPOSED

WINDOW NOTE

1. In case of substitution, general contractor to provide all double-glazed windows and doors to comply with the following requirements:
- Metal framed window assembly: maximum U-factor of 0.55, SHGC of 0.40, maximum air leakage of 0.3 cfm/SF.
- Curtain wall and storefront assembly: maximum U-factor of 0.50, SHGC of 0.40, maximum air leakage of 0.3 cfm/SF.
- Metal framed glazed entrance door: maximum U-factor of 0.85, SHGC of 0.40, maximum air leakage of 1.0 cfm/SF.
- Skylight: maximum U-factor of 0.60, maximum skylight to roof ratio of 3%, maximum air leakage of 0.3 cfm/SF.
- Non-metal framed window assembly: 0.40, SHGC of 0.40, maximum air leakage of 0.3 cfm/SF.
2. General contractor to provide expandable spray-applied polyurethane foam sealant continuously installed at all window rough openings.

ZR123-32 ENVIRONMENTAL CONDITIONS
IN SPECIAL MIXED USE DISTRICTS, ALL NEW DWELLING UNITS SHALL BE PROVIDED WITH A MINIMUM 35DB(A) OF WINDOW WALL ATTENUATION TO MAINTAIN AN INTERIOR NOISE LEVEL OF 45DB(A) OR LESS, WITH WINDOWS CLOSED, AND SHALL PROVIDE AN ALTERNATE MEANS OF VENTILATION.

EQUIPMENT SCHEDULE

TAG	EQUIPMENT	MANUFACTURER	MODEL	DIMENSION	QUANTITY	CAPACITY (BTU/H)	ENERGY EFFICIENCY	MEA / UL NUMBER
1	ELECTRIC HWH	A.O.SMITH	ECL-30	30"h x 22"dia.	9	30 GALLONS	EF=0.93	MEA 25-05-E

EQUIPMENT SCHEDULE

GENERAL					FAN DATA						COOLING DATA					HEATING DATA			FILTER		ELECTRICAL		VIBRATION ISOLATION		DIMENSION (IN)	WEIGHT (LBS)	REMARKS
TAG	EQUIPMENT	MARK	MANUFACTURER	MODEL	CFM	MIN. O.A.	RPM	TOTAL S.P. IN H2O	BHP	DRIVE	TOTAL MBH	SENS. MBH	EAT (DB/WB)(°F)	LAT (DB/WB)(°F)	OUTDOOR TEMP. (°F)	MBH @ 5°F	EAT /LAT (°F)	OUTDOOR TEMP. (°F)	TYPE	EFF. %	PHASE	VOLT	TYPE	DEFL			
2	AIR HANDLING UNIT	AH-1	MITSUBISHI	PEFY-P12NMAU	265/371			0.60		DIRECT DRIVE	12		80/67	55/54	95.0	9	65/85	5	WASH	90%	1	208	NEO PRENE		28 x 28 x 10	51	

EQUIPMENT SCHEDULE

GENERAL						BLOWER DATA						COOLING DATA		HEATING DATA				COMPRESSOR				FILTER	ELECTRICAL				WEIGHT (LBS)	DIMENSION (IN)
TAG	EQUIPMENT	MARK	SERVICE	MANUFACTURER	MODEL	CFM	MIN. O.A.	FLA	ESP (in WG)	BHP	DRIVE	TOTAL MBH	EAT/LAT (°F)	MBH @ 5°F	EAT /LAT (°F)	EWT/ LWT (°F)	GPM	QNTY	TYPE	STEPS	RLA (EACH)		VOLT	PHASE	MCA	MOP		
3	CONDENSING UNIT	ACCU-1	DUPLEX APTS.	MITSUBISHI	PUMU-P36NHMU	3530	100%		0.2-1.0		DIRECT	36	N/A	27	N/A	N/A	N/A	1	ROTARY			NONE	208	1	26	30	287	37 x 14 x 53
3	CONDENSING UNIT	ACCU-2	1ST, 2ND & 3RD FL.	MITSUBISHI	PUZ-A24NHA4	1940	100%		0.2-1.0		DIRECT	24	N/A	18	N/A	N/A	N/A	1	ROTARY			NONE	208	1	18	25	165	37 x 15 x 37

HVAC NOTES

1. Provide one thermostat / humidistat for each zone for hvac system.
2. Electric heat shall be enable only when the heat pump cannot meet load.
3. Zone thermostat operation shall have minimum 5 degree dead band between heating and cooling.
4. All zone thermostat shall be operated via thermostatic setback controls operated via an automatic time clock or a programmable control system.
5. HVAC controls shall have ability to setback temperatures down to 55 degrees F, or up to 85 degrees F.
6. HVAC controls shall be capable of automatically starting and stopping the systems for seven different daily schedules per week, capable of having settings saved in memory for 10 hours during a loss of power, and a manual system "on" override for up to two hours, or an occupancy sensor.
7. When applicable, each outdoor supply air and exhaust air ducts shall be provided with motorized dampers to shut off when not in use. Motorized dampers shall have ability to operate at minimum positions.
8. Operating and Maintenance manual shall be provided by mechanical contractor and specified in the construction documents.
9. If air system is provided, each supply air outlet, and zone terminal device shall be provided with means of balancing. Discharge dampers prohibited on constant volume and VAV fans with motors greater than 10 HP.
10. If hydronic system is provided, all heating and cooling coils to be provided with a means of balancing and pressure test.

HOT WATER TANK NOTES

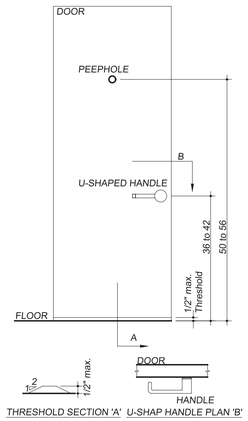
1. Controls shall allow 110 degree F set point for dwellings, and 90 degrees F for other occupancies. Lavatories in public restrooms shall be limited to 110 degrees F
2. Water heating equipment shall be provided with heat traps on the supply and discharge piping if not integrated with equipment
3. Automatic circulating hot water systems-1" insulation. First 8' pipe in non-circulating systems without integral heat traps-0.5" insulation. Conductivity for insulation shall not exceed 0.27 Btu/inch/hxft^2xF
4. Automatic circulating hot water system pumps and heat trace to be turned off manually or automatically when hot water system is not in operation
5. In case of substitution, the installed electric hot water heater shall have a minimum of 0.97 - 0.00132V, EF, or the installed gas hot water heater shall have a minimum of 0.67 - 0.0019V, EF, or the installed gas instantaneous hot water heater shall have a minimum of 0.62-0.0019V, EF.

DOOR SCHEDULE

TAG	LOCATION	DOOR SIZE	DOOR TYPE	SWING	FRAME	FIRE RATING	SADDLE	COMMENTS	GLAZING
1	MAIN ENTRANCE	3'-0" X 8'-0"	GLAZED	DOUBLE	ALUMINUM	1-1/2 HR	ALUM.		35 SF
2	APT ENTRANCE*	3'-0" X 7'-0"	H.M.	SINGLE	H.M.	1-1/2 HR	ALUM.		
3	BEDROOM	2'-10" X 6'-8"	WOOD	SINGLE	WOOD	N/A	NONE		
3a	BATHROOM	2'-10" X 7'-0"	WOOD	SINGLE	WOOD	N/A	MARBLE		
4	BATHROOM	2'-0" X 7'-0"	WOOD	SINGLE	WOOD	N/A	MARBLE		
5	BATHROOM	2'-10" X 7'-0"	WOOD	SLIDING	WOOD	N/A	MARBLE		
6	CLOSET	4'-0" X 6'-8"	WOOD	DOUBLE	WOOD	N/A	NONE		
6a	CLOSET	2'-8" X 6'-8"	WOOD	DOUBLE	WOOD	N/A	NONE		

DOOR NOTE

1. In case of substitution, general contractor to provide all opaque exterior swing doors with insulated metal door at maximum U-factor of 0.70, and maximum air leakage of 0.3 cfm/SF.
2. In case of substitution, general contractor to provide all opaque exterior roll-up or sliding doors with insulated metal door at maximum U-factor of 0.50.
3. Cargo doors and loading dock doors shall be equipped with weather seals to restrict infiltration when vehicles are parked in doorway.



THRESHOLD SECTION 'A' U-SHAP HANDLE PLAN 'B'

Sec. 4.13, ANSI A117.1, 4.13.9 thru 4.13.11

HANDICAP DOOR HARDWARE
NOT TO SCALE

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WINDOW & DOOR SCHEDULES

DOB JOB #	320878074
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SCALE	AS NOTED

A-600.00

18 OF 21

DOB BSCAN STICKER

NYC ENERGY CODE TABULAR ANALYSIS (NYCECC 2011)

ADDRESS	55 Frost St
BLOCK	2737
LOT	10
CLIMATE ZONE	4A
BUILDING TYPE	residential only (group R)
SCOPE OF WORK	Four story and penthouse resicential building

NYECC citation	Provision	Item Description	Proposed Design value	Code Prescriptive Value	Supporting Documentation
Climate Zones, Design Conditions, Materials, Equipment and Systems					
302	**Design Conditions**				
302.1	**Interior Design Conditions**	Minimum and maximum temperatures for interior design load calculations	Load calculations performed at a maximum of 72 degrees F for heating and a minimum of 75 degrees F for cooling.	Load calculations performed at a maximum of 72 degrees F for heating and a minimum of 75 degrees F for cooling.	General note on EN-001
Commercial Building Thermal Envelope					
502.2	**Opaque Assemblies**				
502.2 (1)	**Roof Assembly -Insulation Entirely Above Deck**	new roof membrane and thermal insulation	Roof Type 1: 3 1/2" XPS (R-20.5) continuous insulation above deck	Minimum R-20 continuous insulation	Roof ceiling assembly detail on page A-402
502.2 (1)	**Walls, Above-grade: Mass.**	CMU wall with continuous rigid insulation either on interior side or on exterior side as EIFS	2 1/2" XPS continuous insulation (R-12.5)	Minimum R-11.4 continuous insulation at residential floor	Wall tag on all floor plans Wall Type 2.6 & 2.7 detail on page A-401
502.2 (1)	**Walls, Above-grade: Metal framed**	steel stud walls with EIFS exterior.	R-13 fiberglass batt insulation at cavity, 1 1/2" XPS board (R-7.5ci) at EIFS system	Minimum R13 + R7.5ci	Wall tag on all floor plans Wall Type detail 3.3, 3.5, 3.6, 3.7 on page A-401
502.2 (1)	**Below-Grade Walls**	continuous rigid insulation at cellar / basement concrete wall	1 1/2" XPS continuous insulation (R-7.5)	Minimum R-7.5 continuous insulation at residential floor	Wall tag on all floor plans Wall Type detail 1.6 on page A-400
502.2 (1)	**Slab-on-Grade Floors: Unheated Slabs**	slab on grade	2" XPS continuous insulation (R-10) for 24 in.	R-10 for 24 in. below at residential floor	Foundation detail on page A-403
502.2 (1)	**Opaque Doors, Swinging**	Insulated Metal egress door	U-0.70	U-0.70	Insulated metal door specification on A-600
502.2 (1)	**Opaque Doors, Roll-up or Sliding**	Insulated metal roll-up garage door	U-0.50	U-0.50	Insulated metal door specification on A-600
502.3	**Fenestration**				
502.3	**Window to wall ratio**	Unmodified WWR	less than 40%	40% Maximum	Building Elevations
502.3	**Vertical Fenestration,framing materials other than metal with or without metal reinforcement or cladding, U Value, SHGC, PF <0.25**	New vinyl framed windows at residential floors	U-0.31 SHGC-0.30	U-0.40 SHGC- 0.40	Window schedule and note on A-600
502.3	**Vertical Fenestration, Metal Framing with or without thermal break U Value, SHGC, PF >0.25**	New vinyl framed windows at residential floors, located below overhang	U-0.31 SHGC-0.30	U-0.40 SHGC- NR	Window schedule and note on A-600
502.3	**Glazed Doors, Metal Framing with or without thermal break U Value & SHGC, PF <0.25**	New aluminum framed glazed door at building entry	U-0.69 SHGC-0.26	U-0.85 SHGC- 0.40	Door schedule and note on A-600
502.4	**Air leakage (Mandatory)**				
502.4.1	**Window and door assemblies**	New windows	Air leakage less than 0.3 cfm/sf	Maximum Air Leakage = 0.3 cfm/SF	Window schedule and note on A-600
502.4.3	**Continuous Air Barrier**	Expandable spray-applied polyurethane foam sealant, continuous @ window rough openings	Expandable spray-applied polyurethane foam sealant, continuous @ window rough openings	A continuous air barrier shall be installed: sealing all seams, openings and penetrations of the building and shall be sealed with caulking materials or closed with gasketing systems compatable with the construction materials and location.	Window schedule and note on A-600
502.4.4	**Outdoor intakes and exhaust openings**	New vents and air intakes.	All new vents and air intakes to be provided with Class I motorized, leakage-rated damper with a max leakage rate of 4 cfm/sf at 1.0 in. wg.	Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the bldg envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a max leakage rate of 4 cfm/sf at 1.0 in. wg.	General note on EN-001
502.4.6	**Vestibules**	Vestibule provided @ building entrance. Two sets of swinging doors with selfclosers.	Vestibule not required, entrance doors open directly from a space less than 3000 s.f.	Vestibule provided at door separating conditioned space from the exterior, if doors are open directly from a space no less than 3000 sf	First floor plan
502.5	**Vapor retarders (Mandatory)**				
502.5.3	**Minimum clear air spaces and vented openings for vented cladding.**	Stucco with a 3/8" inch clear airspace with 3/8" inch continuous slot vent openings at the top and bottom of each wall.	Stucco with a 3/8" inch clear airspace with 3/8" inch continuous slot vent openings at the top and bottom of each wall.	Stucco with a 3/8" inch clear airspace with 3/8" inch continuous slot vent openings at the top and bottom of each wall.	Exterior Wall detail on A-401 General note on EN-001
Commercial Building Mechanical Systems					
503	**Building Mechanical Systems**				
503.2	**Mandatory Provisions**				
503.2.1	**Calculation of heating and cooling loads**	Minimum and maximum temperatures for interior design load calculations	Design loads shall be determined in accordance with the procedures described in the ASHRAE/ACCA 183.	ASHRAE/ACCA 183 ASHRAE HVAC Systems and Equipment Handbook, chapter 3 Energy Code	General note on EN-001 Mechanical Plan
503.2.2	**Equipment and system sizing**	Heating and cooling equipment shall not exceed calculated loads	Specified equipment sized within load calculation limits	Heating and cooling equipment shall not exceed calculated loads	General note on EN-001 Mechanical Plan
503.2.3	**HVAC Equipment Performance Requirements**				
503.2.3(2)	**Unitary and applied heat pumps, electrically operated, minimum efficiency requirements**	split system air cooled heat pump	cooling 36,000Btu/h, heating 40,000 Btu/h 13.0 EER, 7.7 HSPF	For unit with cooling capactiy < 65,000 Btu/hr, min. 13.0 SEER at cooling mode and min. 7.7 HSPF at heating mode	Split or Single Package System, air cooled heat pump units schedule on A-600
503.2.4	**HVAC System Controls**				
503.2.4.1	**Thermostatic Controls**	Thermostats/humidistats for mechanical zones	One thermostat is provided for each zone	Minimum one thermostat/humidistat required per zone	Equipment schedule note on A-600
503.2.4.1.1	**Heat Pump Supplementary Electric Resistance Heat**	Heat Pump Supplementary Electric Resistance Heat	Electric heat shall be enable only when the heat pump cannot meet load	Except during defrost, supplementary electric heat to be prevented from coming on when heat pump can meet load	Equipment schedule note on A-600
503.2.4.2	**Set Point Overlap Restriction**	thermostats	Each thermostat will be programmed as required	Zone thermostat operation shall have minimum 5 degree dead band between heating and cooling	Equipment schedule note on A-600
503.2.4.3	**Off-hour Controls, setbacks**	All zones	Each thermostat will be programmable to meet requirements	All zone thermostat shall be operated via thermostatic setback controls operated via an automatic time clock or a programmable control system	Equipment schedule note on A-600
503.2.4.3.1	**Thermostatic Setback capabilities**	All zones	Each thermostat will be programmable to meet requirements	Controls shall have ability to setback temperatures down to 55 degrees F, or up to 85 degrees F.	Equipment schedule note on A-600
503.2.4.3.2	**Automatic Setback and shutdown Capabilities**	All zones	Each thermostat will be programmable to meet requirements	Controls shall be capable of automatically starting and stopping the systems for seven different daily schedules per week, capable of having settings saved in memory for 10 hours during a loss of power, and a manual system "on" override for up to two hours, or an occupancy sensor	Equipment schedule note on A-600
503.2.4.4	**Shutoff damper controls**	Outside air intakes and exhaust	Each outdoor supply air and exhaust air ducts are provided with motorized dampers to shut off when not in use	Each outdoor supply air and exhaust air ducts shall be provided with motorized dampers to shut off when not in use	Equipment schedule note on A-600
503.2.5	**Ventilation**				
503.2.5	**Minimum Mechanical Ventilation**	Outside air control	Motorized dampers shall have ability to operate at minimum positions	Where mechanical ventilation is provided system shall be capable of reducing outside air to the minimum requirements	Equipment schedule note on A-600
503.2.8	**Piping Insulation**				
Table 503.2.8	**Hot Water Piping Insulation**	Hot Water Piping Insulation	2" insulation provided for piping greater than 1.5" in diameter	1.5" for pipe less than 1.5" diameter. 2" for piping greater than 1.5" in diameter. Where k for insulation is 0.27 or less.	Pipe insulation detail on A-404 General note on EN-001
503.2.9	**HVAC System Completion**				
503.2.9.3	**Manuals**	Operating and Maintenance Manual Requirements	Contractor shall provide manual as specified in mechanical specifications	Operating and Maintenance manual shall be provided by mechanical contractor and specified in the construction documents	Equipment schedule note on A-600 General note on EN-001
Commercial Building Service Water Heating					
504.2	**Service Water Heating (Mandatory)**				
504.2	**Equipment Performance Efficiency**	Electric water heater, resistance type	50 Gallon, 4.5 kw, EF=0.91 40 Gallon Lowboy, 4.5 kw, EF=0.92	if <= 12 kw, 0.97-0.00132V, EF min. if > 12kw, 1.73V + 155 SL, Btu/h min.	Equipment schedule note on A-600
504.3	**Temperature Controls**	Temperature Controls	Provided as required	Controls shall allow 110 degree F set point for dwellings, and 90 degrees F for other occupancies. Lavatories in public restrooms shall be limited to 110 degrees F	Equipment schedule note on A-600
504.4	**Heat Traps**	Heat Traps	how water heater supplied with integral heat traps	Water heating equipment shall be provided with heat traps on the supply and discharge piping if not integrated with equipment	Equipment schedule note on A-600
504.5	**Pipe Insulation**	Pipe Insulation	1" insulation to be used on all hot water service piping	Autcmatic circulating hot water systems-1" insulation. First 8' pipe in non-circulating systems without integral heat traps-0.5" insulation Conductivity for insulation shall not exceed 0.27 Btu/inch/hxft^2xF	pipe insulation detail on A-404 Equipment schedule note on A-600
504.6	**Hot water system controls**	Circulating Pumps & Heat Trace	Controls shall shut of heat trace and pumps when heating system is not in operation	Automatic circulating hot water system pumps and heat trace to be turned off manually or automatically when hot water system is not in operation	Equipment schedule note on A-600
Commercial Building Electrical and Power Lighting Systems					
502.2	**Lighting Controls (Mandatory)**				
505.2.1 - as well as 505.2.2, 505.2.3 and 505.2.4.	**Interior lighting controls**	Interior lighting controls include manual, automatic, and occupant sensor controls.	Interior lighting controls have been provided.	Lighting systems shall be provided with controls as required in Sections 505.2.1, 505.2.2, 505.2.3 and 505.2.4.	Lighting notes on reflected ceiling and lighting plan
505.2.4	**Exterior lighting controls.**	Daylight sensor controls provided for exterior lighting. Manual overrides to be provided.	photosensors provided and programmed as per requirements	Lighting not designated for dusk-todawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusktodawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hrs.	Lighting notes on reflected ceiling and lighting plan
505.4	**Exit Signs (Mandatory)**	LED exit signs to be provided.	5W per side	Internally illuminated exit signs shall not exceed 5 watts per side.	Lighting notes on reflected ceiling and lighting plan
505.5	**Interior lighting power requirements (Prescriptive)**				
505.5.1	**Total connected interior lighting power**	Total connected load of proposed interior lighting. Describe building area type, area and associated watts per square foot (w/sq.ft).	Provided as required	The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections 505.5.1.1 through 505.5.1.4.	Reflected ceiling and lighting plan Lighting schedules
505.5.4	**Interior lighting power**	Interior lighting power for multi-family dwelling	Provided as required	The total interior lighting power (watts) is the sum of all interior lighting powers for all areas in the building covered in this permit. 0.7 watt / sf max for multi-family dwelling	Reflected ceiling and lighting plan Lighting schedules
505.5.3	**Lighting within dwelling units**	Lighting within dwelling units	100% of permanently installed fixtures provided are high efficacly lamp	Lighting within dwelling units may have a minimum of 50 percent of the permanently installed interior light fixtures fitted with high-efficacy lamps as an alternative to Section 505.5.2.	Lighting notes on reflected ceiling and lighting plan
505.6, 505.6.2(1) and 505.6.2(2)	**Exterior lighting (Mandatory).**	Total connected load of proposed exterior lighting for lighting zone 2	Provided as required	total allowance calculated per Table 505.6.2(2)	Reflected ceiling and lighting plan Lighting schedules
505.7	**Electrical energy consumption (Mandatory).**	Separate electrical meters have been provided for each unit.	Separate electrical meters have been provided for each unit.	separate electrical meters required for separate dwelling units	Lighting notes on reflected ceiling and lighting plan

PROFESSIONAL STATEMENT: TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE NEW YORK CITY 2011 ENERGY CONSERVATION CODE.

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REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
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Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU STATE OF NEW YORK 034322

ENERGY ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

EN-001.00

19 OF 21

DOB BSCAN STICKER

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

PROGRESS INSPECTIONS FOR ENERGY CODE COMPLIANCE – COMMERCIAL BUILDINGS GROUP R

	INSPECTION / TEST	Periodic (minimum)	Reference Standard (See ECC Chapter 6) or Other Criteria	ECC or Other Citation	THIS INSPECTION REQUIRED YES	NO
IIA	**Envelope Inspections**					
IIA1	Protection of exposed foundation insulation: Insulation shall be visually inspected to verify proper protection where applied to the exterior of basement or cellar walls, crawl space walls and/or the perimeter of slab-on-grade floors.	As required during foundation work and prior to backfill	Approved construction documents	303.2.1; ASHRAE 90.1 – 5.8.1.7	X	
IIA2	Insulation placement and R-values: Installed insulation for each component of the conditioned space envelope and at junctions between components shall be visually inspected to ensure that the R-values are marked, that such R-values conform to the R-values identified in the construction documents and that the insulation is properly installed. Certifications for unmarked insulation shall be similarly visually inspected.	As required to verify continuous enclosure while walls, ceilings and floors are open	Approved construction documents	303.1, 303.1.1, 303.1.2, 502.1, 502.2; ASHRAE 90.1 –5.5, 5.6 or 11; 5.8.1	X	
IIA3	Fenestration thermal values and product ratings: U-factors and SHGC values of installed fenestration shall be visually inspected for conformance with the U-factors and SHGC values identified in the construction drawings by verifying the manufacturer's NFRC labels or, where not labeled, using the ratings in ECC Tables 303.1.3(1), (2) and (3). Where ASHRAE 90.1 is used, visible light transmittance values shall also be verified.	As required during installation	Approved construction documents; NFRC 100, NFRC 200	303.1, 303.1.3, 502.3; ASHRAE 90.1 –5.5; 5.6 or 11; 5.8.2	X	
IIA4	Fenestration and door assembly product ratings for air leakage: Windows and sliding or swinging door assemblies, except site-built windows and/or doors, shall be visually inspected to verify that installed assemblies are listed and labeled by the manufacturer to the referenced standard. For curtain wall, storefront glazing, commercial entrance doors and revolving doors, the testing reports shall be reviewed to verify that the installed assembly complies with the standard cited in the approved plans.	As required during installation; prior to final construction inspection	NFRC 400, AAMA/WDMA/CSA 101/I.S.2/A440 ASTM E283; ANSI/DASMA 105	502.4; ASHRAE 90.1 –5.4.3.2	X	
IIA5	Fenestration areas: Dimensions of windows, doors and skylights shall be verified by visual inspection.	Prior to final construction inspection	Approved construction documents	502.3; ASHRAE 90.1 – 5.5.4, 5.6 or 11	X	
IIA6	Sealing: Openings and penetrations in the building envelope, including site-built fenestration and doors, shall be visually inspected to verify that a continuous air barrier around the envelope forms an air-tight enclosure. The progress inspector shall visually inspect to verify that materials and/or assemblies have been tested and meet the requirements of the respective standards, or that the building is tested and meets the requirements of the standard, in accordance with the standard(s) cited in the approved plans.	As required during construction	Approved construction documents; ASTM E2178, ASTM E2357, ASTM E1677, ASTM E779, ASTM E283.	502.4.3, 502.4.7; ASHRAE 90.1 – 5.4.3.1	X	
IIA7	Projection factors: Where the energy analysis utilized a projection factor > 0, the projection dimensions of overhangs, eaves or permanently attached shading devices shall be verified for conformance with aporoved plans by visual inspection.	Prior to final construction inspection	Approved construction documents, including energy analysis	502.3; ASHRAE 90.1 – 5.5.4, 5.6 or 11	X	
IIA8	Loading dock weatherseals: Weatherseals at loading docks shall be visually verified.	Prior to final construction inspection	Approved construction documents	502.4.5; ASHRAE 90.1 – 5.4.3.3		X
IIA9	Building entrance vestibules: Required entrance vestibules shall be visually inspected for proper operation.	Prior to final construction inspection	Approved construction documents	502.4.6; ASHRAE 90.1 – 5.4.3.4		X
IIB	**Mechanical and Service Water Heating Inspections**					
IIB1	Fireplaces: Provision of combustion air and tight-fitting fireplace doors shall be verified by visual inspection.	Prior to final construction inspection	Approved construction documents; ANSI Z21.60 (see also MC 904), ANSI Z21.50	303.1.5; BC 2111; MC Chapters 7, 9; FGC Chapter 6		X
IIB2	Outdoor air intakes and exhaust openings: Dampers for stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be visually inspected to verify that such dampers, except where permitted to be gravity dampers, comply with approved construction drawings. Manufacturer's literature shall be reviewed to verify that the product has been tested and found to meet the standard.	As required during installation	Approved construction documents; AMCA 500D	502.4.4; ASHRAE 90.1 – 6.4.3.4	X	
IIB3	HVAC, service water heating and pool equipment sizing and performance: Equipment sizing, efficiencies and other performance factors of all major equipment units, as determined by the applicant of record, and no less than 15% of minor equipment units, shall be verified by visual inspection and, where necessary, review of manufacturer's data. Pool heaters and covers shall be verified by visual inspection.	Prior to final plumbing and construction inspection	Approved construction documents	503.2, 504.2, 504.7; ASHRAE 90.1 – 6.3, 6.4.1, 6.4.2, 6.8; 7.4, 7.8	X	
IIB4	HVAC system controls and economizers and service hot water system controls: No less than 20% of each type of required controls and economizers shall be verified by visual inspection and tested for functionality and proper operation. Such controls shall include, but are not limited to: - Thermostatic - Set point overlap restriction - Off-hour - Shutoff damper - Snow-melt system - Demand control systems - Outdoor heating systems - Zones - Economizers - Air systems - Variable air volume fan - Hydronic systems - Heat rejection equipment fan speed - Complex mechanical systems serving multiple zones - Ventilation - Energy recovery systems - Hot gas bypass limitation - Temperature - Service water heating - Hot water system - Pool heater and time switches - Exhaust hoods - Radiant heating systems.	After installation and prior to final electrical and construction inspection, except that for controls with seasonally dependent functionality, such testing shall be performed before sign-off for issuance of a Final Certificate of Occupancy	Approved construction documents, including control system narratives; ASHRAE Guideline 1: The HVAC Commissioning Process where applicable	503.2.4, 503.2.5.1, 503.2.11, 503.3, 503.4, 504.3. 504.6, 504.7; ASHRAE 90.1 – 6.3, 6.4, 6.5, 6.7.2.4, 7.4.4, 7.4.5	X	
IIB4	Controls with seasonally dependent functionality: Controls whose complete operation cannot be demonstrated due to prevailing weather conditions typical of the season during which progress inspections will be performed shall be permitted to be signed off for the purpose of a Temporary Certificate of Occupancy with only a visual inspection, provided, however, that the progress inspector shall perform a supplemental inspection where the controls are visually inspected and tested for functionality and proper operation during the next immediate season thereafter. The owner shall provide full access to the progress inspector within two weeks of the progress inspector's request for such access to perform the progress inspection. For such supplemental inspections, the Department shall be notified by the approved progress inspection agency of any unresolved deficiencies in the installed work within 180 days of such supplemental inspection.	After installation and prior to final electrical and construction inspection, except that for controls with seasonally dependent functionality, such testing shall be performed before sign-off for issuance of a Final Certificate of Occupancy	Approved construction documents, including control system narratives; ASHRAE Guideline 1: The HVAC Commissioning Process where applicable	503.2.4, 503.2.5.1, 503.2.11, 503.3, 503.4, 504.3. 504.6, 504.7; ASHRAE 90.1 – 6.3, 6.4, 6.5, 6.7.2.4, 7.4.4, 7.4.5	X	

IIB5	Duct, plenum and piping insulation and sealing: Installed duct and piping insulation shall be visually inspected to verify proper insulation placement and values. Joints, longitudinal and transverse seams and connections in ductwork shall be visually inspected for proper sealing.	After installation and prior to closing shafts, ceilings and walls	Approved construction documents; SMACNA Duct Construction Standards, Metal and Flexible	503.2.7, 503.2.8, 504.5; ASHRAE 90.1 – 6.3, 6.4.4.2, 6.8.2, 6.8.3; 7.4.3	X	
IIB6	Air leakage testing for high-pressure duct systems: For duct systems designed to operate at static pressures in excess of 3 inches w.g. (746 Pa), representative sections, as determined by the progress inspector, totaling at least 25% of the duct area, per ECC 503.2.7.1.3, shall be tested to verify that actual air leakage is below allowable amounts.	After installation and sealing and prior to closing shafts, ceilings and walls	Approved construction documents; SMACNA HVAC Air Duct Leakage Test Manual	503.2.7.1.3; ASHRAE 90.1 – 6.4.4.2		X
IIC	**Electrical Power and Lighting Systems**					
IIC1	Electrical metering: The presence and operation of individual meters or other means of monitoring individual apartments shall be verified by visual inspection for all apartments.	Prior to final electrical and construction inspection	Approved construction documents	505.7	X	
IIC2	Lighting in dwelling units: Lamps in permanently installed lighting fixtures shall be visually inspected to verify compliance with high-efficacy requirements.	Prior to final electrical and construction inspection	Approved construction documents	505.5.3	X	
IIC3	Interior lighting power: Installed lighting shall be verified for compliance with the lighting power allowance by visual inspection of fixtures, lamps, ballasts and transformers.	Prior to final electrical and construction inspection	Approved construction documents	505.5; ASHRAE 90.1 –9.1, 9.2, 9.5, 9.6; 1RCNY §101-07(c)(3)(v)(C)4	X	
IIC4	Exterior lighting: Installed lighting shall be verified for compliance with source efficacy and/or the lighting power allowance by visual inspection of fixtures, lamps, ballasts and relevant transformers.	Prior to final electrical and construction inspection	Approved construction documents	505.6; ASHRAE 90.1 – 9.4.4, 9.4.5; 1RCNY §101-07(c)(3)(v)(C)4	X	
IIC5	Lighting controls: Each type of required lighting controls, including: - occupant sensorsmanual interior lighting controls - light-reduction controls - automatic lighting shut-off - daylight zone controls - sleeping unit controls - exterior lighting controls shall be verified by visual inspection and tested for functionality and proper operation.	Prior to final electrical and construction inspection	Approved construction documents, including control system narratives	505.2, 505.2.2.2; ASHRAE 90.1 – 9.4.1, 9.4.1.2 (as modified by section ECC A102)	X	
IIC6	Exit signs: Installed exit signs shall be visually inspected to verify that the label indicates that they do not exceed maximum permitted wattage.	Prior to final electrical and construction inspection	Approved construction documents	505.4; ASHRAE 90.1 – 9.4.3	X	
IIC7	Tandem wiring: Tandem wiring shall be tested for functionality.	Prior to final electrical and construction inspection	Approved construction documents	505.3; ASHRAE 90.1 – 9.4.2		X
IIC8	Electric motors (including but not limited to fan motors): Where required by the construction documents for energy code compliance, motor listing or labels shall be visually inspected to verify that they comply with the respective energy requirements in the construction documents.	Prior to final electrical and construction inspection	Approved construction documents	503.2.10; ASHRAE 90.1 – 10.4		X
IID	**Other**					
IID1	Maintenance information: Maintenance manuals for mechanical, service hot water and electrical equipment and systems requiring preventive maintenance shall be reviewed for applicability to installed equipment and systems before such manuals are provided to the owner. Labels required for such equipment or systems shall be inspected for accuracy and completeness.	Prior to sign-off or issuance of Final Certificate of Occupancy	Approved construction documents, including electrical crawings where applicable; ASHRAE Guideline 4: Preparation of Operating and Maintenance Documentation for Building Systems	303.3, 503.2.9.3; ASHRAE 90.1 – 4.2.2.3, 6.7.2.2, 8.7.2	X	

GENERAL NYCECC NOTE

The energy efficiency system will be designed and installed in accordance with the full requirements of the New York City Energy 2011 Conservation Code.

1. Load calculations performed at a maximum of 72 degrees F for heating and a minimum of 75 degrees F for cooling.
2. The building thermal envelope shall meet the requirement of NYCECC 502.
3. Per 502.3, the vertical fenestration area, not including opaque doors, shall not exceed the percentage of the gross area wall area of 40% in climate 4A areas.
4. Vertical Fenestration U-factor, PF and SHGC to comply with table 502.3.
5. Skylight to roof ratio to be 3% maximum per 502.3.
6. Air leakage of all window and doors to be 0.3cfm/SF per 502.4.1.
7. Air leakage of all commercial glazed swinging or revolving doors to be 1.0cfm/SF per 502.4.1.
8. A continuous air barrier shall be installed: sealing all seams, openings and penetrations of the building and shall be sealed with caulking materials or closed with gasketing systems compatible with the construction materials and location.
9. Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the bldg envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a max leakage rate of 4 cfm/sf at 1.0 in. wg.
10. Cargo doors and loading dock doors shall be equipped with weather seals to restrict infiltration when vehicles are parked in doorway.
11. Vestibule to be provided at door separating conditioned space from the exterior, except for doors that open directly from a space less than 3000 SF in area.
12. Recessed luminaires installed in the building thermal envelope shall be sealed to maximum air leakage 2cfm.
13. Vented cladding shall include the following minimum clear air spaces:
- Stucco with a $^{3}/_{8}$-inch (9.52 mm) clear airspace with $^{3}/_{8}$-inch (9.52 mm) continuous slot vent openings at the top and bottom of each wall.
- Brick with a 2-inch (51 mm) clear airspace behind the brick with vents at both the top and bottom of the brick. The vents shall be $^{3}/_{8}$ inch × 2.5-inch (9.52 mm × 63 mm) openings every third brick at both the bottom and top.
- Stone or masonry veneer with a 2-inch (51 mm) clear airspace behind the stone with vents at the top and bottom. The vents shall have at least 1 square inch of vent area for every 24 inches (610 mm) of wall.
- Panel siding with $^{3}/_{8}$-inch (9.52 mm) clear airspace with $^{3}/_{8}$-inch (9.52 mm) continuous slot vent openings at both the top and bottom of each wall.
- Manufactured stone veneer with a $^{3}/_{8}$-inch (9.52 mm) clear airspace with $^{3}/_{8}$-inch (9.52 mm) continuous slot vent openings at both the top and bottom of each wall.

14. Minimum and maximum temperatures for interior design loads shall be determined in accordance with the procedures described in the ASHRAE/ACCA 183. Heating and cooling equipment shall not exceed calculated loads.
15. HVAC system controls to be provided per 503.2.4.
16. When mechanical ducts are provided, they shall be insulated with R-5 in unconditioned spaces, R-8 for outdoor spaces, all duct joints and seams shall be sealed.
17. All low pressure ducts, if provided, operating at 2" of W.G. or less shall be properly sealed with approved methods in accordance with NYECC 503.2.7.7.1.
18. Hot water piping shall provide insulation thickness of min. 1.5" for pipe less than 1.5" diameter, and min. 2" for piping greater than 1.5" in diameter. Where k for insulation is 0.27 or less.
19. If air system is provided, each supply air outlet, and zone terminal device shall be provided with means of balancing. Discharge dampers prohibited on constant volume and VAV fans with motors greater than 10 HP.
20. If hydronic system is provided, all heating and cooling coils to be provided with a means of balancing and pressure test.
21. Contractor shall provide manual as specified in mechanical specifications.
22. Service water heating shall meet efficiency requirements of table 504.2.
23. Internally illuminated exit signs shall not exceed 5 watts per side.
24. Install separate electrical meters required for separate dwelling units.
25. Lighting within dwelling units shall have a minimum of 50 percent of the permanently installed interior light fixtures fitted with high-efficacy lamps. For lamps with less than 15 watts, minimum efficacy is 40 lumen / watt, for lamps with 15-40 watts, minimum efficacy is 50 lumen / watt, for lamps with more than 40 watts, minimum efficacy is 60 lumen / watt.

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JERRY PITERA P.E. JW FIRE
SPRINKLE DESIGN
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MONROE, NY 10950
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PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

ENERGY ANALYSIS

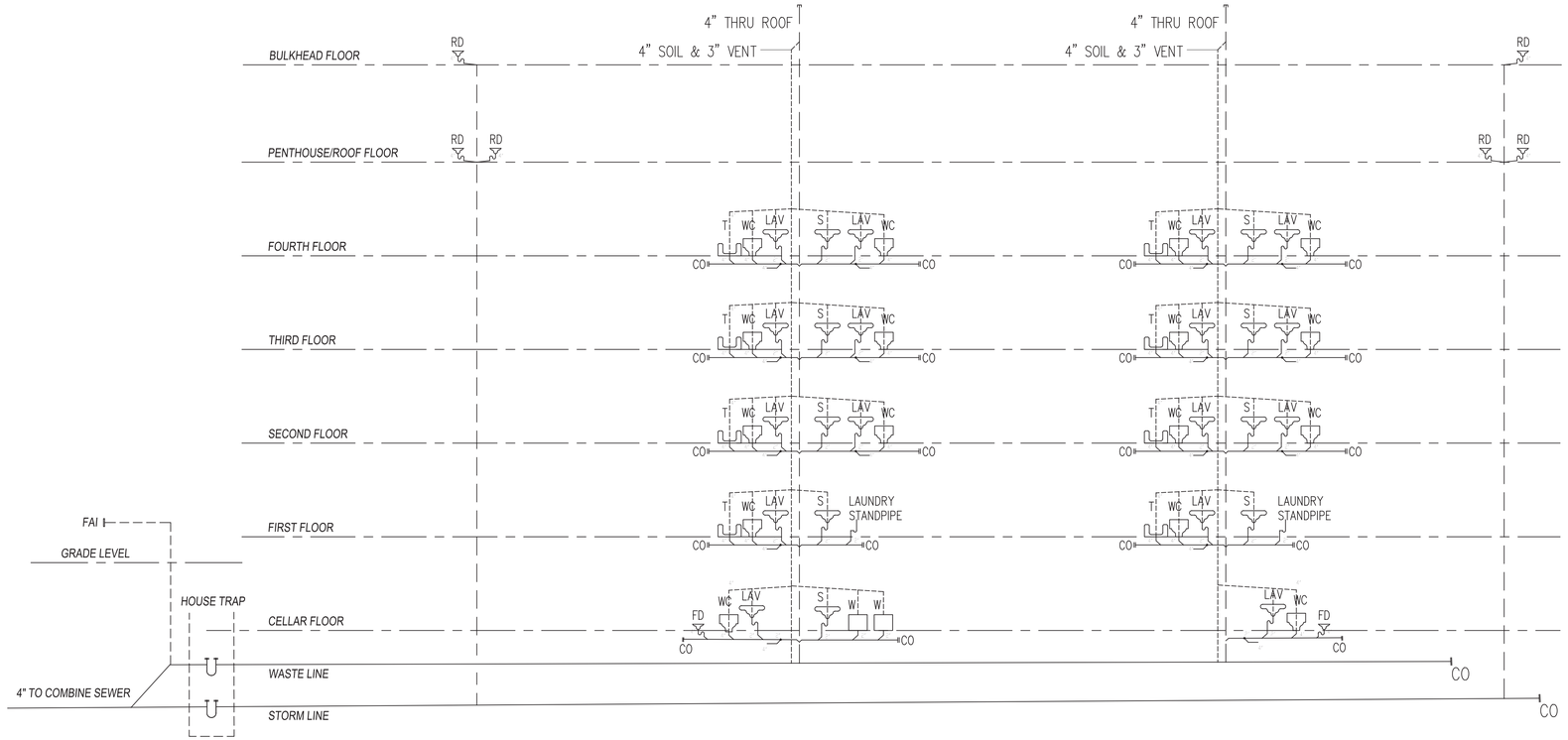
DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

EN-002.00

20 OF 21

DOB BSCAN STICKER

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL



NEW YORK CITY BUILDING DEPARTMENT PLUMBING NOTES:

THE PLUMBING SYSTEMS (SANITARY, WASTE, VENT, WATER DISTRIBUTION AND GAS) AND ALL ASSOCIATED EQUIPMENT WILL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE FULL REQUIREMENTS OF THE NEW YORK CITY 2008 PLUMBING CODE.

1. *THE SANITARY SYSTEM SHALL BE PROVIDED IN FULL ACCORDANCE WITH THE GENERAL PROVISIONS OF SECTION PC301.*
2. *THE MATERIALS USED IN THE PLUMBING SYSTEMS WILL BE PROVIDED IN FULL ACCORDANCE WITH SECTIONS PC302 AND PC303.*
3. *EQUIPMENT HOOK-UP AND THE JOINING WILL BE FULL COMPLIANCE WITH SECTIONS PC605 AND PC705.*
4. *THE INSTALLATION OF FIXTURES WILL BE IN FULL ACCORDANCE WITH PC CHAPTER 4.*
5. *TRAPS FOR FIXTURES AND DRAIN LINES WILL BE PROVIDED AND CLEANOUTS INSTALLED IN FULL COMPLIANCE WITH SECTIONS PC412, PC708 AND PC CHAPTER 10.*
6. *VERTICAL AND HORIZONTAL PIPING WILL BE HUNG AND SUPPORTED AS DIRECTED IN SPECIFICATIONS AND WITH THE FULL COMPLIANCE WITH SECTION PC308.*
7. *THE WATER SUPPLY SYSTEMS OF THE SUBJECT BUILDING SHALL BE INSTALLED AND MAINTAINED IN FULL COMPLIANCE WITH PC CHAPTER 6.*
8. *THE SANITARY DRAINAGE SYSTEM WILL BE SIZED AND INSTALLED IN FULL COMPLIANCE WITH PC CHAPTER 7.*
9. *THE VENT PIPING FOR THE SANITARY DRAINAGE SYSTEM OF THE SUBJECT BUILDING WILL BE INSTALLED IN FULL COMPLIANCE WITH SECTION PC702 & PC CHAPTER 9.*
10. *THE STORM DRAINAGE SYSTEM AND PIPING WILL BE INSTALLED IN FULL COMPLIANCE WITH PC CHAPTER 11.*
11. *GAS PIPING AND EQUIPMENT WILL BE INSTALLED IN FULL COMPLIANCE WITH THE NEW YORK CITY FUEL GAS CODE.*
12. *ALL TRENCHING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC306.*
13. *RAT PROOFING SHALL BE IN ACCORDANCE WITH SECTION PC304.*
14. *TEMPORARY TOILET FACILITIES SHALL BE PROVIDED FOR WORKMAN AS PER SECTION PC311.*

PLUMBING FIXTURE SCHEDULE

FIXTURE	*SYMBOL*	*SOIL*	*VENT*	*HOT WATER*	*COLD WATER*
WATER CLOSET ⅛" FL MTD W/LOW SET TANK SILENT FLUSH	WC		3"	2"	2"
LAVATORY	L	2"	1½"	½"	½"
SINK	S	2"	1½"	½"	½"
BATHTUB - C.I.	T	2"	1½"	½"	½"
FD					
*HWH**	HWH	2"	1½"	½"	½"

HOT WATER HEATER

ELEC. HWH: A.O.SMITH 66 GAL.
MODEL: ECT-66
ENERGY EFFICIENCY: 0.88
UL 174

NO GAS IN HOUSEHOLD. ALL EQUIPMENT ARE TO BE ELECTRICAL.

56 FROST STREET

BROOKLYN, NY 11211

Architect
DE-JAN LU, RA
99 Madison Avenue, Suite 5009
New York, NY 10016
646.820.3558

Design Consultant
J FRANKL ASSOCIATES
110 Broadway
Brooklyn, NY 11249
718.569.2200

DOB Consultant
SPEEDY EXPEDITING
110 Broadway
Brooklyn, NY 11249
718.569.2200

Structural Engineer

Mechanical Engineer
JERRY PITERA P.E. JW FIRE
SPRINKLE DESIGN
5 MEZBISH PLACE UNIT 2001
MONROE, NY 10950
845.234.4599

REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

PLUMBING RISER DIAGRAM

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

P-700.00

21 OF 21

DOB BSCAN STICKER

EXCAVATION AND FOUNDATION NOTES:

1. ALL MATERIAL, FABRICATION, INSTALLATION AND INSPECTION REQUIREMENTS RELATING TO THE FOUNDATIONS SHALL CONFORM TO THE NEW YORK CITY

2. ALL STRUCTURAL WORK SHALL BE COORDINATED AND VERIFIED WITH THE ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING REQUIREMENTS.

3. THE CONTRACTOR SHALL DEMOLISH AND REMOVE EXISTING ELEMENTS AS INDICATED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL REMOVE, TRANSPORT AND DISPOSE OF ALL DEBRIS PROMPTLY.

4. DEMOLITION SHALL BE DONE CAREFULLY. TAKE SPECIAL CARE NOT TO DAMAGE ANY EXISTING UNDERSLAB UTILITIES OR OTHER ELEMENTS NOT DESIGNATED FOR

5. THE CONTRACTOR SHALL PROTECT ALL EXCAVATIONS FROM FLOODING AND EXISTING WATER TABLE AND PROVIDE CONTINUOUS PUMPING AS REQUIRED FOR PERFORMANCE OF WORK. THE DEPTH OF EXCAVATION SHALL NOT BE CARRIED DEEPER THAN SPECIFIED IN THE CONTRACT DOCUMENTS WITHOUT THE ENGINEER OF RECORD'S CONSENT.

6. THE SUBGRADE FOR FOOTINGS AND SLABS SHALL BE INSPECTED AND APPROVED BY THE SOIL INSPECTION AGENCY IMMEDIATELY PRIOR TO PLACING FOUNDATION CONCRETE.

7. THE CONCRETE FOR EACH PILE CAP SHALL BE PLACED IN ONE (1) CONTINUOUS PLACEMENT AS REQUIRED.

8. ALL UNDERPINNING, SHEETING, SHORING OR OTHER SIMILAR CONSTRUCTION REQUIRED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE SUBJECT TO CONTROLLED INSPECTIONS AS REQUIRED BY THE NEW YORK CITY BUILDING CODE. THE CONTRACTOR SHALL RETAIN A LICENSED PROFESSIONAL ENGINEER TO PROVIDE ALL NECESSARY DESIGNS AND REQUIRED INSPECTIONS.

9. DO NOT PLACE CONCRETE WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE CONCRETE

10. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT (HORIZONTAL AND VERTICAL) OF EXISTING OR NEW CONSTRUCTION, INSIDE OR OUTSIDE THE PROJECT LIMITS.

11. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO CONTROL ICE, FROST, SURFACE AND SUBSURFACE WATER SO THAT THE FOUNDATION WORK IS PERFORMED ON DRY SUBGRADE.

12. NEW EXCAVATION SHALL NOT UNDERMINE NOR DISTURB ANY EXISTING ADJACENT FOOTINGS. NEW FOOTINGS SHALL BE SUPPORTED IN A MANNER TO MAINTAIN AN EXCAVATION SLOPE BETWEEN THE BOTTOM OF FOOTINGS AND EXCAVATION OF ONE VERTICAL TO TWO HORIZONTAL.

13. REROUTE ANY UNDERGROUND UTILITIES IF REQUIRED.

14. ALL FILL REQUIRED BELOW ANY PORTION OF THE STRUCTURE SHALL BE COMPACTED IN 8" LIFTS TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY PER ASTM D-1557. REMOVE UNSUITABLE FILL AND REPLACE WITH CONTROLLED FILL AS REQUIRED FOR SOUND PLACEMENT OF FOUNDATIONS.

15. PROVIDE CONTINUOUS WATER STOPS IN ALL WALL AND CURB CONSTRUCTION

16. SEE ARCHITECTURAL DRAWINGS FOR ALL WATERPROOFING AND DAMPROOFING

17. THE PERIMETER OF THE GENERAL EXCAVATION SHALL BE RETAINED BY A TEMPORARY SOIL/ROCK RETENTION SYSTEM. THE DESIGN, INSTALLATION, MAINTENANCE AND REMOVAL (WHERE REQUIRED) SHALL BE THE COMPLETE AND SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT OF EXISTING OR NEW CONSTRUCTION INSIDE OR OUTSIDE THE PROJECT LIMITS, CAUSED BY CONSTRUCTION TECHNIQUES OR MOVEMENTS OF THE SOIL/ROCK RETENTION SYSTEM, IS THE RESPONSIBILITY OF THE CONTRACTOR.

18. THE CONTRACTOR SHALL COORDINATE ALL ELEMENTS OF THE SOIL/ROCK RETENTION SYSTEM WITH ALL ELEMENTS OF THE PERMANENT BUILDING.

19. ALL EXCAVATION SHALL BE BASED ON ENGINEERING DRAWINGS PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK AND RETAINED BY THE CONTRACTOR. THE DRAWINGS SHALL INCLUDE PLANS AND SECTIONS OF EXCAVATION SEQUENCES. THE EXCAVATION SEQUENCES SHALL BE CONTROLLED TO MATCH THE REQUIREMENT OF THE DESIGN OF THE SOIL

20. THE GENERAL EXCAVATION SHALL CONSIST OF EXCAVATING AND REMOVING THE EXISTING SURFICIAL FILL MATERIALS TO REACH THE DESIRED SUBGRADE LEVEL. THE EXPOSED SUBGRADE SHOULD BE PROOFROLLED AND COMPACTED TO A FIRM AND UNYIELDING CONSISTENCY. THE EXCAVATION FOR FOOTINGS, PITS, ETC. SHALL BE EXCAVATED ON AN INDIVIDUAL, LOCALIZED BASIS DOWN FROM THE SLAB-ON-GRADE SUBGRADE LEVEL. EACH EXCAVATION SHALL BE TRIM,

21. ALL EXCAVATION BELOW THE SLAB LEVEL REQUIRED FOR PITS SHALL BE RETAINED BY LOCALIZED SOIL RETENTION SYSTEMS AS MAY BE NECESSARY BASED ON A DESIGN USING APPROPRIATE EARTH AND HYDRAULIC PRESSURES AND OTHER CONSTRUCTION LOADINGS.

22. THE CONTRACTOR SHALL PROVIDE POSITIVE PROTECTION (MAT/SHEET COVERINGS) FOR ALL EXCAVATION SLOPES TO PROTECT SLOPES FROM INSTABILITY AND DETERIORATION DUE TO RAIN, WIND OR SNOW/ICE.

STRUCTURAL CONCRETE NOTES:

1. ALL FOUNDATION, WALLS AND SLAB ON GRADE CONCRETE SHALL BE NORMAL WEIGHT CONCRETE WEIGHING 145 PCF HAVING A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS AND A MAXIMUM WATER-CEMENT RATIO OF 0.4 (+25%).

2. METAL DECK CONCRETE SHALL BE LIGHTWEIGHT WITH A 28 - DAY COMPRESSIVE STRENGTH OF 3,500 PSI (+25%).

3. STRUCTURAL CONCRETE SHALL CONTAIN A WATER-REDUCING, PLASTICIZING ADMIXTURE. ALL CONCRETE EXPOSED TO WEATHER SHALL CONTAIN AN AIR-ENTRAINING ADMIXTURE.

4. ALL CONCRETE WORK: MIXES, INSPECTIONS AND FORMWORK SHALL CONFORM TO THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

5. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR DESIGN OF CONCRETE MIXES AND FOR MAINTAINING STRENGTH AND PROPER SLUMP DURING CONSTRUCTION. CONCRETE MIXES SHALL BE DESIGNED IN ACCORDANCE WITH METHOD I OR METHOD II AS SPECIFIED IN SECTION 27-605 OF THE NEW YORK CITY BUILDING CODE AND SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. NO CONCRETE SHALL BE PLACED UNTIL CONCRETE MIXES HAVE BEEN APPROVED BY ENGINEER.

6. REINFORCING BARS SHALL BE DEFORMED STEEL BARS COMPLYING WITH ASTM A615, GRADE 60.

7. WELDED WIRE FABRIC SHALL COMPLY WITH ASTM A185 AND SHALL HAVE A MINIMUM YIELD STRENGTH OF 70,000 PSI.

8. CONCRETE SLABS SHALL HAVE A MONOLITHIC FINISH AND SHALL BE SCREENED, COMPACTED BY ROLLING OR TAMPING, FLOATED OFF AND GRADED AS REQUIRED. AFTER SUFFICIENT HARDENING IT SHALL BE PROTECTED AND CURED. START CURING AS SOON AS POSSIBLE WITHOUT MARKING FINISH. COVER SLABS WITH REINFORCED PAPER AS REQUIRED. KEEP SURFACE CONTINUOUSLY MOIST FOR SEVEN DAYS OR USE A CURING COMPOUND.

9. ALL REINFORCEMENT SHALL BE DETAILED AND PLACED IN ACCORDANCE WITH ACI MANUAL OF STANDARD PRACTICE, UNLESS OTHERWISE NOTED.

10. CHECKED SHOP DRAWING SHOWING REINFORCING DETAILS, INCLUDING STEEL SIZES, SPACING AND PLACEMENT, SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO FABRICATION.

11. SUBMIT DETAILED DRAWINGS SHOWING THE LOCATIONS OF ALL CONSTRUCTION JOINTS, CURBS, SLAB DEPRESSION, SLEEVES, OPENINGS, ETC.

12. REINFORCING SPLICES SHALL COMPLY WITH ACI 318, BUT SHALL IN NO CASE BE LESS THAN 40 DIAMETERS, UNLESS OTHERWISE NOTED.

13. WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AND TIED SECURELY.

14. WHERE REQUIRED, DOWELS SHALL MATCH SIZE AND NUMBER OF MAIN REINFORCING, UNLESS OTHERWISE NOTED.

15. PROVIDE POCKETS AND DOWELS FOR ALL BEAMS FRAMING INTO FOUNDATION WALLS, PIERS AND BUTTRESSES.

16. DO NOT PLACE CONCRETE WITHOUT APPROVED SHOP DRAWINGS.

17. CONFORM TO ACI HOT AND COLD WEATHER CONCRETING.

18. PROVIDE ADDITIONAL BARS AROUND ALL FLOORS AND WALL OPENINGS, AS PER TYPICAL OPENING DETAIL.

19. CONSTRUCTION JOINTS IN ALL MAT SLABS SHALL NOT BE FURTHER APART THAN 20 FEET IN ANY DIRECTION. CONSTRUCTION JOINTS IN WALLS SHALL NOT BE FURTHER APART THAN 40 FEET.

20. ALL CONSTRUCTION JOINTS SHALL BE CLEANED AND MOISTENED IMMEDIATELY PRIOR TO PLACING NEW CONCRETE.

21. BAR SUPPORTS IN CONTACT WITH EXPOSED SURFACES SHALL BE PLASTIC TIPPED.

22. NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.

23. SEE ARCHITECTURAL, HVAC, ELECTRICAL AND PLUMBING DRAWINGS FOR ADDITIONAL WALL/SLAB OPENINGS.

STRUCTURAL NOTES

1. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE CITY OF NEW YORK.

2. COORDINATE THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL AND M/E/P DRAWINGS.

3. EXISTING CONDITIONS, ELEVATORS, DIMENSIONS AND SYSTEMS SHOWN ON PLANS ARE BASED ON LIMITED FIELD OBSERVATIONS. THE CONTRACTOR SHALL FIELD-VERIFY ALL DETAILS, DIMENSIONS AND ASSUMPTIONS PRIOR TO ANY WORK. WHERE EXISTING CONDITIONS DIFFER FROM OR PRECLUDE THE EXECUTION OF THE OUTLINED DETAILS, THE ENGINEER SHALL BE NOTIFIED.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL FINAL FIELD-VERIFIED DIMENSIONS AND SHALL SUBMIT FIELD-VERIFIED DIMENSIONED SHOP DRAWINGS.

5. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER. STAGING AND SEQUENCE OF SHORING, BRACING OR OTHER CONSTRUCTION REQUIRED FOR SUCH WORK SHALL BE PREPARED IN THE FORM OF SHOP OR DETAIL DRAWINGS AND CALCULATIONS.

6. DO NOT FABRICATE ANY WORK WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS FOR ALL STRUCTURAL WORK, AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE STRUCTURAL WORK.

7. CONTRACTOR TO PROTECT AT ALL TIMES EQUIPMENT, PIPES AND OTHER EXPOSED OR EMBEDDED ITEMS ON THE SITE AGAINST DAMAGE. REROUTE AS REQUIRED PER M/E/P DRAWINGS.

NOTES OF MONITORING PROCEDURES

1. BEFORE START OF UNDERPINNING OPERATIONS, SET UP SURVEY MARKERS AT 4 LOCATIONS ON THE EXTERIOR OF THE WALL TO BE UNDERPINNED. MARKERS SHALL BE LOCATED APPROXIMATELY 1st/ FLOOR LEVEL AND SHALL BE EQUALLY SPACED ALONG THE WALL.
2. ESTABLISH BASE LINE VERTICAL AND HORIZONTAL PARAMETERS TO ALL MARKERS PRIOR TO START OF EXCAVATION.
3. CONDUCT HORIZONTAL AND VERTICAL MONITORING OF MARKERS AT THE END OF EACH UNDERPINNING PHASE BUT DO NOT EXCEED 2 DAYS BETWEEN MEASUREMENTS.
4. MAINTAIN RECORDS OF EACH AND EVERY MONITORING MEASUREMENT. PROVIDE REPORTS OF RESULTS WITHIN 24 HOURS OF SURVEY.
5. REPORT IMMEDIATELY TO THE ENGINEER ANY MOVEMENT GREATER THAN 1/4" FROM THE INITIAL STATE.
6. AFTER COMPLETION OF UNDERPINNING OPERATION, CONDUCT BI-WEEKLY MONITORING FOR A PERIOD OF ONE MONTH.
7. SURVEYOR TO SUBMIT SIGNED AND SEALED REPORT TO ENGINEER (ENGINEER WILL CERTIFY TO DOB).

GENERAL NOTES - EXCAVATION & SHORING

1. TEN DAYS PRIOR STARTING WORK, CONTACT THE NEW YORK STATE UNDERGROUND UTILITIES PROTECTIVE ORGANIZATION (1-800-962-7962) TO MARK LOCATIONS OF EXISTING UTILITIES. LOCATE ALL ADJACENT UTILITIES BY THE TEST HOLES PRIOR TO EXCAVATION OR INSTALLATION OF SOLDIER BEAMS. RELOCATE SHEETING OR INTERFERING UTILITIES AS REQUIRED. VERIFY LOCATION OF ALL ADJACENT UTILITIES AND FOUNDATION PILES.

2. MAINTAIN SAFE CLEARANCE BETWEEN ANY OVERHEAD OR UNDERGROUND UTILITIES AND CRANE , HOE, OR DRILL RIG BOOMS DURING INSTALLATION OF SOLDIER BEAMS, TIEBACK ANCHORS, AND WALES.

3. INSTALL SOLDIER BEAMS IN THE LOCATIONS AND THE DEPTHS REQUIRED. ADJUST LOCATIONS FOR SOLDIER BEAMS AS REQUIRED TO AVOID EXISTING UTILITIES

4. A SAFETY HANDRAIL AND KICKBOARD SHALL BE INSTALLED ALONG THE TOPS OF THE SHEETING WALLS PER OSHA STANDARDS PRIOR TO A MAXIMUM EXCAVATION DEPTH OF 4 FEET.

5. EXCAVATE AND INSTALL TIMBER LAGGING IN 5' MAXIMUM VERTICAL LIFTS TO APPROXIMATELY 1.5' BELOW THE DIAG. BRACING. DECREASE HEIGHT OF LAGGING LIFTS IF REQUIRED TO MAINTAIN A STABLE VERTICAL FACE. LAGGING MAY BE TUCKED BEHIND OR BE ATTACHED TO THE FLANGES OF THE SOLDIER BEAMS. LAGGING SHALL BE 3" NOMINAL THICKNESS, UNTREATED, MIXED HARDWOODS. EACH LIFT OF LAGGING SHALL BE BACKFILLED AS NECESSARY SO THAT THE SOIL IS TIGHT AGAINST THE LAGGING.

6. INSTALL 1 1/2" LOUVER BLOCKS BETWEEN TIMBER LAGGING BOARDS. IF REQUIRED, PACK LOUVER SPACE WITH STRAW OR POROUS GEOTEXTILE FABRIC TO CONTROL GROUND WATER LEAKAGE AND PREVENT SOIL LOSS FROM BEHIND THE LAGGING.

7. CONTINUE EXCAVATING AND LAGGING TO SUBGRADE AND CONSTRUCT THE PROPOSED FOUNDATION.

8. DURING BACKFILL, THE TOPS OF THE SOLDIER BEAMS SHALL BE CUT OFF AND REMOVED TO 3 FEET BELOW FINAL GRADE.

9. STRUCTURAL MEMBERS OF EQUIVALENT OR GREATER STRENGTH MAY BE SUBMITTED FOR THOSE SHOWN.ENGINEER SHALL BE NOTIFIED OF PROPOSED MEMBER SUSTITUTING PRIOR TO THEIR INSTALLATION.

CONTROLLED INSPECTIONS REQUIRED:

1.ALL CONTROLLED INSPECTION SHALL BE CONDUCTED BY A SPECIAL INSPECTION AGENCY RETAINED BY THE CONTRACTOR SUCH AGENCY SHELL BE REGISTERED WITH

AND EMPLOY SPECIAL INSPECTOR

2. THE CONTRACTOR MUST NOTIFY THE INSPECTOR FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

3.INSPECTIONS UNDER STRUCTURAL APPLICATION

CONCRETE - CAST-IN-PLACE AS PER BC 1704.4
CONCRETE TEST CYLINDERS AS PER BC 1905.6
CONCRETE DESIGN MIX AS PER BC 1905.3
EXCAVATION - SHEETING, SHORING, AND BRACING AS PER BC 1704.19 & BC 3304.4.1

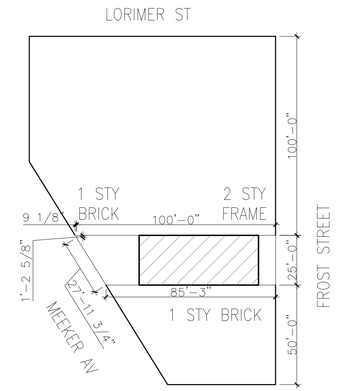
4. SEE ARCH. DRAWINGS FOR ADDITIONAL INSPECTIONS.

PRECONSTRUCTION PREPARATION

1. PRIOR TO START OF WORK, OBTAIN LEGAL AUTHORIZATION FROM NEIGHBORING PROPERTY OWNERS TO ENTER PROPERTY AND PERFORM ALL WORK AS DEPICTED ON THESE DRAWINGS.

2. A PRE-CONSTRUCTION SURVEY SHALL BE PERFORMED ON THE BUILDING TO BE UNDERPINNED BY AN INDEPENDENT PROFESSIONAL. IN ORDER TO DOCUMENT EXISTING CONDITION OF THE BUILDING. PAY ATTENTION TO AND DOCUMENT SIGNS OF EXISTING STRESS INCLUDING CRACKS, SAGGING, TIGHT DOORS,ETC. THE SURVEY SHALL INCLUDE EACH FLOOR BOTH INSIDE AND OUT AND SHALL INCLUDE PICTURES, MEASURMENTS,ETC. LOCATE ALL ADJACENT UTILITIES BY TEST PIT AND NOTIFY ONE CALL PRIOR TO START OF UNDERPINNING.

3. PLEASE REFER TO NOTES OF MONITORING PROCEDURES ON THIS PAGE.



LOCATION PLAN

SCALE: N.T.S.

ADDRESS:
56 FROST ST., BROOKLYN, NY 11211

BLOCK: 2737
LOT : 10

ZONE: M1-2/R6
MAP : 13a

DRAWING LIST:

DRAWING NO.	DRAWING TITLE
SOE-001.00	GENERAL NOTES
SOE-002.00	SOE SECTIONS
SOE-101.00	SOE PLAN

No.	Date	Revision
-	-	-

SHARON ENGINEERING, P.C.
CONSULTING ENGINEERS
34-27 STEINWAY STREET, SUITE 201
LONG ISLAND CITY, NY 11101
(718) 752-1500, Fax: (718) 752-9404
E-Mail: RSHARON@SHARONENGINEERING.COM

Project

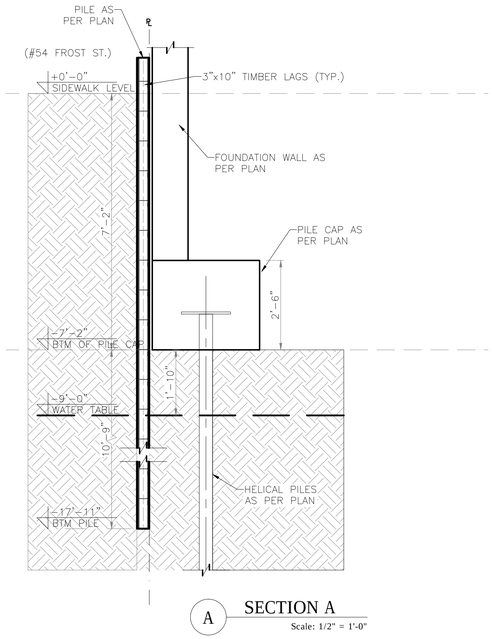
56 FROST STREET
BROOKLYN, NY 11211

Drawing

GENERAL NOTES

Seal:

DATE:	06/30/15
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**SOE-001.00**
CAD FILE No:	1 OF 3



A SECTION A
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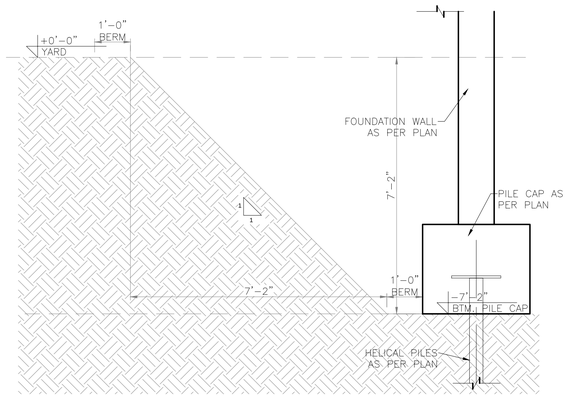

B SECTION B
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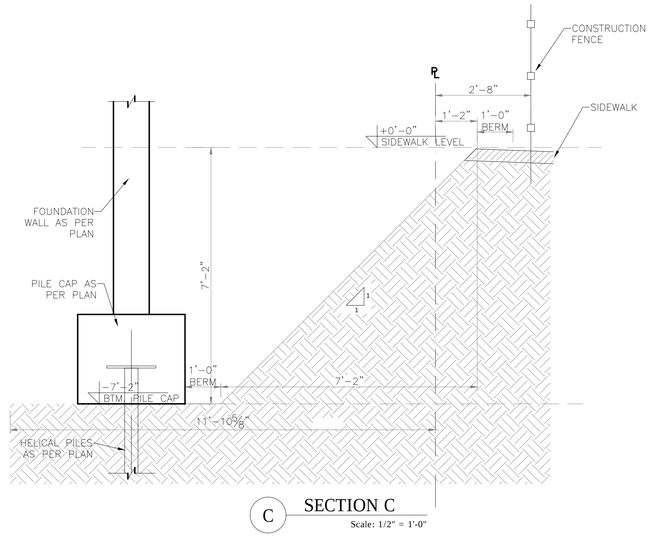

C SECTION C
Scale: 1/2" = 1'-0"

No.	Date	Revision
–	–	–

SHARON ENGINEERING, P.C.
CONSULTING ENGINEERS
34-27 STEINWAY STREET, SUITE 201
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Project

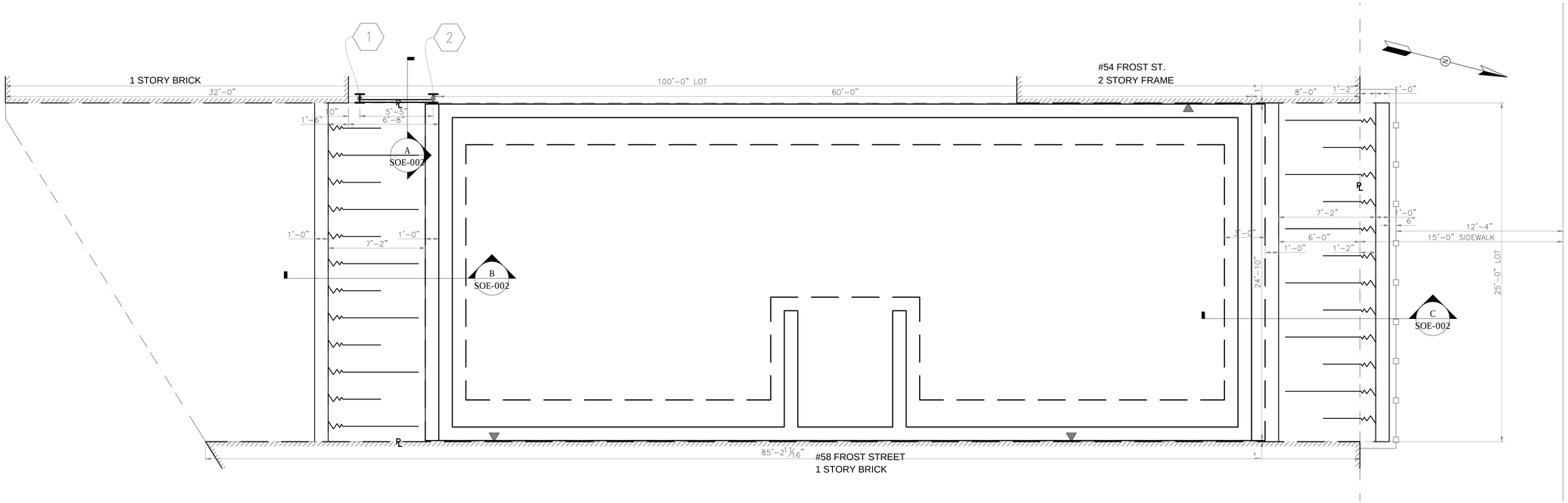
56 FROST STREET
BROOKLYN, NY 11211

Drawing

SOE SECTIONS

Seal:

DATE:	06/30/15
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**SOE-002.00**
CAD FILE No:	2 OF 3



1 SOE PLAN

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

FROST STREET

LEGEND

1. DENOTES SLOPED CUT, MAX SLOPE 1:1
2. H DENOTES NEW STEEL SOLDIER BEAM AS PER SCHEDULE
3. OPTICAL MONITORING POINT

SOLDIER BEAM SCHEDULE			
BEAM NO.	BEAM SIZE.	BEAM LENGTH (FT.)	NOTES
1-2	W8x31	24	

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10. A CONSENT FROM OWNERS OF ADJACENT PROPERTIES SHALL BE OBTAINED IF REQUIRED WORK EXTENTS BEYOND PROPERTY LINE

11. SIDEWALK CLOSING IS REQUIRED FROM DOT.

No.	Date	Revision
–	–	–

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E-Mail: RSHARON@SHARONENGINEERING.COM

Project

56 FROST STREET
BROOKLYN, NY 11211

Drawing

SITE PLAN

Seal:

DATE:	06/30/15
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**SOE-101.00**
CAD FILE No:	3 OF 3

EXCAVATION AND FOUNDATION NOTES:

1. ALL MATERIAL, FABRICATION, INSTALLATION AND INSPECTION REQUIREMENTS RELATING TO THE FOUNDATIONS SHALL CONFORM TO THE NEW YORK CITY BUILDING CODE.

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5. THE CONTRACTOR SHALL PROTECT ALL EXCAVATIONS FROM FLOODING AND EXISTING WATER TABLE AND PROVIDE CONTINOUS PUMPING AS REQUIRED FOR PERFORMANCE OF WORK. THE DEPTH OF EXCAVATION SHALL NOT BE CARRIED DEEPER THAN SPECIFIED IN THE CONTRACT DOCUMENTS WITHOUT THE ENGINEER OF RECORD'S CONSENT.

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9. DO NOT PLACE CONCRETE WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE CONCRETE WORK.

10. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT (HORIZONTAL AND VERTICAL) OF EXISTING OR NEW CONSTRUCTION, INSIDE OR OUTSIDE THE PROJECT LIMITS.

11. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO CONTROL ICE, FROST, SURFACE AND SUBSURFACE WATER SO THAT THE FOUNDATION WORK IS PERFORMED ON DRY SUBGRADE.

12. NEW EXCAVATION SHALL NOT UNDERMINE NOR DISTURB ANY EXISTING ADJACENT FOOTINGS. NEW FOOTINGS SHALL BE SUPPORTED IN A MANNER TO MAINTAIN AN EXCAVATION SLOPE BETWEEN THE BOTTOM OF FOOTINGS AND EXCAVATION OF ONE VERTICAL TO TWO HORIZONTAL.

13. REROUTE ANY UNDERGROUND UNTILITIES IF REQUIRED.

14. ALL FILL REQUIRED BELOW ANY PORTION OF THE STRUCTURE SHALL BE COMPACTED IN 8" LIFTS TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY PER ASTM D-1557. REMOVE UNSUITABLE FILL AND REPLACE WITH CONTROLLED FILL AS REQUIRED FOR SOUND PLACEMENT OF FOUNDATIONS.

15. PROVIDE CONTINUOUS WATER STOPS IN ALL WALL AND CURB CONSTRUCTION JOINTS.

16. SEE ARCHITECTURAL DRAWINGS FOR ALL WATERPROOFING AND DAMPROOFING DETAILS.

17. THE PERIMETER OF THE GENERAL EXCAVATION SHALL BE RETAINED BY A TEMPORARY SOIL/ROCK RETENTION SYSTEM. THE DESIGN, INSTALLATION, MAINTENANCE AND REMOVAL (WHERE REQUIRED) SHALL BE THE COMPLETE AND SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT OF EXISTING OR NEW CONSTRUCTION INSIDE OR OUTSIDE THE PROJECT LIMITS, CAUSED BY CONSTRUCTION TECHNIQUES OR MOVEMENTS OF THE SOIL/ROCK RETENTION SYSTEM, IS THE RESPONSIBILITY OF THE CONTRACTOR.

18. THE CONTRACTOR SHALL COORDINATE ALL ELEMENTS OF THE SOIL/ROCK RETENTION SYSTEM WITH ALL ELEMENTS OF THE PERMANENT BUILDING.

19. ALL EXCAVATION SHALL BE BASED ON ENGINEERING DRAWINGS PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK AND RETAINED BY THE CONTRACTOR. THE DRAWINGS SHALL INCLUDE PLANS AND SECTIONS OF EXCAVATION SEQUENCES. THE EXCAVATION SEQUENCES SHALL BE CONTROLLED TO MATCH THE REQUIREMENT OF THE DESIGN OF THE SOIL RETENTION SYSTEM.

20. THE GENERAL EXCAVATION SHALL CONSIST OF EXCAVATING AND REMOVING THE EXISTING SURFICIAL FILL MATERIALS TO REACH THE DESIRED SUBGRADE LEVEL. THE EXPOSED SUBGRADE SHOULD BE PROOFROLLED AND COMPACTED TO A FIRM AND UNYIELDING CONSISTENCY. THE EXCAVATION FOR FOOTINGS, PITS, ETC. SHALL BE EXCAVATED ON AN INDIVIDUAL, LOCALIZED BASIS DOWN FROM THE SLAB-ON-GRADE SUBGRADE LEVEL. EACH EXCAVATION SHALL BE TRIM, LEVEL SURFACE.

21. ALL EXCAVATION BELOW THE SLAB LEVEL REQUIRED FOR PITS SHALL BE RETAINED BY LOCALIZED SOIL RETENTION SYSTEMS AS MAY BE NECESSARY BASED ON A DESIGN USING APPROPRIATE EARTH AND HYDRAULIC PRESSURES AND OTHER CONSTRUCTION LOADINGS.

22. THE CONTRACTOR SHALL PROVIDE POSITIVE PROTECTION (MAT/SHEET COVERINGS) FOR ALL EXCAVATION SLOPES TO PROTECT SLOPES FROM INSTABILITY AND DETERIORATION DUE TO RAIN, WIND OR SNOW/ICE.

23. ALL PILE MATERIALS AND OPERATIONS SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

24. ALL PILES SHALL BE FRICTION TIMBER PILES AND APPURTENANCES, EXCEPT WHERE NOTED. PILE CAPACITY SHALL BE AS PER PLAN.

25. PERFORM PILE LOAD TESTING AS REQUIRED BY NYC BUILDING CODE.

26. PILES MATERIAL AND INSTALLATION SHALL BE BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

27. ALL PILE INSTALLATION OPERATIONS SHALL BE SUPERVISED BY A LICENSED ENGINEER. THE INSPECTOR SHALL KEEP A COMPLETE RECORD OF THE PILE INSTALLATION OPERATION.

28. TIMBER PILES SHALL BE INSTALLED UNTIL SPECIFIED BEARING CAPACITY.

29. ALL PILES SHOULD BE INSTALLED AS SHOWN ON THE ENGINEER'S PLAN. ALL CHANGES IN PILE LOCATION MUST BE APPROVED BY THE ENGINEER.

30. IF UNDERGROUND OBSTRUCTIONS ARE ENCOUNTERED DURING INSTALLATION, THE CONTRACTOR SHALL HAVE THE OPTION OF REMOVING THE OBSTRUCTION IF POSSIBLE OR RELOCATING THE PILE WITH THE ENGINEER'S APPROVAL. THE LATTER OPTION MAY REQUIRE THE RELOCATION OF ADJACENT PILES.

31. THE PILES SHALL BE DRIVEN USING AN APPROVED HAMMER. THE CONTRACTOR SHALL PROVIDE MONITORING OF ADJACENT BUILDINGS AND REPORT CONDITIONS TO THE ENGINEER, ARCHITECT, AND OWNER. SHOULD VIBRATION EXCEED A PREDETERMINED LEVEL, PREDRILLING OR OTHER METHODS SHALL BE CONSIDERED REFER TO SECTION BELOW.

32. WRITTEN INSTALLATION RECORDS SHALL BE OBTAINED FOR EACH PILE AND SUBMITTED TO THE ENGINEER OF RECORD. THESE RECORDS SHALL INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

A. PROJECT NAME AND/OR LOCATION.
B. DATE AND TIME OF INSTALLATION.
C. LOCATION AND REFERENCE NUMBER OF EACH PILE.
D. PILE LOSS SIGNED AND SEALED BY A LICENSED SURVEYOR OR A PROFESSIONAL ENGINEER.
E. DESCRIPTION OF LEAD SECTION AND EXTENSIONS INSTALLED.
F. OVERALL DEPTH OF INSTALLATIONS REFERENCED FROM BOTTOM OF GRADE BEAM OR PILE CAP.
G. HAMMER ENERGY AND READINGS LOG. CALCULATED BEARING CAPACITY.
PILE TEST RESULTS.
H. PILE DEVIATION PLAN.
I. ANY OTHER RELEVANT INFORMATION RELATING TO THE INSTALLATION.

33. THE CONTRACTOR SHALL NOT POUR ANY PILE CAPS OR BEAMS UNTIL THE ENGINEER OF RECORD AND BUILDING DEPARTMENT HAS APPROVED THE ABOVE DOCUMENTS.

34. ECCENTRICITIES OF "AS-DRIVEN" PILE GROUPS SHALL BE ADJUSTED BY STRAPS, ADDITIONAL REINFORCING OR BY THE DRIVING OF ADDITIONAL PILES AS INDICATED ON REDESIGN SHEETS AS PREPARED BY THE STRUCTURAL ENGINEER. STRUCTURAL REDESIGN AND NEW WORK SHALL BE AT CONTRACTOR'S COST.

STRUCTURAL NOTES

1. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE CITY OF NEW YORK.

2. COORDINATE THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL AND M/E/P DRAWINGS.

3. EXISTING CONDITIONS, ELEVATORS, DIMENSIONS AND SYSTEMS SHOWN ON PLANS ARE BASED ON LIMITED FIELD OBSERVATIONS. THE CONTRACTOR SHALL FIELD-VERIFY ALL DETAILS, DIMENSIONS AND ASSUMPTIONS PRIOR TO ANY WORK. WHERE EXISTING CONDITIONS DIFFER FROM OR PRECLUDE THE EXECUTION OF THE OUTLINED DETAILS, THE ENGINEER SHALL BE NOTIFIED.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL FINAL FIELD-VERIFIED DIMENSIONS AND SHALL SUBMIT FIELD-VERIFIED DIMENSIONED SHOP DRAWINGS.

5. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER. STAGING AND SEQUENCE OF SHORING, BRACING OR OTHER CONSTRUCTION REQUIRED FOR SUCH WORK SHALL BE PREPARED IN THE FORM OF SHOP OR DETAIL DRAWINGS AND CALCULATIONS.

6. DO NOT FABRICATE ANY WORK WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS FOR ALL STRUCTURAL WORK, AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE STRUCTURAL WORK.

7. CONTRACTOR TO PROTECT AT ALL TIMES EQUIPMENT, PIPES AND OTHER EXPOSED OR EMBEDDED ITEMS ON THE SITE AGAINST DAMAGE. REROUTE AS REQUIRED PER M/E/P DRAWINGS.

CONTROLLED INSPECTIONS REQUIRED:

1. ALL CONTROLLED INSPECTIONS SHALL BE CONDUCTED BY A SPECIAL INSPECTION AGENCY" RETAINED BY THE CONTRACTOR. SUCH AGENCY SHALL BE REGISTERED WITH THE N.Y.C. DEPARTMENT OF BUILDING AS QUALIFIED TO CONDUCT SPECIFIED INSPECTIONS AND EMPLOY SPECIAL INSPECTORS.

2. THE CONTRACTOR MUST NOTIFY THE INSPECTOR FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

3. INSPECTIONS UNDER STRUCTURAL APPLICATION

   1. CONCRETE – CAST-INPLACE AS PER BC 1704.4
   2. CONCRETE TEST CYLINDERS AS PER BC 1905.6
   3. CONCRETE DESIGN MIX AS PER BC 1905.3
   4. PILE FOUNDATIONS AND PIERS AS PER 1704.8
   5. FOOTING AND FOUNDATION AS PER 109.3.1

4. ANY REQUIRED INSPECTIONS AND TESTS OF MATERIALS BY THE CONTRACTOR SHALL BE MADE UNDER THE DIRECT SUPERVISION OF A LICENSED ARCHITECT OR ENGINEER RETAINED BY OR ON THE BEHALF OF THE CONTRACTOR WHO SHALL BE ACCEPTABLE TO THE ARCHITECT OR ENGINEER WHO SUPERVISED THE PREPARATION OF THE PLANS.

5. SEE ARCH. DRAWINGS FOR ADDITIONAL INSPECTIONS.

STRUCTURAL CONCRETE NOTES:

1. ALL FOUNDATION, WALLS AND SLAB ON GRADE CONCRETE SHALL BE NORMAL WEIGHT CONCRETE WEIGHING 145 PCF HAVING A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS AND A MAXIMUM WATER-CEMENT RATIO OF 0.4 (+25%).

2. METAL DECK CONCRETE SHALL BE LIGHTWEIGHT WITH A 28 – DAY COMPRESSIVE STRENGTH OF 3,500 PSI (+25%).

3. STRUCTURAL CONCRETE SHALL CONTAIN A WATER-REDUCING, PLASTICIZING ADMIXTURE. ALL CONCRETE EXPOSED TO WEATHER SHALL CONTAIN AN AIR-ENTRAINING ADMIXTURE.

4. ALL CONCRETE WORK: MIXES, INSPECTIONS AND FORMWORK SHALL CONFORM TO THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

5. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR DESIGN OF CONCRETE MIXES AND FOR MAINTAINING STRENGTH AND PROPER SLUMP DURING CONSTRUCTION. CONCRETE MIXES SHALL BE DESIGNED IN ACCORDANCE WITH METHOD I OR METHOD II AS SPECIFIED IN SECTION 27-605 OF THE NEW YORK CITY BUILDING CODE AND SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. NO CONCRETE SHALL BE PLACED UNTIL CONCRETE MIXES HAVE BEEN APPROVED BY ENGINEER.

6. REINFORCING BARS SHALL BE DEFORMED STEEL BARS COMPLYING WITH ASTM A615, GRADE 60.

7. WELDED WIRE FABRIC SHALL COMPLY WITH ASTM A185 AND SHALL HAVE A MINIMUM YIELD STRENGTH OF 70,000 PSI.

8. CONCRETE SLABS SHALL HAVE A MONOLITHIC FINISH AND SHALL BE SCREENED, COMPACTED BY ROLLING OR TAMPING, FLOATED OFF AND GRADED AS REQUIRED. AFTER SUFFICIENT HARDENING IT SHALL BE PROTECTED AND CURED. START CURING AS SOON AS POSSIBLE WITHOUT MARKING FINISH. COVER SLABS WITH REINFORCED PAPER AS REQUIRED. KEEP SURFACE CONTINUOUSLY MOIST FOR SEVEN DAYS OR USE A CURING COMPOUND.

9. ALL REINFORCEMENT SHALL BE DETAILED AND PLACED IN ACCORDANCE WITH ACI MANUAL OF STANDARD PRACTICE, UNLESS OTHERWISE NOTED.

10. CHECKED SHOP DRAWING SHOWING REINFORCING DETAILS, INCLUDING STEEL SIZES, SPACING AND PLACEMENT, SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO FABRICATION.

11. SUBMIT DETAILED DRAWINGS SHOWING THE LOCATIONS OF ALL CONSTRUCTION JOINTS, CURBS, SLAB DEPRESSION, SLEEVES, OPENINGS, ETC.

12. REINFORCING SPLICES SHALL COMPLY WITH ACI 318, BUT SHALL IN NO CASE BE LESS THAN 40 DIAMETERS, UNLESS OTHERWISE NOTED.

13. WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AND TIED SECURELY.

14. WHERE REQUIRED, DOWELS SHALL MATCH SIZE AND NUMBER OF MAIN REINFORCING, UNLESS OTHERWISE NOTED.

15. PROVIDE POCKETS AND DOWELS FOR ALL BEAMS FRAMING INTO FOUNDATION WALLS, PIERS AND BUTTRESSES.

16. DO NOT PLACE CONCRETE WITHOUT APPROVED SHOP DRAWINGS.

17. CONFORM TO ACI HOT AND COLD WEATHER CONCRETING.

18. PROVIDE ADDITIONAL BARS AROUND ALL FLOORS AND WALL OPENINGS, AS PER TYPICAL OPENING DETAIL.

19. CONSTRUCTION JOINTS IN ALL MAT SLABS SHALL NOT BE FURTHER APART THAN 20 FEET IN ANY DIRECTION. CONSTRUCTION JOINTS IN WALLS SHALL NOT BE FURTHER APART THAN 40 FEET.

20. ALL CONSTRUCTION JOINTS SHALL BE CLEANED AND MOISTENED IMMEDIATELY PRIOR TO PLACING NEW CONCRETE.

21. BAR SUPPORTS IN CONTACT WITH EXPOSED SURFACES SHALL BE PLASTIC TIPPED.

22. NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.

23. SEE ARCHITECTURAL, HVAC, ELECTRICAL AND PLUMBING DRAWINGS FOR ADDITIONAL WALL/SLAB OPENINGS.

24. SUBMIT TO THE ARCHITECT, PROPOSALS FOR ALL PROCEDURES AND SEQUENCES FOR FORM WORK STRIPPING AND RESHORING SYSTEMS.

25. SEE ARCHITECTURAL DRAWINGS FOR TYPE AND LOCATION OF ALL FLOOR FINISHES, FLOOR DEPRESSIONS AND CURBS.

HELICAL PILE SPECIFICATIONS

1) ALL PILES SHALL BE PATENTED HELICAL PILES AND APPURTENANCES AS MANUFACTURED BY MACLEAN DIXIE AND FURNISHED EXCLUSIVELY BY PREMIUM TECHNICAL SERVICES (1-800-282-7453). ALL HELICAL PILES ARE TO BE INSTALLED BY A FACTORY CERTIFIED INSTALLER, OTHERWISE A CERTIFIED TECHNICIAN FROM PREMIUM TECHNICAL SERVICES MUST BE ON SITE AT ALL TIMES TO WITNESS PILE INSTALLATION. **ALL HELICAL PILES MUST BE ICC APPROVED AND BE IN ACCORDANCE W/ NYC D.O.B. 2014 CODE.**

A. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING.

B. ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.

2) HELICAL PILE LEAD SECTIONS SHALL BE MODEL **175-101214-S7** WITH A **1.75"** ROUND CORNER SQUARED SHAFT AND A **10", 12",** AND **14"** DIAMETER HELIX. LEAD SECTIONS SHALL BE **7'** LONG. ALL HELIX PILE EXTENSIONS SHALL BE **D10 - 1.75" (MIN. 10,000 FT-LB TORQUE RATING)** SOLID ROUND CORNERED SQUARE SHAFT 5, 7 OR 10' LONG DEPENDING ON VERTICAL CLEARANCE. **ALL PILES SHALL INCORPORATE THE PATENTED MACLEAN-DIXIE SQUARE CONNECTIONS.**

3) HELICAL PILES, EXTENSIONS AND APPURTENANCES SHALL BE HOT-DIPPED GALVANIZED STEEL IN ACCORDANCE WITH ASTM A153 (LATEST REVISION) AND **ESR-3032.**

4) ALL PILE INSTALLATION OPERATIONS SHALL BE SUPERVISED BY A LICENSED ENGINEER. THE INSPECTOR SHALL KEEP A COMPLETE RECORD OF THE PILE INSTALLATION OPERATION.

5) HELICAL PILES SHALL BE INSTALLED TO A MINIMUM DEPTH OF **19'** BELOW GRADE BEAM OR **5' PAST ALL UNSUITABLE SOIL LAYERS** AND A MINIMUM TORQUE OF **10,000** FT-LBS. AND A MINIMUM CARRYING CAPACITY OF **50 TONS** ULTIMATE LOAD (FACTORED) SUBJECT TO THE FOLLOWING PROVISIONS:

A) IF THE MINIMUM TORQUE REQUIREMENT HAS NOT BEEN SATISFIED AT THE MINIMUM DEPTH LEVEL, THE CONTRACTOR SHALL HAVE THE FOLLOWING OPTIONS:

a) INSTALL THE PILE DEEPER USING ADDITIONAL EXTENSIONS UNTIL THE SPECIFIED TORQUE LEVEL IS OBTAINED.
b) REMOVE THE EXISTING PILE AND INSTALL A PILE WITH LARGER AND/OR MORE HELICES. THE REVISED PILE SHALL BE INSTALLED BEYOND THE TERMINATION DEPTH OF THE ORIGINAL PILE, AS DIRECTED ENGINEER.
c) ADD ADDITIONAL PILES AS RECOMMENDED BY ENGINEER.

B) IF THE MAXIMUM TORQUE RATING OF THE PILE AND/OR INSTALLING UNIT HAS BEEN REACHED PRIOR TO SATISFYING THE MINIMUM DEPTH REQUIREMENT, THE CONTRACTOR SHALL HAVE , a) THE OPTION TO INCREASE THE TERMINAL TORQUE TO A MAXIMUM OF **10,000** FT. LBS., b)AFTER CONSULTING WITH THE ENGINEER OF RECORD, THE CONTRACTOR MAY REDUCE THE SIZE OF THE HELIX AS REQUIRED TO ACHIEVE THE MINIMUM DEPTH WHILE STILL ACHIEVING THE MINIMUM TORQUE.

6) HELICAL PILES SHOULD BE INSTALLED AS SHOWN ON THE ENGINEER'S PLAN. ALL CHANGES IN PILE LOCATION MUST BE APPROVED BY THE ENGINEER.

7) IF UNDERGROUND OBSTRUCTIONS ARE ENCOUNTERED DURING INSTALLATION, THE CONTRACTOR SHALL HAVE THE OPTION OF REMOVING THE OBSTRUCTION IF POSSIBLE OR RELOCATING THE PILE WITH THE ENGINEER'S APPROVAL. THE LATTER OPTION MAY REQUIRE THE RELOCATION OF ADJACENT PILES.

8) THE HELICAL PILE SHALL BE CONNECTED TO THE STRUCTURE USING A PTS APPROVED STEEL BRACKET OR SLAB-SUPPORTING CHANNEL AS THE CASE MAY BE- AS SHOWN ON ENGINEER'S PLAN. THESE CONNECTION DEVICES SHALL BE CAPABLE OF SAFELY TRANSFERRING THE STRUCTURAL LOADS TO THE HELICAL PILE.

9) WRITTEN INSTALLATION RECORDS SHALL BE OBTAINED FOR EACH HELICAL PILE. THESE RECORDS SHALL INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

a) PROJECT NAME AND/OR LOCATION.
b) NAME OF CONTRACTOR'S FOREMAN OR REPRESENTATIVE WHO WITNESSED THE INSTALLATION.
c) DATE AND TIME OF INSTALLATION.
d) LOCATION AND REFERENCE NUMBER OF EACH PILE.
e) DESCRIPTION OF LEAD SECTION AND EXTENSIONS INSTALLED.
f) OVERALL DEPTH OF INSTALLATIONS REFERENCED FROM BOTTOM OF GRADE BEAM OR FOOTING.
g) TORQUE READING FOR THE LAST THREE FEET OF INSTALLATION IF PRACTICAL. IN LIEU OF THIS REQUIREMENT, THE TERMINAL TORQUE SHALL BE RECORDED AS A MINIMUM.
h) MAKE AND MODEL OF THE EQUIPMENT USED FOR INSTALLATION
i) THE INSTALLATION SPEED (RPM) OF THE HELICAL PILE
j) ABRUPT CHANGES IN INSTALLATION TORQUE
k) ANY OTHER RELEVANT INFORMATION RELATING TO THE INSTALLATION.

10) THE INSTALLER MUST PROVIDE A N.Y.S. LICENSED PROFESSIONAL ENGINEER CERTIFIED PILE LOG.

DRAWING LIST

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
-	10/09/13	Preliminary

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Project

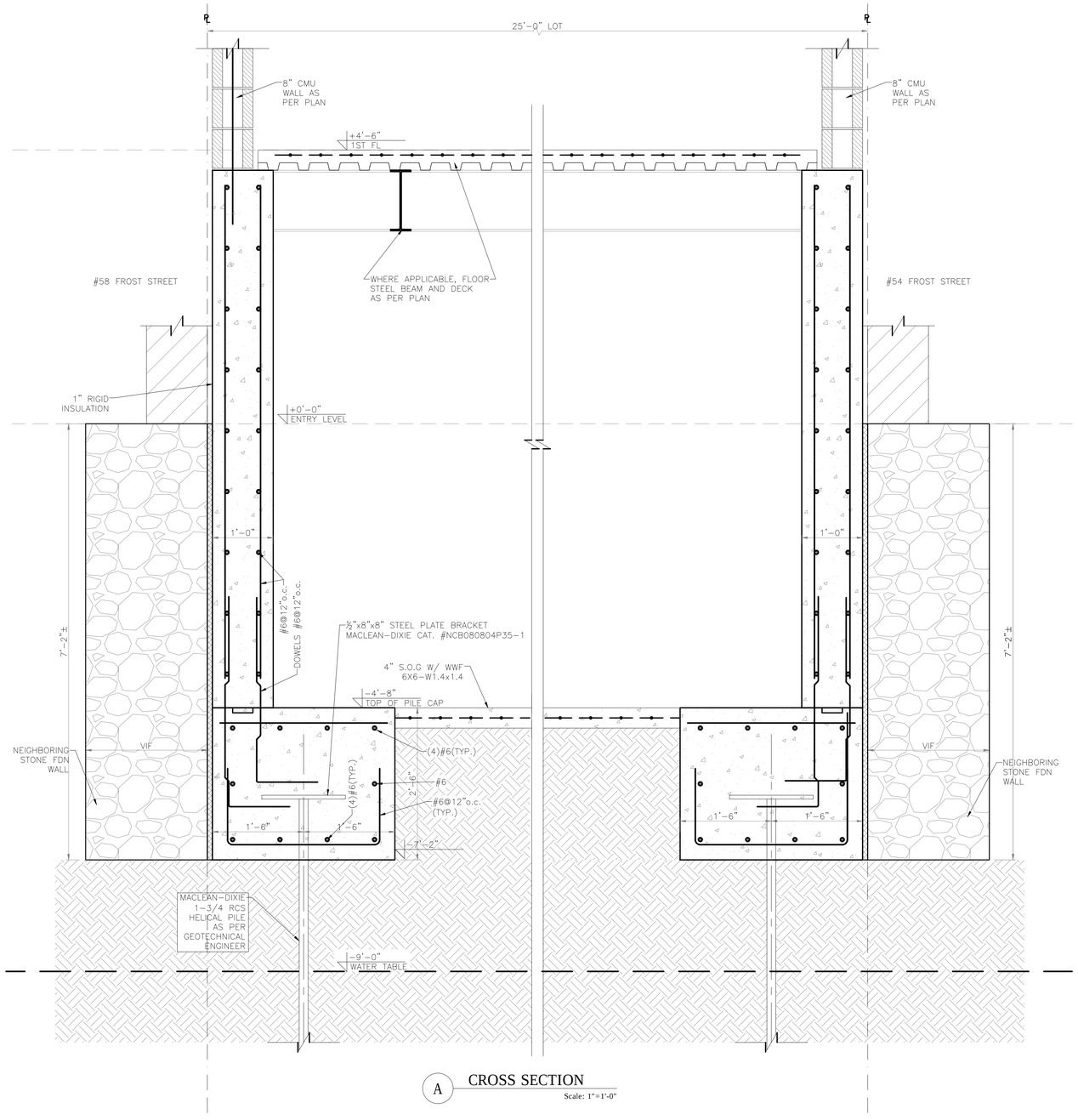
56 FROST STREET
BROOKLYN, NY 11211

Drawing

GENERAL NOTES

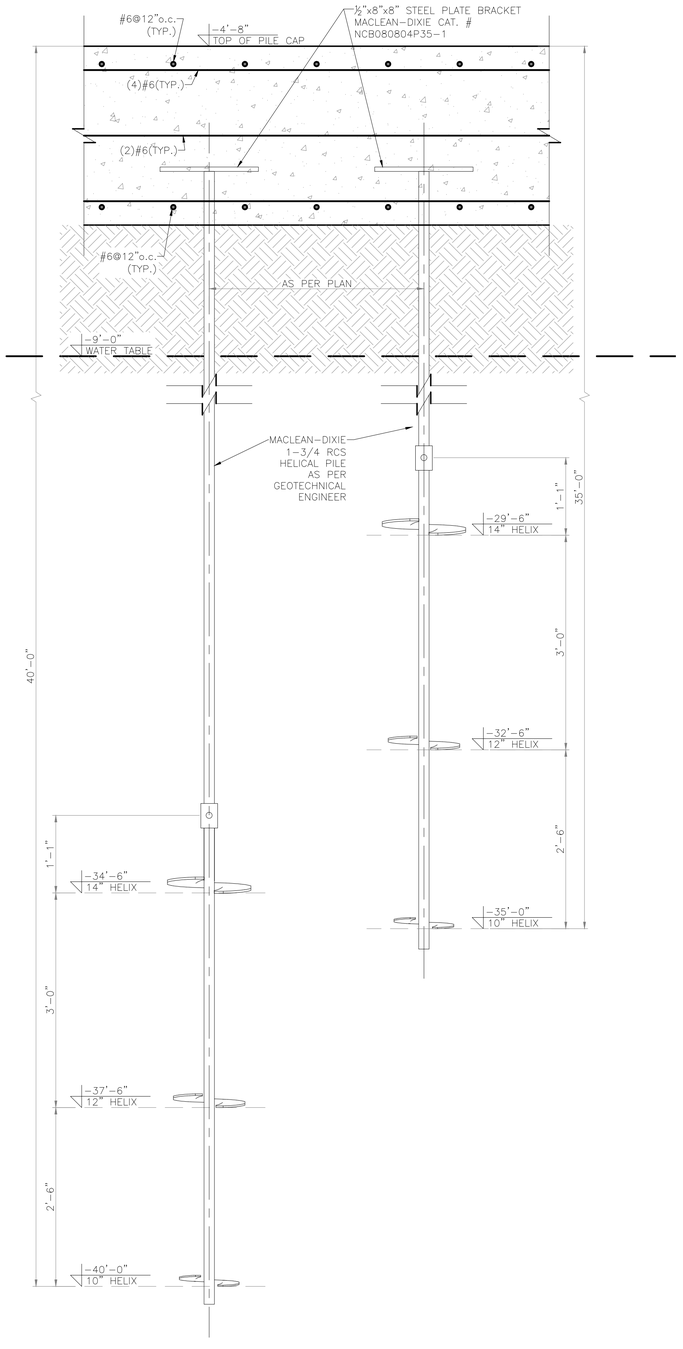
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**FO-001.00**
CAD FILE No:	1 OF 3



A CROSS SECTION

Scale: 1"=1'-0"



B ALTERNATING 35FT. & 40FT. HELICAL PILES (TYP.)

Scale: 1"=1'-0"

No.	Date	Revision
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BROOKLYN, NY 11211

Drawing

DETAILS

Seal:

STATE OF NEW YORK — RAJIB SHAW SHARON — 065105 — LICENSED PROFESSIONAL ENGINEER

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**FO-002.00**
CAD FILE No:	2 OF 3

LEGEND

- PATTERN — NEW WALL BELOW
- PATTERN — NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

CELLAR PLAN

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

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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CELLAR PLAN

Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**FO-101.00**
CAD FILE No:	3 OF 3

STRUCTURAL STEEL NOTES:

1. STRUCTURAL STEEL SHALL COMPLY WITH ASTM A572 GRADE 50, UNLESS OTHERWISE NOTED.

2. STRUCTURAL STEEL TUBING SHALL COMPLY WITH ASTM A500, UNLESS OTHERWISE NOTED.

3. BOLTS, NUTS AND WASHERS SHALL COMPLY WITH ASTM A325, BOLTS SHALL BE A MINIMUM OF 3/4" DIAMETER, UNLESS OTHERWISE NOTED.

4. SUBMIT SHOP DRAWINGS FOR ALL WORK. DO NOT PROCEED WITH ANY FABRICATION UNTIL THE SHOP DRAWINGS ARE REVIEWED AND APPROVED. SHOP DRAWINGS SHALL BE BASED ON FIELD-VERIFIED CONDITIONS.

5. AFTER FABRICATION, CLEAN STEEL OF ALL RUST, LOOSE MILL, SCALE AND OTHER FOREIGN MATERIALS.

6. ALL WELDING SHALL BE DONE BY QUALIFIED WELDERS AND SHALL CONFORM TO "AWS STRUCTURAL WELDING CODE – STEEL", LATEST EDITION. WELDERS SHALL BE LICENSED BY THE BUILDING SUPERINTENDENT IN ACCORDANCE WITH ALL REQUIREMENTS OF THE CITY OF NEW YORK BUILDING CODE, AND THE RULES AND REGULATIONS OF THE BOARD OF STANDARDS AND APPEALS.

7. WELDING ELECTRODES SHALL BE E70XX FOR NEW CONST. AND E60 LOW HYDROGEN FOR EXISTING.

8. MINIMUM FILLET WELDS SHALL COMPLY WITH AISC, BUT SHALL NOT BE LESS THAN ¼ INCH,UNLESS OTHERWISE NOTED.

9. PROVIDE FIREPROOF BLANKETS AND OTHER FIRE PROTECTION MEASURES AS REQUIRED FOR FIRE SAFETY DURING WELDING.

10. SURFACES OF ALL STEEL THAT IS TO RECEIVE WELDS SHALL BE POWER BRUSHED AND CLEANED THOROUGHLY OF ALL FOREIGN MATTER AND PAINT FOR A DISTANCE OF 2 INCHES FROM EACH SIDE OF THE OUTSIDE LINES OF WELD.

11. ALL NEW INTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP2 Hand Tool Clean
Prime: 10-99 or 4 Versare, 2-3 mils dft
Intermediate: 2H or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

12. ALL EXISTING INTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP2 Hand Tool Clean
Prime: 4 Versare, 2-3 mils dft
Intermediate: 2H or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

13. ALL NEW EXTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP3 Power Tool Clean
Prime: 10-99 or 4 Versare, 2-3 mils dft
Intermediate: 2H or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

14. ALL EXISTING EXTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP3 Power Tool Clean
Prime: 4 Versare, 2-3 mils dft
Intermediate: 2h or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

15. OMIT PAINT WHERE SPRAY FIREPROOFING IS USED.

16. FIREPROOFING: PROVIDE ANY OF THE FOLLOWING FOR ALL STEEL (REFER TO ARCH. REQUIREMENTS).

A. 1 ¼" MIN. 1:2 MILL-MIXED GYPSUM-PERLITE PLASTER OVER 3.4 LB. DIAMOND MESH METAL LATH. PROVIDE 1" SPACE FROM BOTT. LEGS TO LATH
B. 5/8" TYPE X GYPSUM WALL BOARD OR VENEER BASE AROUND ANGLES, SEE ARCH. DWGS. FOR THE NUMBER OF LAYERS. ALL EXISTING STEEL FIREPROOFED SHALL BE RESTORED.
C. SPRAY FIREPROOFING
D. RESTORE ALL REMOVED ORIGINAL FIREPROOFING
E. EXPOSED FIREPROOFING SHALL BE PLASTERED TO MATCH EXISTING
F. FOR SPRAY FIREPROOFING REQUIREMENT AT DECK SEE PLAN.

17. STAIR STRINGERS SHALL HAVE FULL PENETRATION WELDED CONNECTIONS ALL AROUND AT CRANKED SEGMENTS.

18. ALL CONNECTIONS SHALL BE DESIGNED BY THE FABRICATOR'S PROFESSIONAL ENGINEER AND SUBMITTED IN SHOP DRAWING FORM FOR REVIEW. BEAM TO BEAM CONNECTORS SHALL BE DESIGNED TO TRANSFER THE REACTION FOR A SIMPLY SUPPORTED, UNIFORMLY LOADED BEAM OF SAME SIZE, SPAN AND (FY) AS LISTED IN THE TABLE OF UNIFORM LOAD CONSTANTS, AISC MANUAL OF STEEL CONSTRUCTION, EIGHTH EDITION, OR FOR THE REACTION SHOWN ON THE FRAMING PLAN, WHICHEVER IS GREATER. WHERE NO REACTION IS SHOWN ON THE FRAMING PLAN, CONNECTION SHALL TRANSFER THE REACTION AS NOTED ABOVE.

MASONRY NOTES

1. MATERIAL:

(A) HOLLOW LOAD BEARING CONCRETE MASONRY AND BRICK UNITS SHALL CONFORM TO ASTM C90, GRADE N, TYPE1. THE MASONRY ASSEMBLY SHALL HAVE AN ULTIMATE COMPRESSIVE STRENGTHS (F'M) OF 1,500 PSI WITH A MINIMUM UNIT STRENGTH OF 4,000 PSI, UNLESS PRISM TESTS ARE CONDUCTED SUCCESSFULLY WITH LOWER STRENGTH CMU.

(B) GROUT FOR LOAD BEARING MASONRY SHALL CONFORM TO ASTM C476-6, WITH A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI

(C) ALL MORTAR SHALL CONFORM TO ASTM C270, TYPE S.

(D) REINFORCING BARS FOR REINFORCED MASONRY SHALL CONFORM TO ASTM A615-60.

2. VERTICAL CELLS TO BE FILLED WITH GROUT SHALL BE ALIGNED TO PROVIDE A CONTINUOUS, UNOBSTRUCTED OPENING OF THE DIMENSIONS SHOWN ON THE PLANS. CELLS WHICH WILL CONTAIN VERTICAL REINFORCEMENT SHALL HAVE A MINIMUM OF TWO (2) INCH CLEAR OPENING. VERTICAL REINFORCING SHALL HAVE A MINIMUM 3/4" CLEARANCE FROM MASONRY.

3. CONTINUOUS WIRE REINFORCING (JOINT REINFORCING) SHALL BE GALVANIZED TRUSS TYPE FABRICATED UNITS WITH A SINGLE PAIR OF 9 GAUGE SIDE RODS AND 9 GAUGE CONTINUOUS DIAGONAL CROSS RODS FABRICATED FROM COLD DRAWN STEEL WIRE COMPLYING WITH ASTM A82. JOINT REINFORCING SHALL BE SPACED AT 16" O.C. VERTICALLY IN ALL MASONRY WALLS.

4. GROUT FOR FILLING REINFORCED OR NON-REINFORCED CELLS SHALL BE FLUID AND PLACED BY ACCEPTABLE GROUTING PROCEDURES. GROUT SHALL BE PLACED IN MAXIMUM FOUR (4) FOOT LIFTS AND CONSOLIDATED IN PLACE BY VIBRATION OR OTHER METHODS WHICH INSURE COMPLETE FILLING OF THE CELLS. ALL CELLS CONTAINING REINFORCING BARS AND/OR ANCHOR BOLTS SHALL BE FULLY GROUTED.

5. ALL REINFORCED CELLS, ALL CELLS BELOW GRADE AND ALL CELLS BELOW FINISHED FLOOR SHALL BE GROUTED SOLID WITH HIGH SLUMP 6" + SUPER PLASTICIZING 3000 PSI PEA GRAVEL CONCRETE.

6. REINFORCING SPLICES SHALL IN NO CASE BE LESS THAN 48 DIAMETERS, OR 2'-0" WHICHEVER IS GREATER, UNLESS OTHERWISE NOTED. BARS SPLICED BY NON-CONTACT LAP SPLICES SHALL NOT BE SPACED TRANSVERSELY FARTHER APART THAN ONE-FIFTH THE REQUIRED LENGTH OF LAP NOR MORE THAN 8 INCHES. THE MINIMUM DISTANCE BETWEEN THE EDGE OF REINFORCING AND THE MASONRY UNITS SHALL NOT BE LESS THAN HALF AN INCH.

7. PROVIDE DOWELS AND MATCH VERTICAL REINFORCING AT ALL CMU WALLS UNLESS OTHERWISE NOTED.

8. MECHANICAL SPLICING IF REQUIRED, SHALL HAVE THE BARS CONNECTED TO DEVELOP AT LEAST 125 PERCENT OF THE SPECIFIED YIELD STRENGTH OF THE BAR. IF MECHANICAL SPLICING IS USED, SUBMIT PRODUCT LITERATURE DESCRIBING STRENGTH AND METHOD OF INSTALLATION.

9. HOLLOW UNITS SHALL BE LAID WITH FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS EXCEPT THAT WEBS SHALL ALSO BE BEDDED WHERE THEY ARE ADJACENT TO CELLS TO BE REINFORCED AND/OR FILLED WITH GROUT, IN THE STARTING COURSE ON FOOTINGS AND SOLID FOUNDATION WALLS AND IN NON-REINFORCED OR GROUTED PIERS, PILASTERS, AND COLUMNS.

10. SOLID MASONRY UNITS SHALL BE LAID WITH FULL HEAD AND BED JOINTS.

11. POINTS OF BEARING SHALL BE ON TWO (2) COURSES OF SOLID MASONRY GROUTED SOLID CONTINUOUSLY.

12. ALL AUTHORIZED CUTTING AND FITTING OF MASONRY, INCLUDING THAT REQUIRED TO ACCOMMODATE THE WORK OF OTHER TRADES, SHALL BE DONE WITH MASONRY SAWS.

13. PROVIDED ADEQUATE, TEMPORARY BRACING AS REQUIRED DURING CONSTRUCTION TO WITHSTAND LATERAL LOADS AND THE PRESSURE OF FLUID GROUT. PROVIDE INTERMEDIATE BRACING AS THE WORK PROGRESSES.

14. CONCRETE MASONRY SHALL BE PROTECTED FROM ABSORBING MOISTURE AND WATER WHILE AT THE PLANT, DURING SHIPMENT AND AT THE SITE DURING CONSTRUCTION.

15. PROVIDE ADDITIONAL (2) #4 CONTINUOUS VERTICAL REINFORCEMENT AT ALL CORNERS AND OPENING JAMBS IN CMU WALLS.

16. REPOINTING SHALL BE TO A MINIMUM OF 3/4" OR MORE IF REQ'D.

17. CONSTRUCTION AND/OR CONTROL JOINT SHALL BE PLACED AS SHOWN ON PLAN.

STRUCTURAL METAL DECK NOTES:

1. FABRICATE METAL DECKING FROM STEEL TYPE ASTM A446, GRADE A, HAVING A MINIMUM YIELD STRENGTH OF 33,000 PSI; HOT DIPPED GALVANIZED.

2. SUBMIT, TO THE ARCHITECT, PUBLISHED MANUFACTURER'S DATA VERIFYING THE SPECIFIC DECK REQUIREMENTS. SUBMIT ENGINEERED AND CHECKED SHOP DRAWINGS INDICATING LOCATION, GAUGE AND SIZE OF EACH PIECE OF DECKING. SHOP DRAWINGS SHALL CLEARLY SHOW FASTENING/WELDING DETAILS TO STRUCTURAL FRAMING, SIDE LAP CONNECTION DETAILS AND SUPPLEMENTARY SUPPORT STEEL AS REQUIRED.

3. FASTEN METAL DECKING AT 12 INCHES MAXIMUM ON CENTER TO THE SUPPORTING STEEL FASTEN SIDE LAPS AT 30 INCHES MAXIMUM ON CENTER.

4. PROVIDE CONTINUOUS SHEET METAL CLOSURES AT ALL SLAB OPENINGS AND SLAB EDGES AND CONTINUOUS DECK CLOSURE AT ALL DECK ENDS.

5. DECK SHALL BE OF A MIN. OF TWO (2) SPANS CONTINUOUS U.O.N.

STRUCTURAL NOTES

1. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE CITY OF NEW YORK.

2. COORDINATE THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL AND M/E/P DRAWINGS.

3. EXISTING CONDITIONS, ELEVATORS, DIMENSIONS AND SYSTEMS SHOWN ON PLANS ARE BASED ON LIMITED FIELD OBSERVATIONS. THE CONTRACTOR SHALL FIELD-VERIFY ALL DETAILS, DIMENSIONS AND ASSUMPTIONS PRIOR TO ANY WORK. WHERE EXISTING CONDITIONS DIFFER FROM OR PRECLUDE THE EXECUTION OF THE OUTLINED DETAILS, THE ENGINEER SHALL BE NOTIFIED.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL FINAL FIELD-VERIFIED DIMENSIONS AND SHALL SUBMIT FIELD-VERIFIED DIMENSIONED SHOP DRAWINGS.

5. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER. STAGING AND SEQUENCE OF SHORING, BRACING OR OTHER CONSTRUCTION REQUIRED FOR SUCH WORK SHALL BE PREPARED IN THE FORM OF SHOP OR DETAIL DRAWINGS AND CALCULATIONS.

6. DO NOT FABRICATE ANY WORK WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS FOR ALL STRUCTURAL WORK, AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE STRUCTURAL WORK.

7. CONTRACTOR TO PROTECT AT ALL TIMES EQUIPMENT, PIPES AND OTHER EXPOSED OR EMBEDDED ITEMS ON THE SITE AGAINST DAMAGE. REROUTE AS REQUIRED PER M/E/P DRAWINGS.

CONTROLLED INSPECTIONS REQUIRED:

1.ALL CONTROLLED INSPECTION SHALL BE CONDUCTED BY A SPECIAL INSPECTION AGENCY RETAINED BY THE CONTRACTOR SUCH AGENCY SHELL BE REGISTERED WITH N.Y.C DEPARTMENT OF BUILDINGS AS QUALIFIED TO CONDUCT SPECIFIED INSPECTIONS AND EMPLOY SPECIAL INSPECTOR

2. THE CONTRACTOR MUST NOTIFY THE INSPECTOR FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

3.INSPECTIONS UNDER STRUCTURAL APPLICATION
STRUCTURAL STEEL – WELDING AS PER BC 1704.3.1
STRUCTURAL STEEL – ERECTION & BOLTING AS PER BC 1704.3.2 & BC 1704.3.3
MASONRY AS PER BC 1704.5
STRUCTURAL SAFETY – STRUCTURAL STABILITY AS PER BC 1704.19

4. SEE ARCH. DRAWINGS FOR ADDITIONAL INSPECTIONS.

DRAWING LIST

NO.	DRAWING NO.	DRAWING TITLE
1	S-001.00	GENERAL NOTES
2	S-002.00	TYPICAL STEEL DETAILS
3	S-003.00	TYPICAL FLOOR JOIST DETAILS
4	S-004.00	TYPICAL FLOOR JOIST DETAILS
5	S-005.00	TYPICAL FLOOR JOIST DETAILS
6	S-006.00	TYPICAL LIGHT GAUGE DETAILS
7	S-101.00	1ST FL & 2ND FL FRAMING PLANS
8	S-102.00	3RD FL & 4TH FL FRAMING PLANS
9	S-103.00	PENTHOUSE FL AND BULKHEAD FRAMING PLANS
10	S-201.00	DETAILS

LOADING SCHEDULE

FLOOR	DEAD LOAD (PSF)	SUPERIMPOSED (PSF)	TOTAL DEAD LOAD (PSF)	LIVE LOAD (PSF)	TOTAL LOAD (PSF)
CELLAR	–	–	–	40	40
1ST TO 4TH FL	37	20	57	40	97
1ST FL ENTRY	37	20	57	100	157
PENTHOUSE RES.	37	20	57	40	97
ROOF	41	10	51	100	151
BULKHEAD	30	10	40	50	90
BALCONY	37	10	47	60	107

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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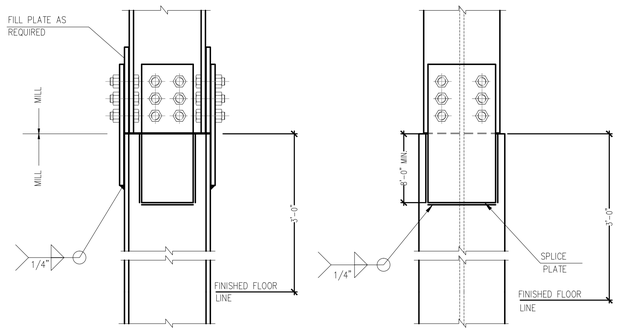
Project
56 FROST STREET
BROOKLYN, NY 11211

Drawing
GENERAL NOTES

Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	S-001.00
CAD FILE No:	1 OF 10

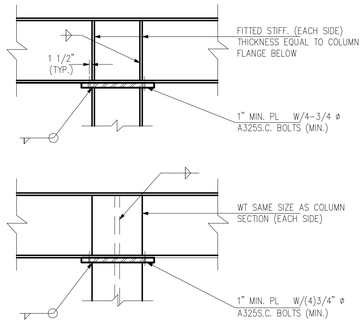


1 TYPICAL COLUMN SPLICE

SCALE: N.T.S.

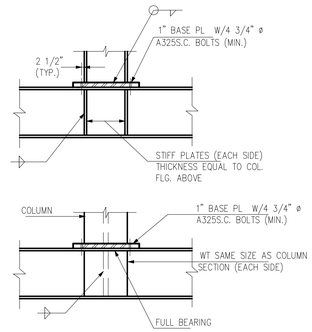
NOTES:

1. PROVIDE COLUMN SPLICE WITH FULL MOMENT CAPACITY AT MOMENT FRAME AND BRACED FRAME



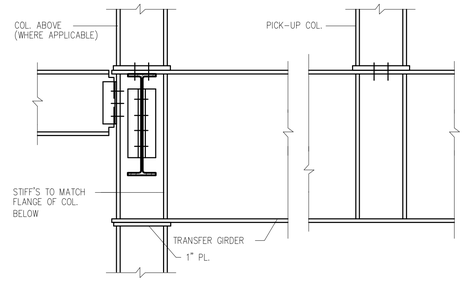
2 TYPICAL DETAIL FOR BEAM OVER COLUMN

SCALE: N.T.S.



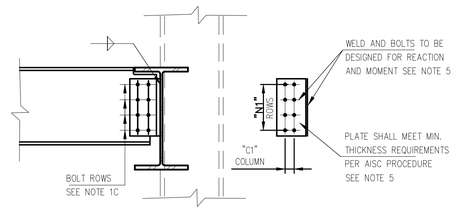
3 TYPICAL DETAIL FOR COLUMN OR POST PICK-UP

SCALE: N.T.S.



4 TYPICAL DETAIL AT COLUMN SUPPORTING TRANSFER GIRDER

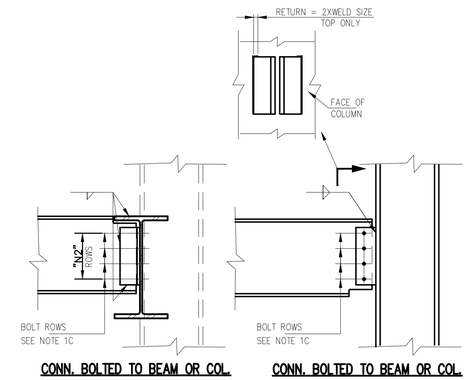
SCALE: N.T.S.



5 SHEAR PLATE CONNECTIONS TO BEAM OR COLUMN

SCALE: N.T.S.

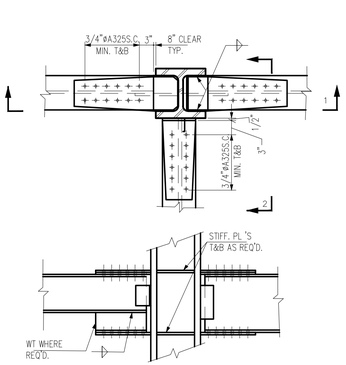
NOTE: CONN. SIMILAR WHEN CONNECTING TO GIRDER OR COLUMN (SHOWN AS DASHED LINE)

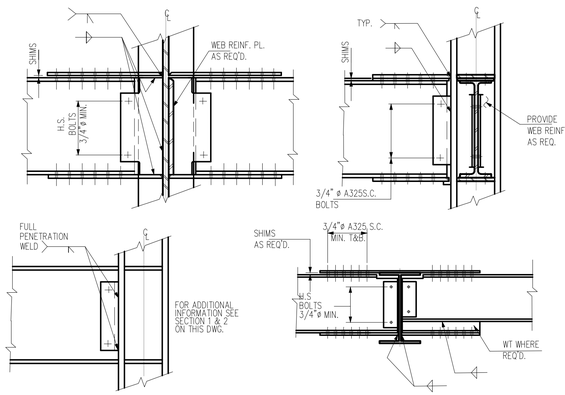


6 DOUBLE ANGLE CONNECTIONS TO BEAM OR COLUMN

SCALE: N.T.S.

NOTE: CONN. SIMILAR WHEN CONNECTING TO GIRDER OR COLUMN (SHOWN AS DASHED LINE)



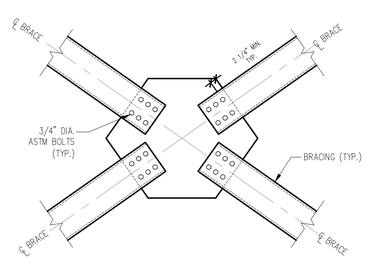


7 TYPICAL MOMENT CONNECTION DETAILS

SCALE: N.T.S.

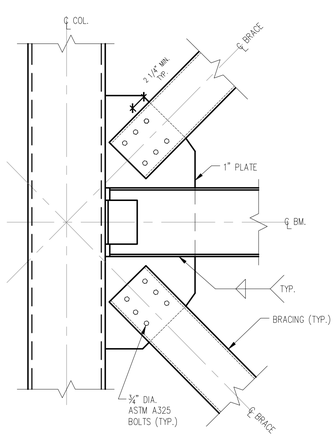
NOTES:

1. WELDS & BOLTS FOR MOM. CONNECTION MUST DEVELOP MOMENTS AS INDICATED ON DRAWINGS.
2. MIN. THICKNESS OF MOMENT PLATES SHALL BE 3/4"
3. WELD MAY BE SUBSTITUTED FOR BOLTS UPON APPROVAL BY ENGINEER OF AN EQUIVALENT DETAIL.
4. PROVIDE WEB REINFORCING WHERE REQUIRED DUE TO WEB CUT FOR CONNECTIONS.
5. PROVIDE COLUMN WEB DOUBLER PLATES AND/OR COLUMN FLANGE STIFFENERS WHERE REQUIRED TO RESIST FORCES FROM MOMENT CONNECTIONS.
6. ALL W.G. MEMBERS TO HAVE FULL CAPACITY MOMENT CONNECTIONS U.O.N.



8 TYPICAL BRACING CONNECTION

SCALE: N.T.S.



9 TYPICAL BRACING CONNECTION

SCALE: N.T.S.

MIN. No OF BOLTS AND MIN. CONNECTION CAPACITY		
BEAM SIZE	"N"	"V"
W36	6	60
W33	6	60
W30	5	50
W27	5	50
W24	4	40
W21	4	40
W18	3	30
W16	3	30
W14	3	30
W12	2	20
W10	2	20
W8	2	20

"V" = MINIMUM CONN. SERVICE LOAD CARRYING CAPACITY IN KIPS. U.O.N.
"N" = MINIMUM NUMBER OF BOLT ROWS

NOTES:

1. SIMPLE SHEAR CONNECTIONS SHALL BE DESIGNED FOR THE REACTION SHOWN ON THE DRAWINGS OR THE GREATEST OF THE FOLLOWING:
   a. FOR COMPOSITE BEAMS, REACTION FROM AISC LRFD UNIFORM LOAD TABLES FOR BEAMS FOR APPLICABLE BEAM MATERIAL MULTIPLIED BY 2.0.
   b. FOR NON-COMPOSITE BEAMS, REACTION FROM AISC LRFD UNIFORM LOAD TABLES FOR BEAMS FOR APPLICABLE BEAM MATERIAL MULTIPLIED BY 1.3
   c. MINIMUM NUMBER OF BOLT ROWS AND MINIMUM CONNECTION CAPACITY, SEE TABLE
2. BOLTS SHALL BE 3/4" DIAMETER A325 MINIMUM (U.O.N.).
3. ALL BOLTS SHALL BE FULLY PRE-TENSIONED.
4. PROVIDE WEB REINFORCING AS REQUIRED DUE TO WEB CUTS, COPES AND ETC.
5. DESIGN OF DOUBLE ANGLE AND SHEAR PLATE CONNECTIONS SHALL BE BASED UPON THE LATEST AISC PROCEDURES SHOWN IN THE AISC MANUAL OF STEEL CONSTRUCTION, VOLUME II CONNECTIONS.
6. FACTOR FOR CONVERSION OF LOADS FROM SERVICE TO ULTIMATE SHALL BE EQUAL TO 1.3.
7. ALTERNATE CONNECTION SYSTEM (SINGLE ANGLE) MAY BE USED AT FILLER BEAM TO BEAM CONNECTIONS ONLY PROVIDED THE DETAILER SUBMITS DESIGN PROCEDURE TO ENGINEER OF RECORD FOR APPROVAL.

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

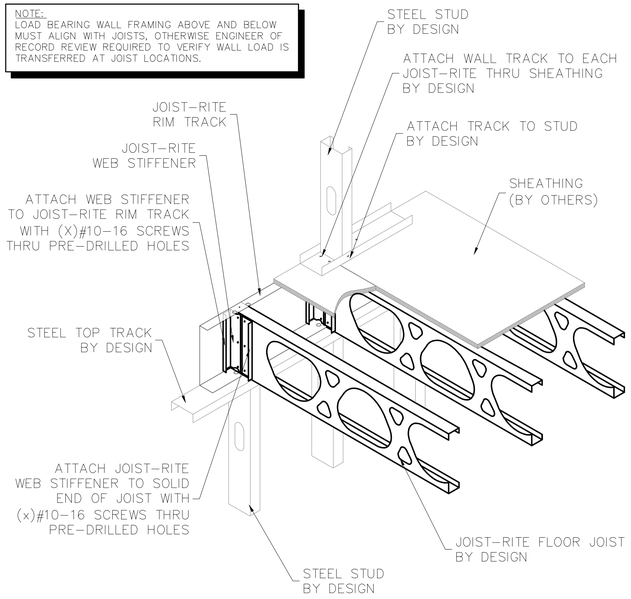
56 FROST STREET
BROOKLYN, NY 11211

Drawing

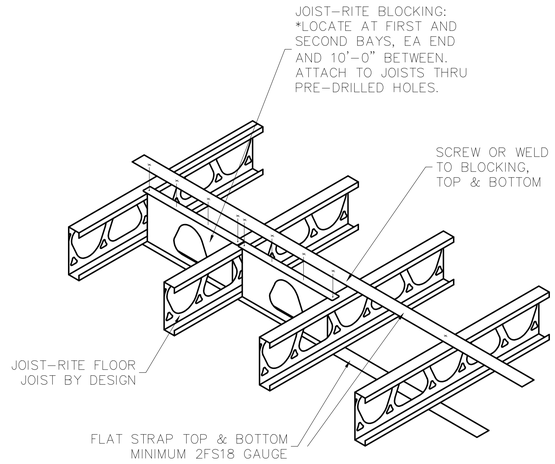
TYPICAL STEEL DETAILS

Seal:

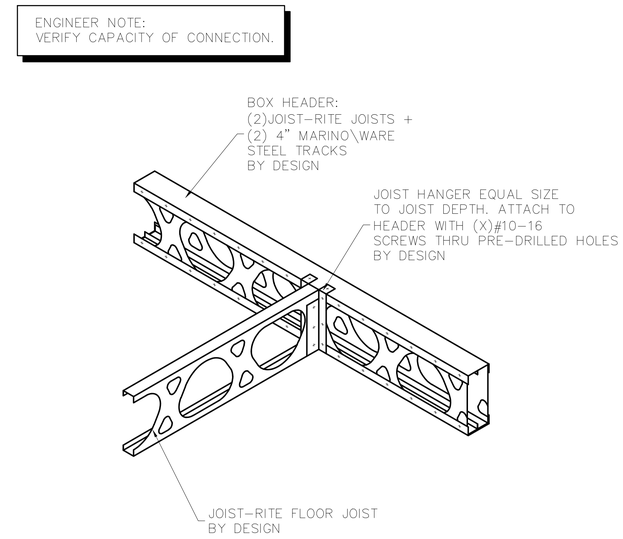
DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-002.00**
CAD FILE No:	2 OF 10



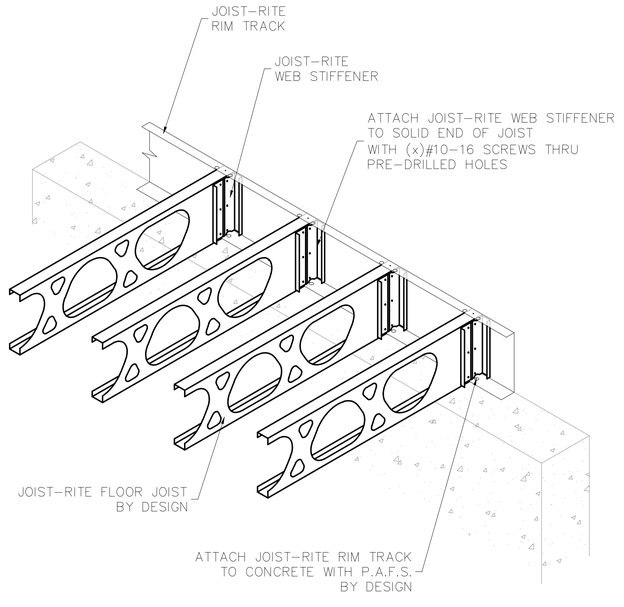
1 **JOIST-RITE BEARING ON STEEL STUD**
SCALE: 1" = 1'-0"



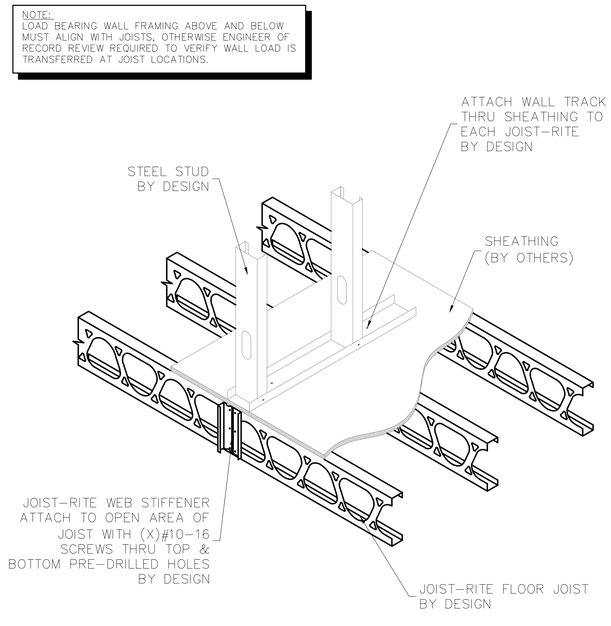
2 **JOIST-RITE BRIDGING AND BLOCKING**
SCALE: 1" = 1'-0"



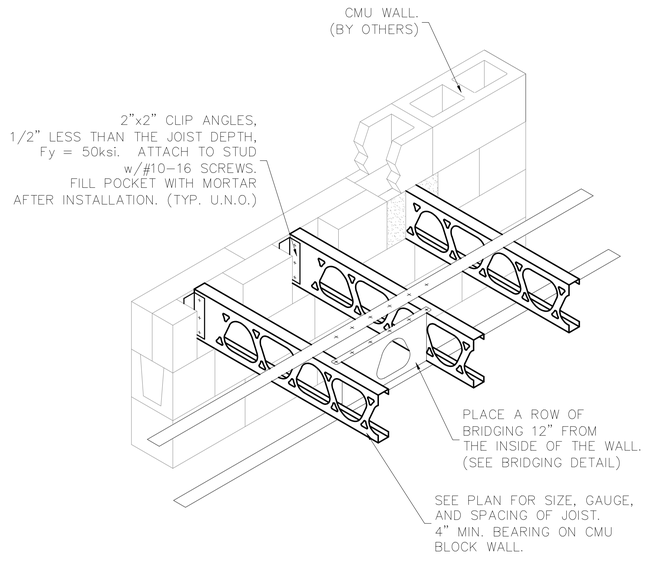
3 **JOIST-RITE TO HEADER DETAIL**
SCALE: 1" = 1'-0"



4 **JOIST-RITE BEARING ON MASONRY**
SCALE: 1" = 1'-0"



5 **BEARING WALL ON JOIST-RITE**
SCALE: 1" = 1'-0"



6 **JOIST-RITE ATTACHMENT**
JOIST BEARING ON POCKETED CMU WALL
SCALE: 1" = 1'-0"

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2	07/14/15	Structural update
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Project
56 FROST STREET
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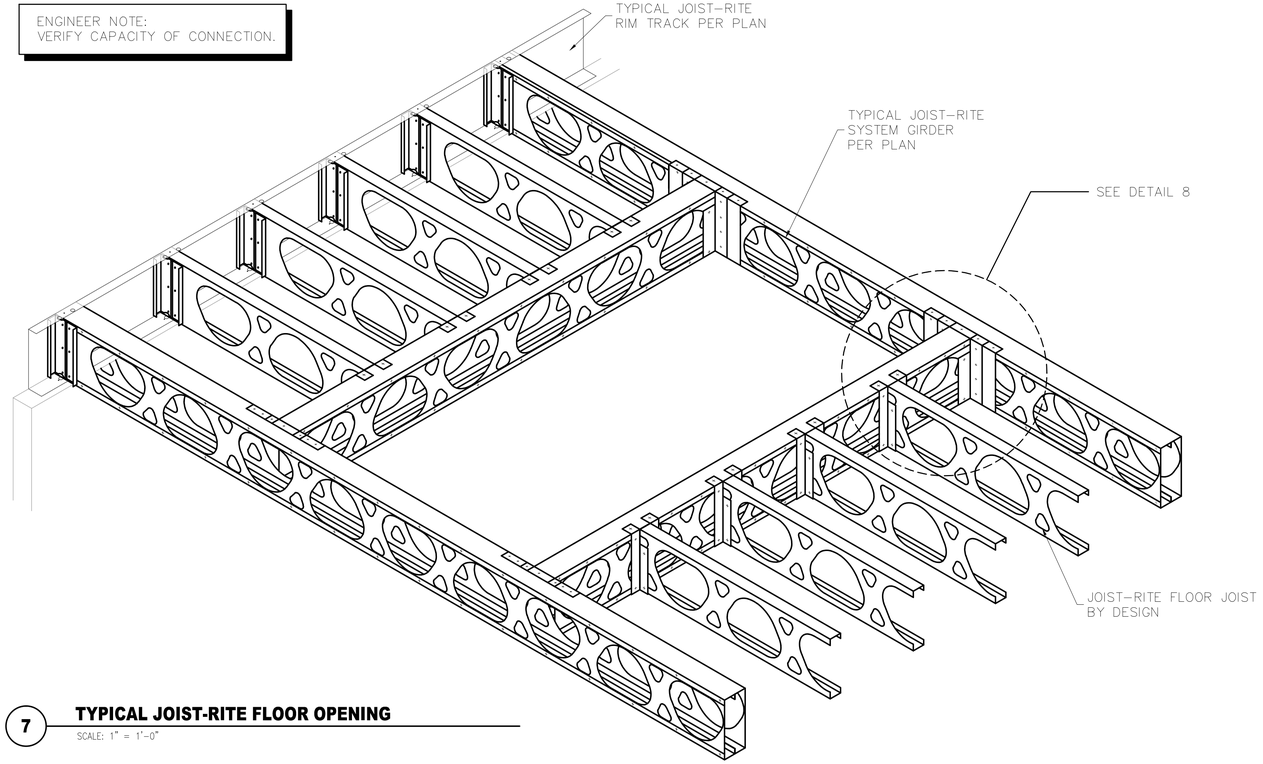
Drawing
TYPICAL FLOOR JOIST DETAILS

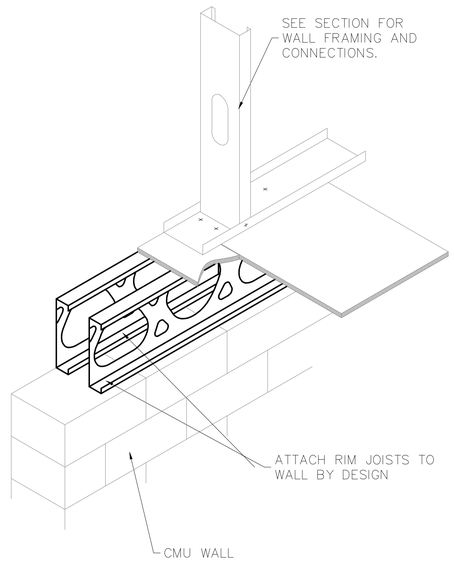
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	S-003.00
CAD FILE No:	3 OF 10

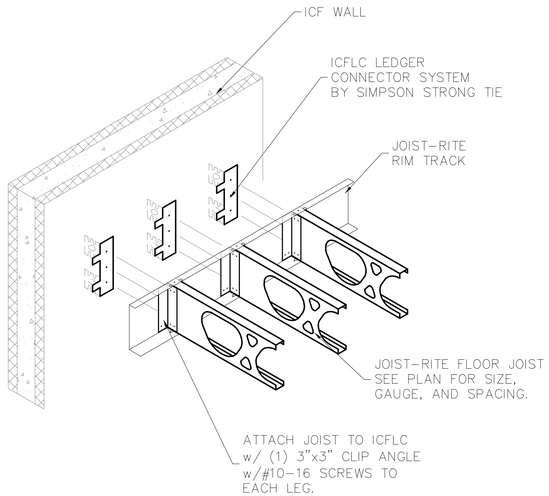
ENGINEER NOTE:
VERIFY CAPACITY OF CONNECTION.



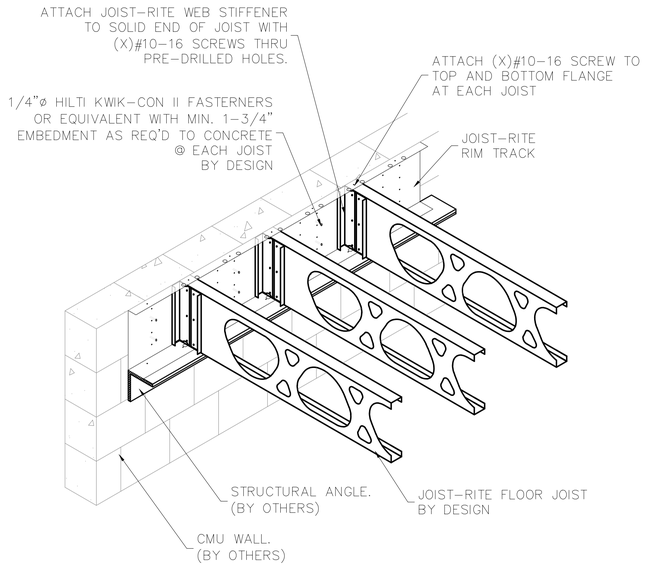
7 **TYPICAL JOIST-RITE FLOOR OPENING**
SCALE: 1" = 1'–0"



8 **DOUBLE JOIST DETAIL - AT EXTERIOR WALL**
SCALE: 1" = 1'–0"

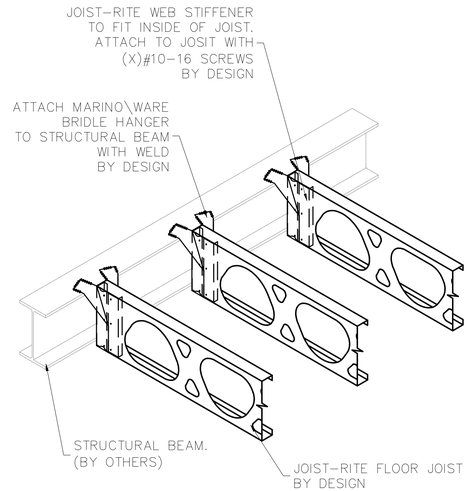


9 **JOIST-RITE CONNECTION TO ICF WALL**
SCALE: 1" = 1'–0"



10 **JOIST-RITE CONNECTION TO CMU WALL**
SCALE: 1" = 1'–0"

ENGINEER NOTE:
VERIFY CAPACITY OF CONNECTION.



11 **JOIST-RITE CONNECTION TO I-BEAM**
SCALE: 1" = 1'–0"

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Project

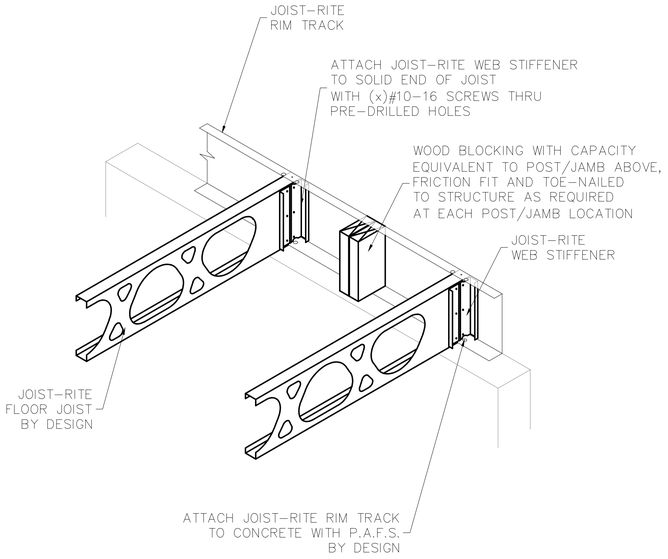
56 FROST STREET
BROOKLYN, NY 11211

Drawing

TYPICAL FLOOR JOIST DETAILS

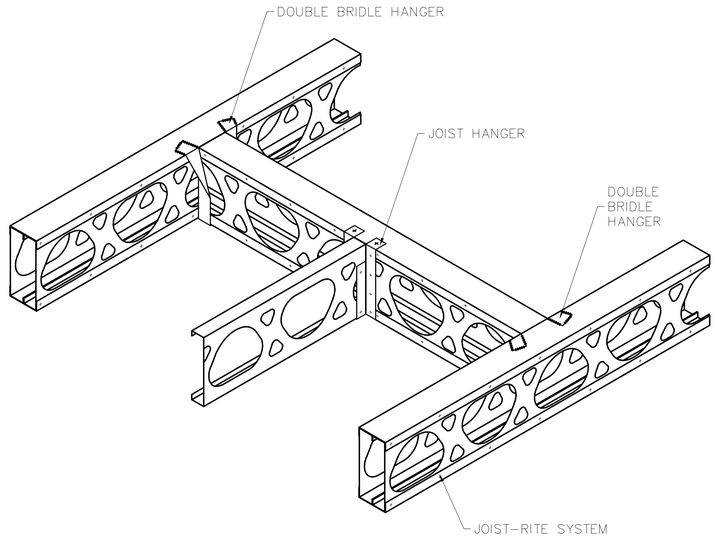
Seal:

DATE:	10/14/14
PROJECT No:	1309–1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-004.00**
CAD FILE No:	4 OF 10



12 **SQUASH BLOCK CONDITION**

USING WOOD STUD
SCALE: 1" = 1'–0"

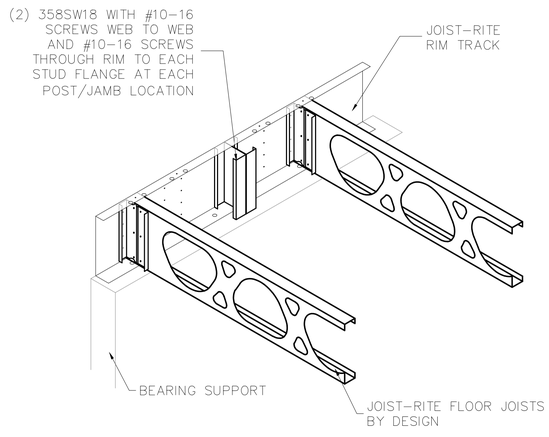


13 **TYPICAL JOIST-RITE DETAIL**

USING DOUBLE BRIDLE HANGER
SCALE: 1" = 1'–0"

NOTE:
LOAD BEARING WALL FRAMING ABOVE AND BELOW MUST ALIGN WITH JOISTS, OTHERWISE E.O.R. REVIEW REQUIRED TO VERIFY WALL LOAD IS TRANSFERRED AT JOIST LOCATIONS.

NOTE:
SQUASH BLOCK CAPACITY = 5973 LBS.
IF ACTUAL LOADS EXCEEDS CAPACITY FURTHER ENGINEERING REVIEW IS REQUIRED.



13 **SQUASH BLOCK CONDITION**

USING STEEL STUD
SCALE: 1" = 1'–0"

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

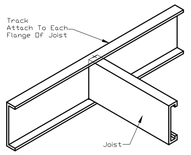
56 FROST STREET
BROOKLYN, NY 11211

Drawing

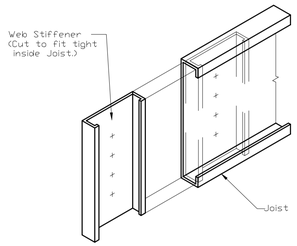
TYPICAL FLOOR JOIST DETAILS

Seal:

DATE:	10/14/14
PROJECT No:	1309–1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-005.00**
CAD FILE No:	5 OF 10

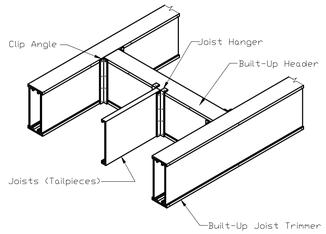


FLOOR SYSTEMS - JOIST END CLOSURE



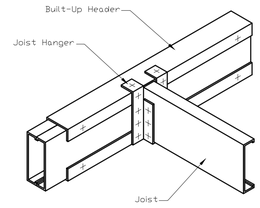
NOTE: NO. OF SCREWS WILL VARY WITH DEPTH OF JOIST

FLOOR SYSTEMS
WEB STIFFENER TYPICAL CONNECTION



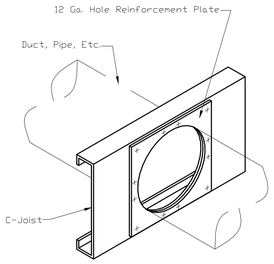
NOTE: FASTEN BUILT-UP MEMBERS TOGETHER AT 12" O.C. MAX.

FLOOR SYSTEMS
TYPICAL FLOOR OPENING FRAMING



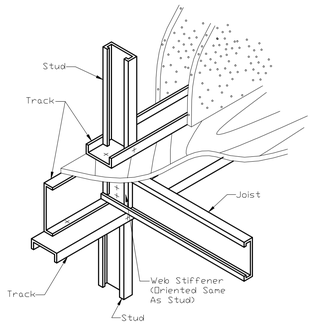
NOTE: 1. FASTEN BUILT-UP MEMBERS TOGETHER AT 12" O.C. MAX.
2. ALL SCREWS MUST BE INSTALLED

FLOOR SYSTEMS - JOIST HANGER CONNECTION



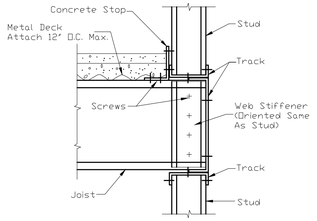
NOTE: 1. ALL SCREWS MUST BE INSTALLED
(OR EQUAL AMOUNT OF WELD)
2. DO NOT TORCH CUT HOLES IN JOIST

FLOOR SYSTEMS - HOLE REINFORCEMENT PLATE



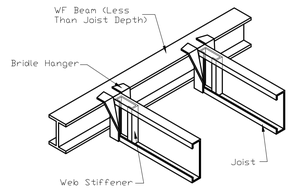
NOTE: 1. ALIGN WEBS OF ALL MEMBERS.
2. ATTACH PLYWOOD TO JOIST AT 12" O.C. IN FIELD
OF BOARD AND 6" O.C. AT ENDS.

FLOOR SYSTEM - EXTERIOR WALL



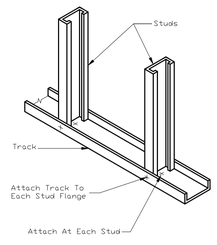
NOTE: 1. NO. OF SCREWS WILL VARY WITH DEPTH OF JOIST
2. ALIGN WEBS OF ALL MEMBERS

FLOOR SYSTEMS - JOIST END FRAMING

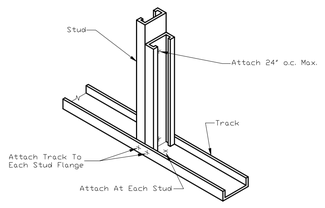


NOTE: 1. WELD, SCREW, OR P.A.F. ATTACH BRIDLE HANGER TO BEAM
2. ATTACH BRIDLE HANGER TO WEB OF JOIST

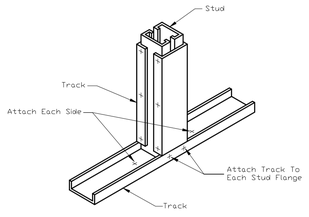
FLOOR SYSTEMS - CONNECTION TO WF BEAM



LOAD BEARING WALL - STUDS IN PLACE

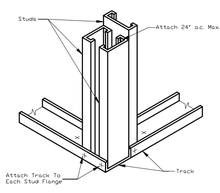


LOAD BEARING WALL - DOUBLED STUDS

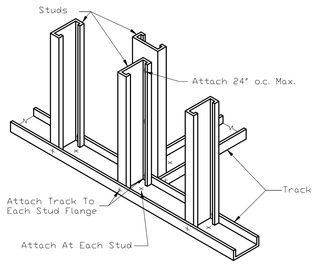


NOTE: FASTEN BUILT-UP MEMBER TOGETHER AT 12" O.C. MAX

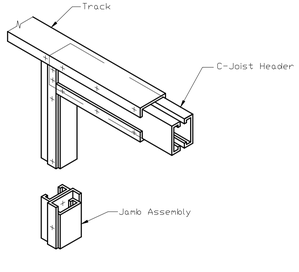
LOAD BEARING WALL - BUILT-UP POST



LOAD BEARING WALL - THREE STUD CORNER

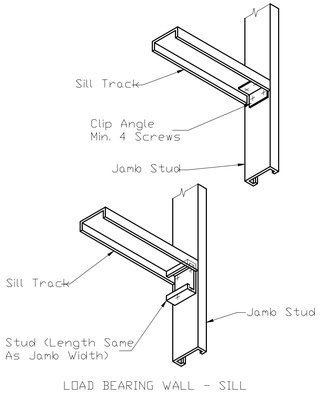


LOAD BEARING WALL - PARTITION INTERSECTION

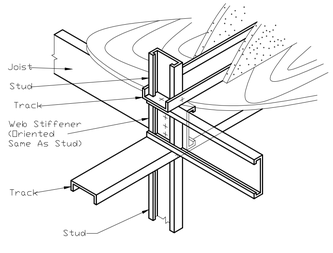


NOTE: FASTEN BUILT-UP MEMBERS TOGETHER AT 12" O.C. MAX.

LOAD BEARING WALL - BEARING HEADER

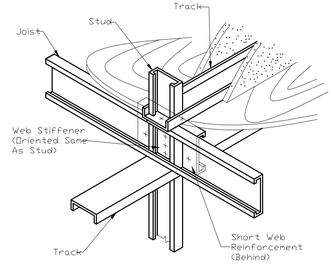


LOAD BEARING WALL - SILL



NOTE: 1. ALIGN WEBS OF ALL MEMBERS
2. ATTACH PLYWOOD TO JOIST AT 12" O.C. IN FIELD
OF BOARD AND 6" O.C. AT ENDS

LOAD BEARING WALL
INTERIOR WALL-LAPPED JOISTS



NOTE: 1. ALIGN WEBS OF ALL MEMBERS
2. ATTACH PLYWOOD TO JOIST AT 12" O.C. IN FIELD
OF BOARD AND 6" O.C. AT ENDS

LOAD BEARING WALL
INTERIOR WALL-CONTINUOUS JOIST

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

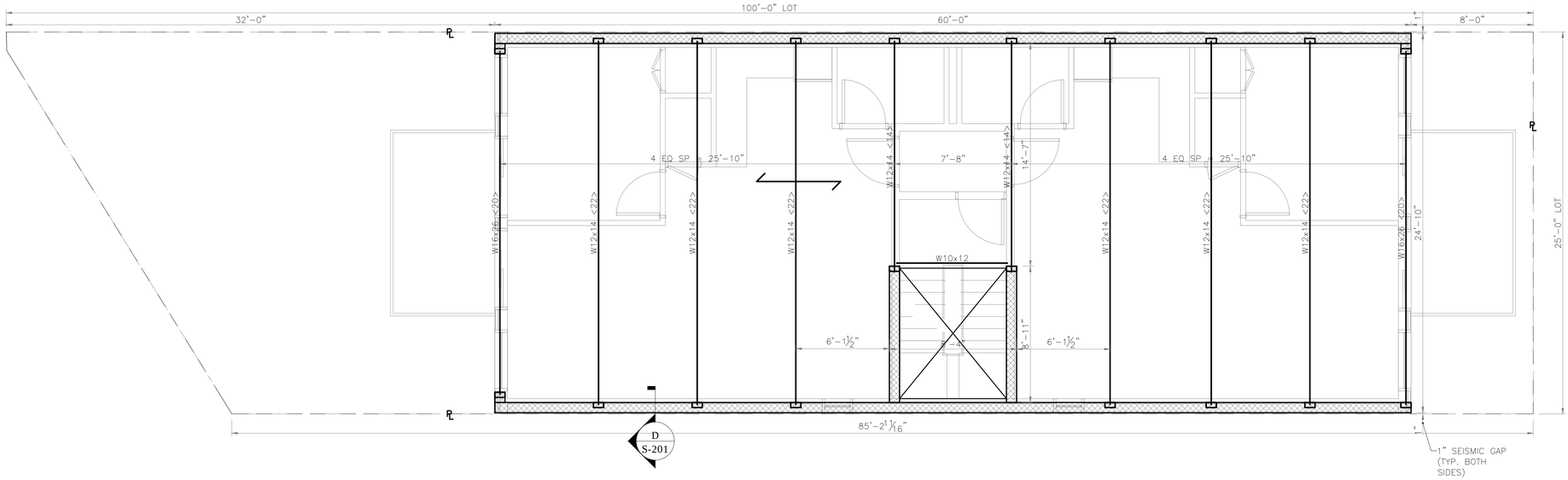
56 FROST STREET
BROOKLYN, NY 11211

Drawing

TYPICAL FLOOR JOIST DETAILS

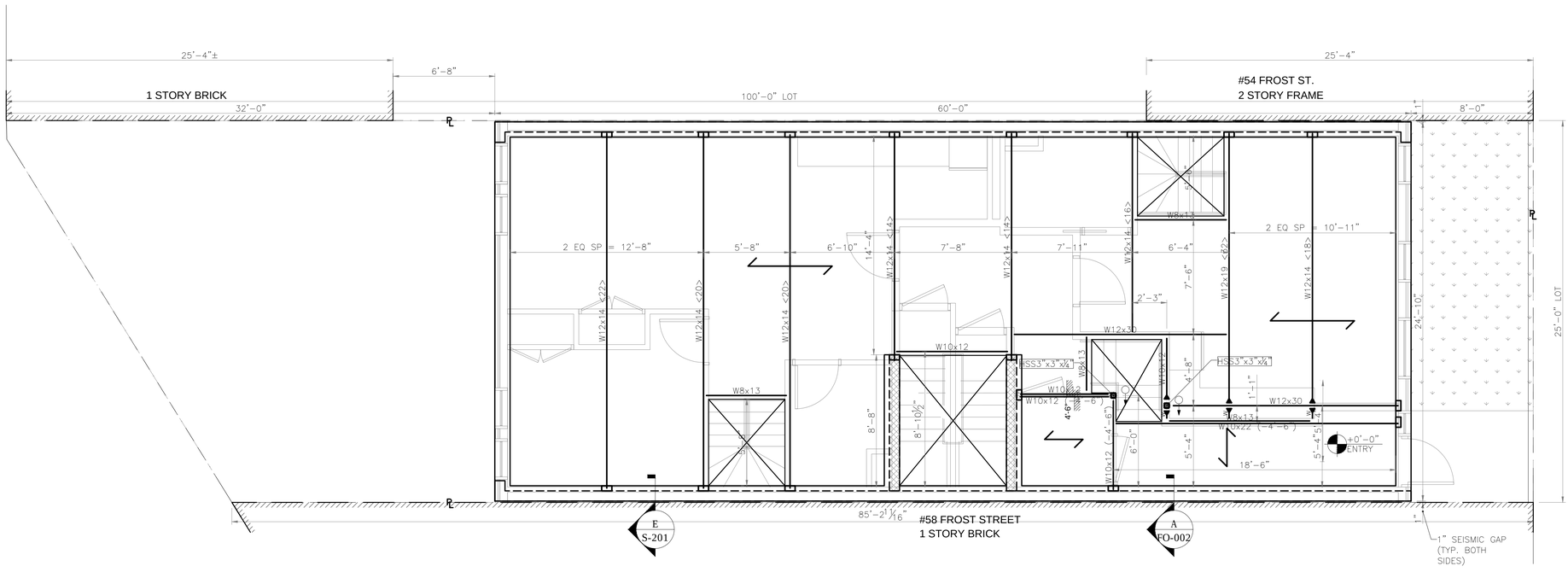
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-006.00**
CAD FILE No:	6 OF 10



2ND FLOOR FRAMING PLAN

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



1ST FLOOR FRAMING PLAN

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

LEGEND

- NEW WALL BELOW
- NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

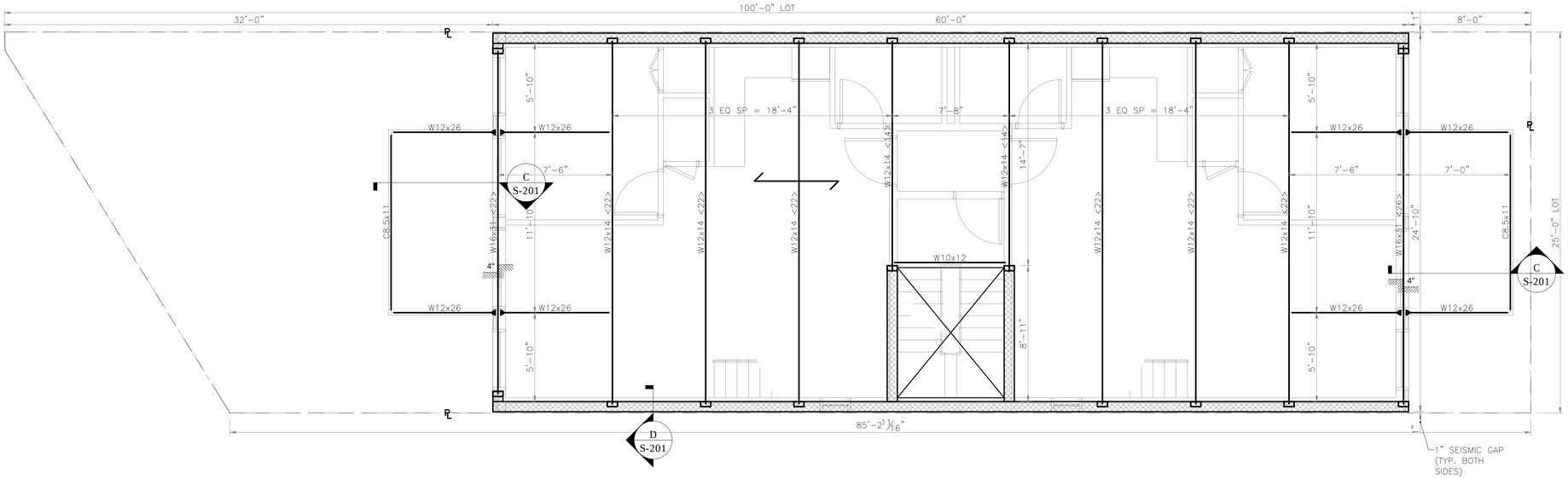
56 FROST STREET
BROOKLYN, NY 11211

Drawing

1ST FL AND 2ND FL FRAMING PLANS

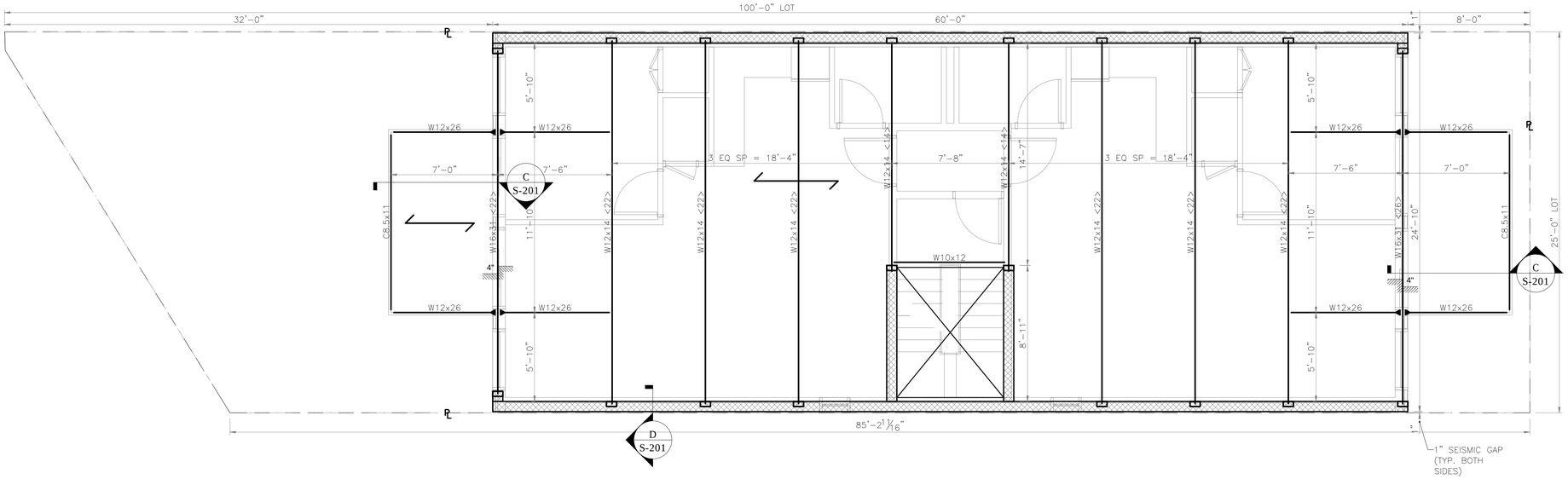
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-101.00**
CAD FILE No:	7 OF 10



4TH FLOOR FRAMING PLAN

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



3RD FLOOR FRAMING PLAN

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

LEGEND

- PATTERN — NEW WALL BELOW
- PATTERN — NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

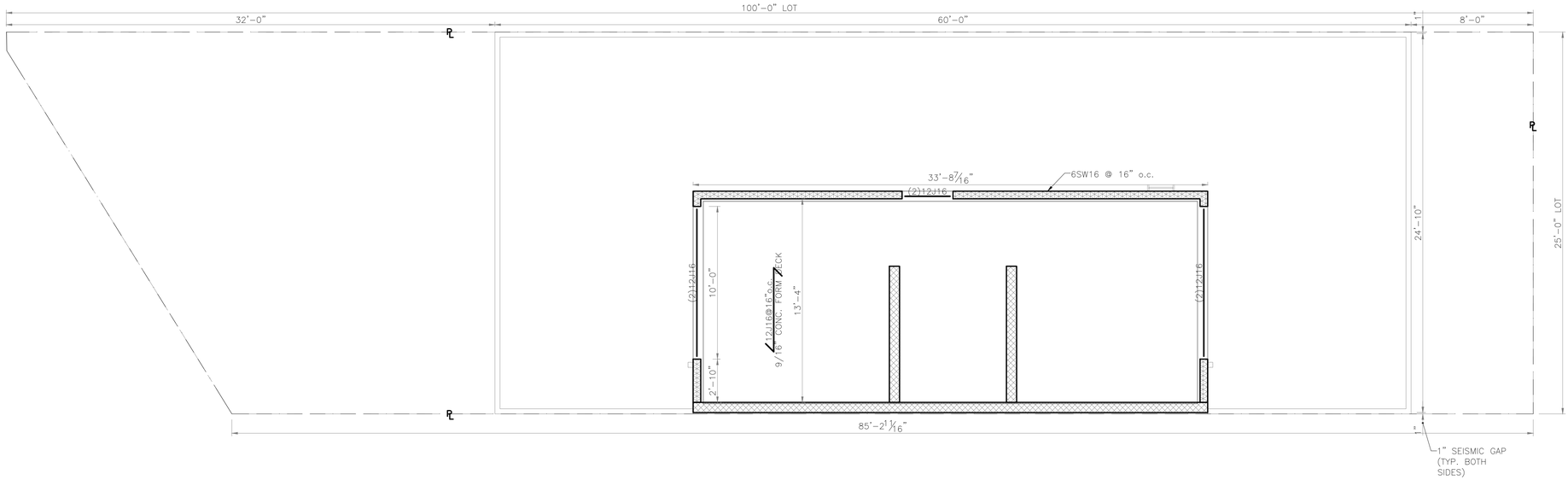
56 FROST STREET
BROOKLYN, NY 11211

Drawing

3RD FL AND 4TH FL FRAMING PLANS

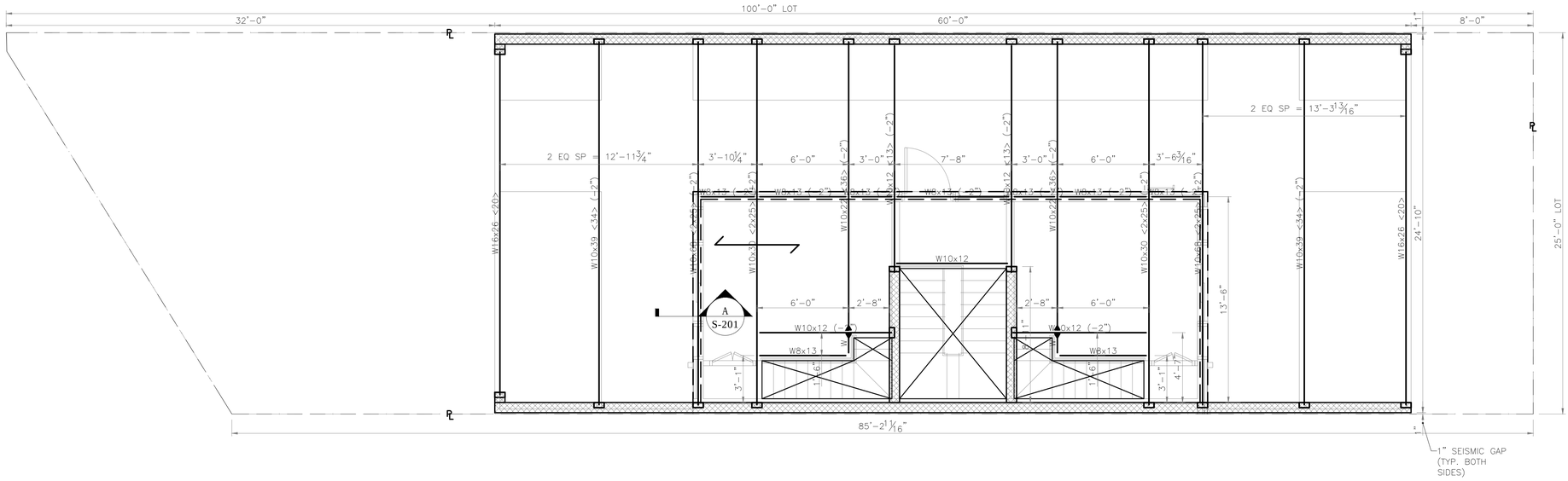
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	S-102.00
CAD FILE No:	8 OF 10



BULKHEAD FRAMING PLAN

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



PENTHOUSE FRAMING PLAN

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

LEGEND

- PATTERN — NEW WALL BELOW
- PATTERN — NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

No.	Date	Revision
2	07/14/15	Structural update
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Project

56 FROST STREET
BROOKLYN, NY 11211

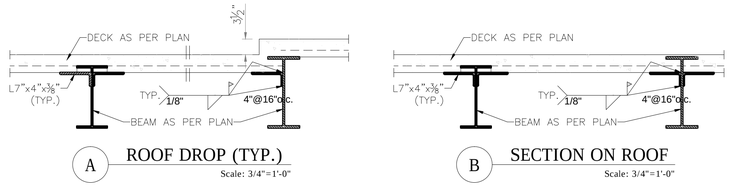
Drawing

PENTHOUSE/ROOF & BULKHEAD FRAMING PLANS

Seal:

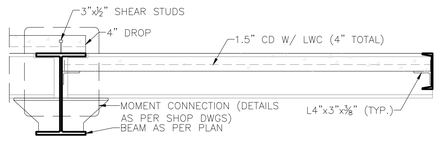
STATE OF NEW YORK — RAJESH SHARON — LICENSED PROFESSIONAL ENGINEER

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	S-103.00
CAD FILE No:	9 OF 10

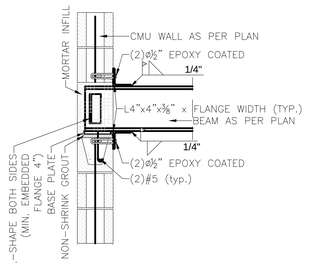


A ROOF DROP (TYP.)
Scale: 3/4"=1'-0"

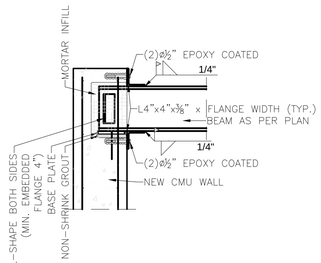
B SECTION ON ROOF
Scale: 3/4"=1'-0"



C BALCONY DROP
Scale: 3/4"=1'-0"



D POCKET IN CMU WALL (TYP.)
Scale: 3/4"=1'-0"



E POCKET IN CONCRETE WALL (TYP.)
Scale: 3/4"=1'-0"

MAXIMUM UNSHORED CLEAR SPAN ([ft-in], LIGHT WEIGHT CONCRETE, MAX 110PCF)

DECK / SLAB	1.5 VL VULCRAFT								
	22 ga.			20 ga.			18 ga.		
	SINGLE SPAN	DOUBLE SPAN	TRIPLE SPAN	SINGLE SPAN	DOUBLE SPAN	TRIPLE SPAN	SINGLE SPAN	DOUBLE SPAN	TRIPLE SPAN
3.5"	6-4	8-5	8-6	7-8	9-7	9-11	9-6	11-4	11-9
4"	6-0	8-1	8-1	7-3	9-7	9-9	8-11	11-4	11-5
4.5"	5-9	7-8	7-8	6-11	9-2	9-4	8-6	10-10	11-0
4.75"	5-7	7-7	7-7	6-9	9-0	9-1	8-3	10-7	10-9
5"	5-6	7-5	7-5	6-7	8-10	8-11	8-1	10-5	10-7
5.75"	5-2	7-0	7-0	6-2	8-4	8-5	7-7	9-10	10-0

MINIMUM ACI CD SLAB REINFORCEMENT

DECK / SLAB	ACI RECOMMENDED WELDED WIRE FABRIC		
	1.5 CD	2.0 CD	3.0 CD
3.5"	WWF 6x6-W1.4xW1.4	N/A	N/A
4"	WWF 6x6-W1.4xW1.4	WWF 6x6-W1.4xW1.4	N/A
4.5"	WWF 6x6-W1.4xW1.4	WWF 6x6-W1.4xW1.4	N/A
5"	WWF 6x6-W2.1xW2.1	WWF 6x6-W1.4xW1.4	WWF 6x6-W1.4xW1.4
5.5"	WWF 6x6-W2.1xW2.1	WWF 6x6-W2.1xW2.1	WWF 6x6-W1.4xW1.4
6"	WWF 6x6-W2.1xW2.1	WWF 6x6-W2.1xW2.1	WWF 6x6-W1.4xW1.4
6.5"	N/A	WWF 6x6-W2.1xW2.1	WWF 6x6-W2.1xW2.1
7"	N/A	N/A	WWF 6x6-W2.1xW2.1
7.5"	N/A	N/A	WWF 6x6-W2.1xW2.1

1. MINIMUM REQUIRED BEARING LENGTH (INTERIOR/EXTERIOR):
   1.a. 1.5 CD: 4"/1½"
   1.b. 2.0 CD: 4"/2"
   1.c. 3.0 CD: 5"/2½"

LOOSE LINTEL SCHEDULE

WALL THICKNESS	UNDER 4'-0" OPNG.	4'-0"+8'-0" OPNG.	8'-0"+12'-0"
8"	2Ls 4"x3"x5/16"	W8x31	W8x35
12"	3Ls 4"x3"x5/16"	W8x31 & W8x15	W8x31 & W8x31

BEAM BEARING PLATE SCHEDULE

BEAM SIZE	PLATE (TYP., U.O.N.)
W8	8"x¾"x8"
W10	8"x¾"x8"
W12	8"x1"x8"
W14	8"x1"x10"
W16	8"x1"x10"
W18	8"x1"x16"
W21	8"x1"x24"
W24	8"x1"x24"

No.	Date	Revision
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Project
56 FROST STREET
BROOKLYN, NY 11211

Drawing
DETAILS

Seal:

DATE: 10/14/14
PROJECT No: 1309-1091
DRAWING BY: A.P.
CHK BY: R.S.
DWG No:
S-201.00
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10 OF 10

Appendix 15
Construction Health and Safety Plan (CHASP)

Appendix 4
Construction Health and Safety Plan

for
56 Frost Street
Remedial Action Plan

56 Frost Street; Brooklyn, NY 11211
Block 2737, Lot 10
NYC VCP Number: 16CVCP007K
OER Project Number 14EHAZ352K

Submitted to:
New York City Office of Environmental Remediation
100 Gold Street, 2nd Floor
New York, NY 10038

Prepared for:
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2917 Avenue I
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August 2015

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1.0 INTRODUCTION

This Construction Health and Safety Plan (CHASP) has been prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and guidance that govern site investigation activities, other applicable regulations, and Tenen Environmental LLC (Tenen) health and safety policies and procedures. The purpose of this CHASP is the protection of Tenen field personnel and others during the implementation of the Remedial Action Plan.

The Site is located at 56 Frost Street in the Greenpoint section of Brooklyn, New York on the south side of 56 Frost Street between Lorimer and Leonard Streets. The Site is 2,315 square feet and contains a vacant, one-story building. The property is zoned M1-2/R6, which is a special mixed-use zoning district with residential and manufacturing/industrial uses. Several properties to the north and west are located in separate zoning districts, which are also special districts for mixed residential and industrial use.

The proposed development will consist of a 4-story residential building with a basement and a penthouse. The total excavation depth will be approximately 7 feet and two inches below grade from 56 Frost Street, and will be within the footprint of the proposed building.

1.1 Scope of CHASP

This CHASP includes safety procedures to be used by Tenen staff during the following activities:

- Implementation of remedial oversight and air monitoring activities during soil excavation for the proposed basement.

Contractors performing remedial construction work will ensure that performance of the work is in compliance with this CHASP and applicable laws and regulations. The CHASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Satisfaction.

2.0 PROJECT SAFETY AUTHORITY

The following personnel are responsible for project health and safety under this CHASP.

- Project Manager – Mohamed Ahmed
- Health and Safety Officer (HSO) – Matthew Carroll

In addition, each individual working at the Site will be responsible for compliance with this CHASP and general safe working practices. All Site workers will have the authority to stop work if a potentially hazardous situation or event is observed.

2.1 Designated Personnel

The Project Manager is responsible for the overall operation of the project, including compliance with the CHASP and general safe work practices. The Project Manager may also act as the Health and Safety Officer (HSO) for this project.

Tenen will appoint one of its on-site personnel as the on-site HSO. This individual will be responsible for the implementation of the CHASP. The HSO will have a 4-year college degree in occupational safety or a related science/engineering field, and at least two (2) years of experience in implementation of air monitoring and hazardous materials sampling programs. The HSO will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards.

The HSO will be present on-site during all field operations involving soil excavation or other subsurface disturbance, and will be responsible for all health and safety activities and the delegation of duties to the field crew. The HSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the HSO must be absent from the field, a replacement who is familiar with the Construction Health and Safety Plan, air monitoring and personnel protective equipment (PPE) will be designated.

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

Known previous occupants of the site were listed under commercial names with industrial style buildings. Occupancy includes an auto house along the frontage of Frost Street, a welder to the rear (along Meeker Avenue), an auto repair shop to the rear, and storage for mineral water to the rear of the Site.

Adjacent and nearby properties had similar historic uses, as well as residential, commercial and a variety of industrial uses. Operations with recognized environmental concerns include a brass refinery and brass foundries, an iron yard, tannery, lumber yard, a "moulding" company, a galvanizing works, cedar-ware manufacturing, varnish works, an electrical supply company (including a plating and machine shop), a fur cleaning/dyeing plant, furniture and fabric manufacturing, various auto repair shops and auto houses, some containing underground gasoline storage tanks, a filling station, and an oil drum reclamation facility; these are operations that may have used petroleum products or chlorinated solvents. Commercial uses, which may be assumed to have included some processing uses, include a poultry market, a bottle dealer, wagon houses, an engine company, electrical supplies with batteries, and a carpentry company.

The findings of the Phase II investigations conducted in January 2014 indicate the following:

- Fill material consisting of cinders, ash, coal fragments, red brick fragments, and pieces of glass with tan to black sandy silt is located from grade to a depth of approximately 9 ft-bg;
- Groundwater has been measured at a depth of approximately 7 ft-bg. Groundwater flow is estimated to be toward the northwest;
- There is no evidence of USTs or other significant subsurface anomalies;
- There is evidence of conductive utility lines. Main electric and gas lines were detected along the north side of the current building along Frost Street, a water service line runs along the western wall of the current building and a sanitary sewer line was detected in the middle of the building;
- Petroleum-related compounds were not detected above the Unrestricted Use or Restricted Residential Use SCOs. However, methyl tert-butyl ether (MTBE) was detected in one of eight soil sample locations below both SCOs, which is assumed to be associated with two petroleum releases identified in two databases, NY SPILLS (Spill #9103795) and LTANKS (Spill #9007766). Each spill was reported to the New York State Department of Environmental Conservation (NYSDEC);
- Tetrachloroethene (PCE), trichloroethene (TCE), and carbon tetrachloride were not detected in soil vapor. However, the reporting limits for carbon tetrachloride at each location, are above the New York State Department of Health (NYSDOH)-reference indoor air background concentrations, and 1,1,1-trichloroethane (1,1,1-TCA) was detected in one soil vapor sample above the NYSDOH 2003 Fuel Oil Indoor Air guidance value;

- Chloromethane, 1,3-butadiene, n-hexane, toluene, ethylbenzene, p/m-xylene and o-xylene were detected in soil vapor above the New York State Department of Health (NYSDOH)-referenced indoor air background concentrations;
- All volatile organic compounds (VOCs), pesticides and polychlorinated biphenyls (PCBs) in soil are below the Part 375/CP-51 Restricted-Residential Use soil cleanup objectives (SCOs);
- PCE, TCE, 1,1,1-TCA and carbon tetrachloride were not detected in soil.
- Seven fill-related SVOCs, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene and 3-mehylphenol/4-methylphenol were detected in samples at concentrations above the Unrestricted Use SCOs. 3-methylphenol/4-methylphenol may also be related to tire treatment by creosote, based on the Site's historic use as an auto repair shop and auto housing area. Four of the compounds, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene, exceeded the Restricted-Residential Use SCOs.
- Nine metals, arsenic, barium, cadmium, copper, lead, mercury, nickel, silver and zinc, were detected in soil samples above Unrestricted Use SCOs. Seven of these compounds, arsenic, barium, cadmium, copper, lead, mercury and zinc, were detected above the Restricted Residential Use SCO;
- All pesticides and PCBs in groundwater are below the TOGS 1.1.1 Class GA Standards;
- One petroleum-related compound, methyl tert-butyl ether, was detected in one of three sample locations above the Class GA Standard;
- PCE, TCE, Carbon tetrachloride and 1,1,1-TCA were not detected in groundwater;
- One fill-related SVOC, benzo(b)fluoranthene, was detected in groundwater in one sample location above the Class GA Standards; and
- Nine metals – antimony, cadmium, copper, iron, lead, manganese, mercury, sodium and zinc – were detected in one or more groundwater sample locations above the Class GA Standards. All metals, except for mercury, were detected above Class GA Standards in dissolved form in one or more of these sample locations.

The Site is mapped on the Brooklyn, NY Quadrangle 7.5 Minute Topographic Map, published by the United States Geological Survey (USGS 2003) (Figure 1). Review of the topographic map reveals that the Site is located at approximately 20 feet above the National Geodetic Vertical Datum of 1929 (an approximation of mean sea level) (USGS). The surface topography at the Site and surrounding area is relatively flat with a downward slope to the northwest.

During environmental and geotechnical sampling, the subsurface lithology to the depth of 10 feet was determined to be fill material with some wetness at 7 to 9-feet below grade (ft-bg). The fill material at the Site is typical of that encountered in New York City (predominantly coal and brick fragments, cinders and sands). Wet material was found at 7 ft-bg at three of the four soil boring locations, and at 9ft-bg at one of the four locations.

Groundwater has been measured at depths of 6.50 to 7.65 ft-bg.

3.1 Human Exposure Pathways

The media of concern at the Site include potentially-impacted soil, groundwater and soil vapor. Potential exposure pathways include dermal contact, incidental ingestion and inhalation of vapors. The risk of dermal contact and incidental ingestion will be minimized through general safe work practices, a personal hygiene program and the use of PPE. The risk of inhalation will be minimized through the use of an air monitoring program for volatile organic compounds and particulates.

3.2 Chemical Hazards

Based on historic research and sampling data, the following contaminants of concern are present at the Site:

Chlorinated Solvents

- 1,1,1-trichlorethane (1,1,1-TCA)
- carbon tetrachloride
- chloromethane

Petroleum Constituents

- 1,3-butadiene
- ethylbenzene
- methyl tert-butyl ether (MTBE)
- n-hexane
- toluene
- o- and p/m- xylenes

Metals

- antimony
- arsenic
- barium
- cadmium
- copper
- iron
- lead
- magnesium
- mercury

Metals (continued)

- nickel
- silver
- sodium
- zinc

Semivolatile Organic Compounds

- Polyaromatic Hydrocarbons (PAHs)including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene and 3-methylphenol/4-methylphenol

Material Safety Data Sheets (MSDSs) for each contaminant of concern are included in Appendix C. All personnel are required to review the MSDSs included in this CHASP.

3.3 Physical Hazards

The physical hazards associated with the field activities likely present a greater risk of injury than the chemical constituents at the Site. Activities within the scope of this project shall comply with New York State and Federal OSHA construction safety standards.

Head Trauma

To minimize the potential for head injuries, field personnel will be required to wear National Institutes of Occupational Safety and Health (NIOSH)-approved hard hats during field activities. Hats must be worn properly and not altered in any way that would decrease the degree of protection provided.

Foot Trauma

To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed. To afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

Eye Trauma

Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed to prevent eye injuries caused by contact with chemical or physical agents.

Noise Exposure

Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed. High noise areas are those areas in which a conversation can be clearly understand as each individual speaks at

normal level

Buried Utilities and Overhead Power Lines

Boring locations were cleared by an underground utility locator service during the Phase II Investigation in January 2014. In addition, prior to any intrusive activities, the drilling subcontractor will contact the One Call Center to arrange for a utility mark-out, in accordance with New York State requirements. Protection from overhead power lines will be accomplished by maintaining safe distances of at least 15 feet at all times.

Thermal Stress

The effects of ambient temperature can cause physical discomfort, personal injury, and increase the probability of accidents. In addition, heat stress due to lack of body ventilation caused by protective clothing is an important consideration. Heat-related illnesses commonly consist of heat stroke and heat exhaustion.

The symptoms of heat stroke include: sudden onset; change in behavior; confusion; dry, hot and flushed skin; dilated pupils; fast pulse rate; body temperature reaching 105° or more; and/or deep breathing, later followed by shallow breathing.

The symptoms of heat exhaustion include: weak pulse; general weakness and fatigue; rapid shallow breathing; cold, pale and clammy skin; nausea or headache; profuse perspiration; unconsciousness; and/or appearance of having fainted.

Heat-stress monitoring will be conducted if air temperatures exceed 70 degrees Fahrenheit. The initial work period will be set at 2 hours. Each worker will check his/her pulse at the wrist for 30 seconds early in each rest period. If the pulse rate exceeds 110 beats per minute, the next work period will be shortened by one-third.

One or more of the following precautions will reduce the risk of heat stress on the Site:

- Provide plenty of liquids to replace lost body fluids; water, electrolytic drinks, or both will be made available to minimize the risk of dehydration and heat stress
- Establish a work schedule that will provide appropriate rest periods
- Establish work regimens consistent with the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
- Provide adequate employee training on the causes of heat stress and preventive measures

In the highly unlikely event of extreme low temperatures, reasonable precautions will be made to avoid risks associated with low temperature exposure.

Traffic

Field activities will occur near public roadways. As a result, vehicular traffic will be a potential hazard during these activities and control of these areas will be established using barricades or traffic cones. Additional staff will be assigned, as warranted, for the sole purpose of coordinating traffic. Personnel will also be required to wear high-visibility traffic vests while working in the vicinity of the public roadways and local requirements for lane closure will be observed as needed. All work in public rights-of-way will be coordinated with local authorities and will adhere to their requirements for working in traffic zones.

Hazardous Weather Conditions

All Site workers will be made aware of hazardous weather conditions, specifically including extreme heat, and will be requested to take the precautions described herein to avoid adverse health risks. All workers are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain or high wind. Conditions of sleet, snow or freezing are extremely unlikely.

Slip, Trip and Fall

Areas at the Site may be slippery from mud or water. Great care should be taken by all Site workers to avoid slip, trip and fall hazards. Workers shall not enter areas that not have adequate lighting. Additional portable lighting will be provided at the discretion of the HSO.

Biological Hazards

Drugs and alcohol are prohibited from the Site. Any on-site personnel violating this requirement will be immediately expelled from the Site.

It is the responsibility of any worker or oversight personnel with a medical condition that may require attention should inform the HSO of such condition. The HSO will describe appropriate measures to be taken if the individual should become symptomatic.

Due to the Site location in an urban area, it is highly unlikely that poisonous snakes, spiders, plants, and insects will be encountered. However, other animals (dogs, cats, etc.) may be encountered, and care should be taken to avoid contact.

4.0 AIR MONITORING

The NYSDOH Generic Community Air Monitoring Plan (CAMP), included as Appendix 1A of DER-10, will be implemented during all ground-intrusive sampling and remedial activities. Continuous monitoring will be implemented during all soil handling activities, boring installation (soil borings, monitoring wells and soil vapor points) and periodic monitoring will be implemented during sampling (groundwater and soil vapor samples).

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis, or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring should be performed using equipment appropriate for the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.
4. All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should 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 must 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.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.
3. All readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protection equipment required for various kinds of site investigation tasks is based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, "General Description and Discussion of the Levels of Protection and Protective Gear."

Tenen field personnel and other site personnel will wear Level D personal protective equipment. During activities such as drilling, well installation, or sampling, where there is a chance of contact with contaminated materials, modified Level D equipment will be worn. The protection will be upgraded to Level C if warranted by the results of the air monitoring. A description of the personnel protective equipment for Levels D and C is provided below.

Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, long pants, nitrile gloves

Modified Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, coveralls/tyvek, nitrile gloves

Level C
Respiratory Protection: Air purifying respirator with organic vapor cartridges and filters.
Protective Clothing: Same as modified Level D

6.0 EXPOSURE MONITORING

Selective monitoring of workers in the exclusion area may be conducted, as determined by the HSO, if sources of hazardous materials are identified. Personal monitoring may be conducted in the breathing zone at the discretion of the Project Manager or HSO and, if workers are wearing respiratory protective equipment, outside the face-piece.

7.0 SITE ACCESS

Access to the Site during the investigation will be controlled by the Project Manager or HSO. Unauthorized personnel will not be allowed access to the Site.

8.0 WORK AREAS

During any activities involving drilling or other subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, clarify the type of protective equipment needed, and provide an area for decontamination.

The Exclusion Zone is defined as the area where potentially contaminated materials are generated as the result of drilling, sampling, or similar activities. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located adjacent to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a field phone, fire extinguisher and/or first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all Site workers will assemble in the event of an emergency. These zones shall be designated daily, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Control measures such as "Caution" tape and traffic cones will be placed around the perimeter of the work area when work is being done in the areas of concern (i.e., areas with exposed soil) to prevent unnecessary access.

9.0 DECONTAMINATION PROCEDURES

Personnel Decontamination

Personnel decontamination (decon), if deemed necessary by the HSO, will take place in the designated decontamination area delineated for each sampling location. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

Equipment Decontamination

Sampling equipment, such as split-spoons and bailers, will be decontaminated in accordance with U.S. Environmental Protection Agency methodologies, as described in the work plan. Because site soil is considered essentially non-hazardous, there is no need to decontaminate vehicles used for transporting equipment and personnel over the Site.

Disposal of Materials

Purged well water, water used to decontaminate any equipment and well cuttings will be containerized and disposed off-site in accordance with federal, state and local regulations.

10.0 GENERAL SAFE WORK PRACTICES

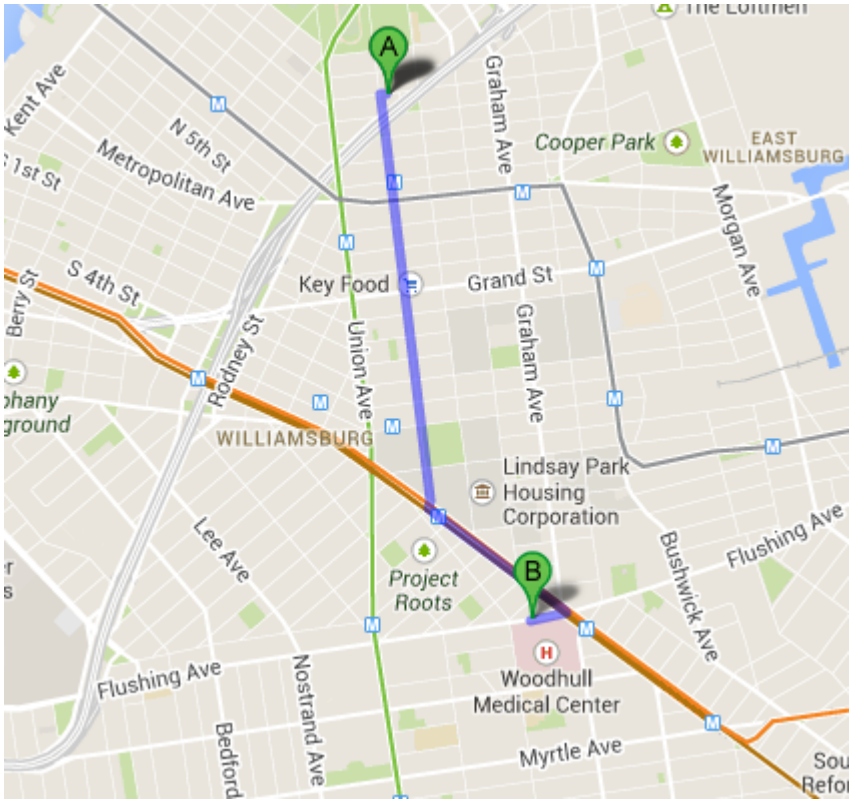
To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the HSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the site.
- Removal of potential contamination from PPE and equipment by blowing, shaking or any means that may disperse materials into the air is prohibited.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.
- Personnel will be cautioned to inform each other of symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- No excessive facial hair that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

11.0 EMERGENCY PROCEDURES

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the HSO will determine the nature of the emergency and will have someone call for an ambulance, if needed. If the nature of the injury is not serious—i.e., the person can be moved without expert emergency medical personnel—on-site personnel should drive him/her to a hospital. **The nearest emergency room is at Woodhull Medical Center at 760 Broadway, Brooklyn, NY 11206. The phone number is (718) 963-8000.** The route to the hospital is shown and detailed on the next page.

11.1 Route to Hospital



1. Head west on Frost Street toward Lorimer Street
2. At the first intersection, turn left onto Lorimer Street, go 0.9 mile
3. Turn left onto Broadway, go 0.4 mile
4. Turn right onto Flushing Avenue
5. Drive <0.1 mile, following Emergency signs
6. **The emergency room is on the left, 400 feet after Broadway (before Throop Avenue).**

11.2 Emergency Contacts

There will be an on-site field phone. Emergency and contact telephone numbers are listed below:

Table 1 – Emergency Contacts

Ambulance	911
Emergency Room	(718) 963-8000
NYSDEC Spill Hotline	(800) 457-7362
Tenen QEP, Mohamed Ahmed	(917) 612-6018
On-site Field Phone, Matthew Carroll	(646) 827-1061

12.0 TRAINING

All personnel performing the field activities described in this CHASP will have received the initial safety training required by 29 CFR, 1910.120. Current refresher training status also will be required for all personnel engaged in field activities.

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All field personnel must attend a training program covering the following areas:

- potential hazards that may be encountered;
- the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- the purpose and limitations of safety equipment; and
- protocols to enable field personnel to safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. The HSO will be responsible for conducting the training program.

13.0 MEDICAL SURVEILLANCE

All Tenen and subcontractor personnel performing field work involving drilling or other subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). The medical examination for Tenen employees will, at a minimum, be provided annually and upon termination of hazardous waste site work.

Appendix A
Acknowledgement of CHASP

ACKNOWLEDGMENT OF CHASP

Below is an affidavit that must be signed by all Tenen Environmental employees who enter the site. A copy of the CHASP must be on-site at all times and will be kept by the HSO.

AFFIDAVIT

I have read the Construction Health and Safety Plan (CHASP) for the 56 Frost Street Site. I agree to conduct all on-site work in accordance with the requirements set forth in this CHASP and understand that failure to comply with this CHASP could lead to my removal from the site.

Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____

Appendix B

Injury Reporting Form (OSHA Form 300)

How to Fill Out the Log

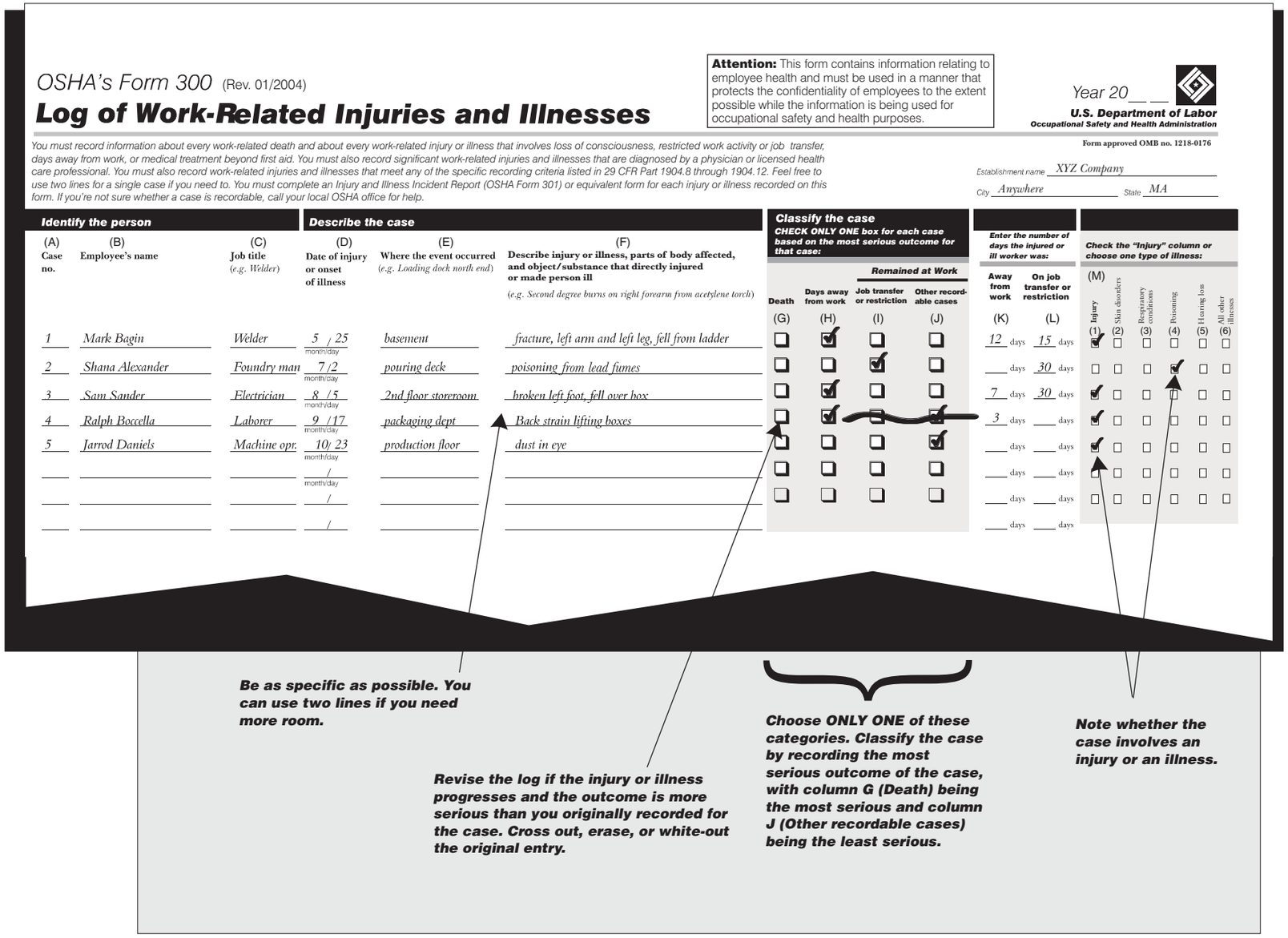
The *Log of Work-Related Injuries and Illnesses* is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened.

If your company has more than one establishment or site, you must keep separate records for each physical location that is expected to remain in operation for one year or longer.

We have given you several copies of the *Log* in this package. If you need more than we provided, you may photocopy and use as many as you need.

The *Summary* — a separate form — shows the work-related injury and illness totals for the year in each category. At the end of the year, count the number of incidents in each category and transfer the totals from the *Log* to the *Summary*. Then post the *Summary* in a visible location so that your employees are aware of injuries and illnesses occurring in their workplace.

You don't post the Log. You post only the Summary at the end of the year.



OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name XYZ Company
City Anywhere State MA

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
							Remained at Work										
(A) Case no.	(B) Employee's name	(C) Job title (*e.g. Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g. Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g. Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	(M) Injury (1)	Skin disorders (2)	Respiratory conditions (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
1	Mark Bagin	Welder	5/25	basement	fracture, left arm and left leg, fell from ladder	☐	☑	☐	☐	12 days	15 days	☑	☐	☐	☐	☐	☐
2	Shana Alexander	Foundry man	7/2	pouring deck	poisoning from lead fumes	☐	☐	☑	☐	___ days	30 days	☐	☐	☐	☑	☐	☐
3	Sam Sander	Electrician	8/5	2nd floor storeroom	broken left foot, fell over box	☐	☑	☐	☐	7 days	30 days	☑	☐	☐	☐	☐	☐
4	Ralph Boccella	Laborer	9/17	packaging dept	Back strain lifting boxes	☐	☑	☐	☐	3 days	___ days	☑	☐	☐	☐	☐	☐
5	Jarrod Daniels	Machine opr.	10/23	production floor	dust in eye	☐	☐	☐	☑	___ days	___ days	☑	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days						

Be as specific as possible. You can use two lines if you need more room.

Revise the log if the injury or illness progresses and the outcome is more serious than you originally recorded for the case. Cross out, erase, or white-out the original entry.

Choose ONLY ONE of these categories. Classify the case by recording the most serious outcome of the case, with column G (Death) being the most serious and column J (Other recordable cases) being the least serious.

Note whether the case involves an injury or an illness.

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

City _____ State _____

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
								Remained at Work				(M)					
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
			___/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			___/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			___/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
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			___/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
Page totals ➤						___	___	___	___	___	___	___	___	___	___	___	___

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Injury (1) | Skin disorder (2) | Respiratory condition (3) | Poisoning (4) | Hearing loss (5) | All other illnesses (6)

Appendix C

Material Safety Data Sheets (MSDS)

ZINC METAL
MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Zinc Metal

NOTE: In the form in which it is sold this product is not regulated. This Material Safety Data Sheet is provided for information purposes only.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
Teck Metals Ltd.
1500-120 Adelaide Street, W.
Toronto, Ontario
M5H 1T1

MSDS Preparer:
Teck Metals Ltd.
3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Revision/Edit: June 1, 2009.

Product Use: Zinc metal is used to coat steel for corrosion protection (galvanizing, electroplating, electrogalvanizing), as an alloying element in bronze, brass, aluminum and other metal alloys, for zinc die casting alloys, for zinc dry cell and zinc/air batteries, for the production of zinc sheet for architectural and coinage applications, as a reducing agent in organic chemistry and for other chemical applications.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)		LD_{50} / LC_{50} Species and Route
Zinc	99+%	7440-66-6	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	No Data

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration. ACGIH - American Conference of Governmental Industrial Hygienists. NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit. PEL – Permissible Exposure Limit. TLV – Threshold Limit Value. REL – Recommended Exposure Limit.

NOTE: While there is no established OEL for zinc as such, there are OELs for zinc oxide which may be formed during burning, welding or other fuming processes.

The OSHA PEL final rule limits for zinc oxide dust are 10 mg/m³ (total) and 5 mg/m³ (respirable); the OSHA PEL final rule limit for zinc oxide fume is 5 mg/m³. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. They are 15 mg/m³ (total) and 5 mg/m³ (respirable) while the transitional PEL for zinc oxide fume is 5 mg/m³. The ACGIH TLV for zinc oxide is 2 mg/m³ (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m³ (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m³ 10 hr TWA with a 15 mg/m³ ceiling limit (15 minute sample) for zinc oxide dust and a 10 mg/m³ STEL for zinc oxide fume (15 minute sample).

Trade Names and Synonyms: High Grade Zinc; Special High Grade Zinc; TADANAC® Zinc; C-CAST® Zinc; Zn

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A lustrous bluish-silver metal that does not burn but may form explosive mixtures if dispersed in air as a fine powder. Contact with acids or alkalis generates flammable hydrogen gas which can accumulate in poorly-ventilated areas. Do NOT use water or foam in fire fighting. Apply dry chemical, sand or special powder extinguishing media. Zinc is relatively non-toxic and poses little immediate health hazard to personnel or the environment in an emergency situation.

Potential Health Effects: Pure zinc dust is relatively non-toxic to humans by inhalation. However, acute over-exposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting. Ingestion of soluble salts may cause abdominal irritation resulting in nausea and vomiting. In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. (see Toxicological Information, Section 11)

Potential Environmental Effects: In the form in which the product is sold, zinc metal does not represent a significant threat to the environment. However, extended exposure in the aquatic or terrestrial environments may lead to the release of zinc in a bioavailable form. (see Ecological Information, Section 12)

EU Risk Phrase(s): Not applicable - zinc is not listed as a dangerous substance.

SECTION 4. FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: If symptoms are experienced remove source of contamination or move victim to fresh air. Obtain medical advice. NOTE: Metal fume fever may develop 3-10 hours after exposure. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

Ingestion: If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if irritation or discomfort occurs, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not considered a fire or explosion hazard. However, finely divided metallic dust or powder may form flammable or explosive dust clouds when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Bulk dust in a damp state may heat spontaneously and ignite on exposure to air. Contact with acids and alkali hydroxides results in evolution of hydrogen gas which is potentially explosive. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

Extinguishing Media: Apply dry chemical, dry sand, or special powder extinguishing media. Do NOT use water, carbon dioxide or foam on molten metals. Water may be ineffective for extinguishing a fire but should be used to keep fire-exposed containers cool.

Fire Fighting: If possible, move material from fire area and cool material exposed to flame. Apply dry chemical, sand, or special powder extinguishing media. Zinc oxide fumes may evolve in fires. Fire fighters should be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Lower Flammable Limit (Zinc Dust): 500 g/m^3; Upper Flammable Limit: Not Applicable.

Autoignition Temperature: Approximately 680ºC (dust cloud in air), 460ºC (dust layer).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Solid metal is recyclable. Vacuuming recommended for accumulated metal dust. Molten metal should be allowed to solidify prior to clean-up. Return uncontaminated spilled material to the process if possible. Place contaminated and non-recyclable material in suitable labeled containers for later disposal. Treat or dispose of waste material in accordance with all local, regional and national requirements, as applicable.

Personal Precautions: Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with zinc dust or powder. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash.

Environmental Precautions: Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, contamination of water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store zinc in a DRY covered area, separate from incompatible materials. Zinc ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Ingots may contain cavities that collect moisture. Entrained moisture will expand explosively when immersed in a molten bath. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate designated areas. No special packaging materials are required.

EU Safety Phrase(s): Not applicable - zinc in ingot form is not listed as a dangerous substance.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when zinc is processed. Eye protection should be worn where fume or dust is generated. Respiratory protection may be required where zinc oxide fume is generated. Where hot or molten metal is handled, heat resistant gloves, face shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Ventilation: Use adequate local or general ventilation to maintain the concentration of zinc oxide fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Where metallic dust particles of zinc metal are being collected and transported by a ventilation system, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Locate dust collectors and fans outdoors if possible and provide dust collectors with explosion vents or blow out panels.

Respirators: Where zinc oxide dust or fumes are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Bluish-silver lustrous metal	**Odour:** None	**Physical State:** Solid	**pH**: Not Applicable
Vapour Pressure: 1 mm at 487ºC Negligible at 20ºC	**Vapour Density:** Not Applicable	**Boiling Point/Range:** 908º C	**Freezing/Melting Point/Range:** 420º C
Specific Gravity: 7.1	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Odour Threshold:** None
Solubility: Insoluble in Water			

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable under normal temperatures and pressures. It slowly becomes covered with a white coating of a hydrated basic zinc carbonate on exposure to moist air. Fine, condensed zinc dust or powder may heat spontaneously and ignite on exposure to air when damp. Zinc metal will react with acids and strong alkalis to generate hydrogen gas. A violent, explosive reaction may occur when powdered zinc is heated with sulphur. Powdered zinc will become incandescent or ignite in the presence of fluorine, chlorine or bromine. Powdered zinc can also react explosively with halogenated hydrocarbons if heated. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

Incompatibilities: Contact with acids and alkalis will generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic and antimony compounds may evolve highly toxic ARSINE or STIBINE gas. Incompatible with strong oxidizing agents such as chlorine, fluorine, bromine, sodium potassium or barium peroxide, sodium or potassium chlorate, chromium trioxide and fused ammonium nitrate. Also incompatible with elemental sulphur dust, halogenated hydrocarbons or chlorinated solvents and chlorinated rubber.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate zinc oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever, a transient influenza-like illness.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Zinc, especially in the metal form, is relatively non-toxic. However, it can react with other materials, such as oxygen or acids, to form compounds that can be potentially toxic. The primary route of exposure would be through the generation and inhalation of zinc oxide fume from welding or burning or overheated melting pots.

Acute:
Skin/Eye: In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc metal is not chemically irritating to the eyes.

Inhalation: If excessive quantities of zinc oxide fume are inhaled, it can result in the condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest and coughing, which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after affects, or chronic affects that result from this condition.

Ingestion: When ingested in excessive quantities, zinc can irritate the stomach resulting in nausea and vomiting.

Chronic: There is no chronic form of metal fume fever but in rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia. Some workers may develop a short-term immunity (resistance) so that repeated exposure to zinc oxide fumes does not cause metal fume fever. This immunity (resistance) however is quickly lost after short absences from work (weekends or vacations). Workers exposed to finely-divided metallic zinc for up to 35 years revealed no acute or chronic illnesses attributable to zinc. Prolonged or repeated skin contact with zinc dust or powder may cause dryness, irritation and cracking (dermatitis) since zinc is astringent and may tend to draw moisture from the skin. Zinc dust is not listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

SECTION 12. ECOLOGICAL INFORMATION

Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, its processing or extended exposure in the environment may result in the formation of bioavailable zinc compounds. In aquatic systems, zinc bioaccumulates in both plants and animals. In terrestrial systems, the mobility of zinc in soil is dependent on soil conditions, such as cation exchange capacity, pH, redox potential, and chemical species present in the soil. Zinc also bioaccumulates in terrestrial plants, vertebrates, and mammals, with plant uptake from soil dependent on the plant species, soil pH, and soil composition.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not applicable – not regulated.
U.S. DOT AND TRANSPORT CANADA HAZARD CLASSIFICATION .... Not applicable
U.S. DOT AND TRANSPORT CANADA PID..... Not applicable
MARINE POLLUTANT ..... No
IMO CLASSIFICATION ..... Not regulated

SECTION 15. REGULATORY INFORMATION

U.S.
INGREDIENT LISTED ON TSCA INVENTORY ..... Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD ..... No

CERCLA SECTION 103 HAZARDOUS SUBSTANCES ..... Zinc ..... Yes.....RQ: 1,000 lb. (454 kg.)*
* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE ..... No

EPCRA SECTION 311/312 HAZARD CATEGORIES ..... No Hazard Categories Apply

EPCRA SECTION 313 Toxic Release Inventory: ..... This product does not contain any toxic chemicals subject to the Toxic Release reporting requirements. However, potential by-products from working with this product - "Zinc (Fume or Dust)" CAS 7440-66-6 are reportable.

CANADIAN:

INGREDIENTS LISTED ON DOMESTIC SUBSTANCES LIST..... Yes

WHMIS CLASSIFICATION:..... Not applicable. Zinc is not a Controlled Product under CPR.

EUROPEAN UNION:

LISTED ON THE EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS)..... Yes

EU CLASSIFICATION: ..... Not applicable. Zinc in ingot form is not listed as a dangerous substance.

SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition.
- American Conference of Governmental Industrial Hygienists, 2006, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2005, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, Ontario, CHEMINFO Record No. 239 – Zinc (Last Revision 2006-01).
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, 2003, Hazardous Substance Data Bank. (on-line version).
- Oak Ridge National Laboratory, Oak Ridge, Tennessee – Toxicity Summary for Zinc and Zinc Compounds, April 1992.
- Patty's Toxicology, Fifth Edition, 2001 E. Bingham, B. Cohrssen & CH Powell (Eds.).
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition (September 2005).
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, August 2005, Toxicological Profile for Zinc.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Metals Ltd. extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations; therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

Material Safety Data Sheet

Revision Issued: 6/09/98 Supercedes: 9/17/97 First Issued: 4/10/89

Section I - Chemical Product And Company Identification

Product Name: Xylene

CAS Number: 1330-20-7 HBCC MSDS No. CX01000

HILL BROTHERS Chemical Co.
1675 NORTH MAIN STREET • ORANGE, CALIFORNIA 92867-3499
(714) 998-8800 • FAX: (714) 998-6310
http://hillbrothers.com

1675 No. Main Street, Orange, California 92867
Telephone No: 714-998-8800 | Outside Calif: 800-821-7234 | Chemtrec: 800-424-9300

Section II - Composition/Information On Ingredients

			Exposure Limits (TWAs) in Air		
Chemical Name	CAS Number	%	ACGIH TLV	OSHA PEL	STEL
Xylene	1330-20-7	79-82	100 ppm	100 ppm	150 ppm
			435 mg/m³	435 mg/m³	
Ethylbenzene	100-41-4	18-20	100 ppm	100 ppm	125 ppm
			435 mg/m³	435 mg/m³	
Toluene	108-88-3	< 1	50 ppm	50 ppm	150 ppm

Section III - Hazard Identification

Ingestion: Liquid ingestion may result in vomiting; aspiration (breathing) of vomitus into the lungs must be avoided as even small quantities in the lungs may result in chemical pneumonitis and pulmonary edema/hemorrhage.

Inhalation: High vapor/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death. Negligible hazard at ambient temperature (-18 to 38 Deg C; 0 to 100 Deg F)

Skin: Prolonged and repeated liquid contact can cause defatting and drying of the skin which may result in skin irritation and dermatitis.

Eyes: Short-term liquid or vapor contact may result in slight eye irritation. Prolonged and repeated contact may be more irritating. High vapor/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the eyes.

Summary of Chronic Health Hazards: N/A

Signs and Symptoms of Exposure: Prolonged or repeated skin contact with this product tends to remove oils possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Effects of Overexposure: High vapor concentration (greater than approximately 1000 ppm) are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic, and may have other central nervous system effects including death.

Medical Conditions Generally Aggravated by Exposure: Petroleum Solvents/Petroleum Hydrocarbons - Skin contact may aggravate an existing dermatitis.

Note to Physicians: If more than 2.0 ml per kg has been ingested and vomiting has not occurred, emesis should be induced with supervision. Keep victim's head below hips to prevent aspiration. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before emesis, gastric lavage using a cuffed endotracheal tube should be considered. Inhalation of high concentrations of this material, as could incur in enclosed spaces or during deliberate abuse, may be associated with

cardiac arrhythmias. Sympathomimetic may initiate cardiac arrhythmias in persons exposed to this material. This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity when deciding whether to induce vomiting. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions), kidney, auditory system. Individuals with preexisting heart disorders may be mre susceptible to arrhythmias (irregular heartbeats) if exposed to high concentrations of this material.

Section IV - First Aid Measures

Ingestion: If individual is drowsy or unconscious, do not give anyhting by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended. GET MEDICAL ATTENTION IMMEDIATELY.

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. GET MEDICAL ATTENTION IMMEDIATELY.

Skin: Wash with soap and water. Remove contaminated clothing and shoes; do not reuse until cleaned. If persistent irritation occurs, GET MEDICAL ATTENTION IMMEDIATELY.

Eyes: If splashed into eyes, flush with water for 15 minutes while holding eyelids open or until irritation subsides. If irritation persists, GET MEDICAL ATTENTION IMMEDIATELY.

Section V - Fire Fighting Measures

Flash Point: 80°F (26.6°C) **Autoignition Temperature:** 980°F (526.6°C)

Lower Explosive Limit: 1% **Upper Explosive Limit:** 6.6%

Unusual Fire and Explosion Hazards: Vapors are heavier than air and may accumulate in low areas and may travel along the ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from handling point. Flashback of flame to the handling site may occur. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. The following may form: carbon dioxide, and carbon monoxide, and various hydrocarbons.

Extinguishing Media: Use water fog, foam, dry chemical or CO_2. Do not use a direct stream of water. Product will float and can be reignited on surface of water.

Special Firefighting Procedures: Evacuate hazard area of unprotected personnel. Wear proper protective clothing including a NIOSH approved self-contained breathing apparatus. Cool fire-exposed containers with water. In the case of large fires, also cool surrounding equipment and structures with water. If a leak or spill has not ignited, use water spray to disperse the vapors.

Section VI - Accidental Release Measures

[Spills may need to be reported to the National Response Center (800/424-8802) CERCLA Reportable Quantity (RQ) is 1000 pounds]. Shut off and eliminate all ignition sources. Keep people away. Recover by pumping (use an explosion proof or hand pump) or with a suitable absorbent such as sand, earth or other suitable absorbent to spill area. Do not use combustible materials such as sawdust. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.

Section VII - Handling and Storage

Keep away from heat, sparks and open flames. Keep containers tightly closed. Store away from strong oxidizing agents in a cool, dry place with adequate explosion-proof ventilation. Ground equipment to prevent accumulation of static charge. If pouring or transferring materials, containers must be bonded and grounded.

Other Precautions: Do Not weld, heat or drill on or near container; even emptied containers can contain explosive vapors.

Section VIII - Exposure Controls/Personal Protection

Respiratory Protection: Use either an atmosphere-supplying respirator or an air-purifying respirator in confined or enclosed spaces for organic vapors, if needed.

Ventilation: Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. Use explosion-proof equipment.

Protective Clothing: Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular

clothing which could result in prolonged or repeated skin contact.
Eye Protection: Use chemical splash goggles or face shield when eye contact may occur.
Other Protective Clothing or Equipment: Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.
Work/Hygienic Practices: Minimize breathing vapor or mist. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean and dry before reuse. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

Section IX - Physical and Chemical Properties

Physical State: Liquid
pH: N/A
Melting Point/Range: N/A
Boiling Point/Range: 279°F (137.2°C)
Appearance/Color/Odor: Colorless, light aromatic odor
Solubility in Water: Less than 0.08%
Vapor Pressure(mmHg): 2.4 @ 68°F
Specific Gravity(Water=1): 0.87
Molecular Weight: 106
Vapor Density(Air=1): 3.7
% Volatiles: 100
How to detect this compound : N/A
Evaporation Rate, n-BuAcetate=1: 0.86
Odor Threshold: 0.5 ppm
Freezing Point: -54.0°F (-47.7°C)

Section X - Stability and Reactivity

Stability: Stable
Hazardous Polymerization: Will Not Occur
Conditions to Avoid: Avoid heat, sparks, and open flames.
Materials to Avoid: Strong oxidizing agents, concentrated nitric and sulfuric acids, and molten sulphur. Temperatures above ambient.
Hazardous Decomposition Products: Fumes, smoke, carbon monoxide, aldehydes, various hydrocarbons, and other organic compounds may be formed during combustion.

Section XI - Toxicological Information

N/A

Section XII - Ecological Information

N/A

Section XIII - Disposal Considerations

Use non-leaking containers, seal tightly and label properly. Dispose of in accordance with applicable local, county, state and federal regulations.

Section XIV - Transport Information

DOT Proper Shipping Name: Xylene
DOT Hazard Class/ I.D. No.: 3, UN1307, III

Section XV - Regulatory Information

CALIFORNIA PROPOSITION 65: WARNING
This product contains the following substance known to the state of California to cause cancer: Benzene
This product contains the following substance known to the state of California to cause birth defects: Toluene
Reportable Quantity: 1000 Pounds (454 Kilograms) (139.50 Gals)
NFPA Rating: Health - 2; Fire - 3; Reactivity - 0
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme
Carcinogenicity Lists: No **NTP:** No **IARC Monograph:** No **OSHA Regulated:** Yes

Section 313 Supplier Notification: This product contains the following toxic chemcial(s) subject to the reporting requirements of SARA TITLE III Section 313 of the Emergency Planning and Community Right-To Know Act of 1986 and of 40 CFR 372:

CAS #	Chemical Name	% By Weight
1330-20-7	Xylene	79-82%
100-41-1	Ethylbenzene	18-20%
108-88-3	Toluene	< 1%

Section XVI - Other Information

Synonyms/Common Names: Xylol; Dimethyl Benzene; Methyl Toluene
Chemical Family/Type: Aromatic Hydrocarbon

IMPORTANT! Read this MSDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This MSDS has been prepared according to the OSHA Hazard Communication Standard [29 CFR 1910.1200]. The MSDS information is based on sources believed to be reliable. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control, **Hill Brothers Chemical Company** makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Also, additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks prior to use, and then to exercise appropriate precautions for protection of employees and others.

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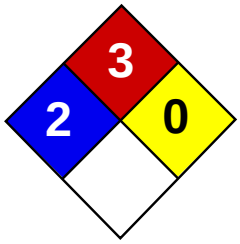

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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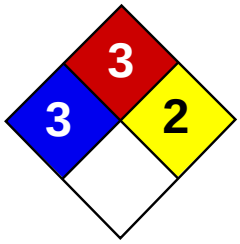

Material Safety Data Sheet
Sodium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium

Catalog Codes: SLS3505

CAS#: 7440-23-5

RTECS: VY0686000

TSCA: TSCA 8(b) inventory: Sodium

CI#: Not applicable.

Synonym: Natrium

Chemical Name: Sodium

Chemical Formula: Na

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium	7440-23-5	100

Toxicological Data on Ingredients: Sodium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 115°C (239°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Extremely flammable in presence of moisture. Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. Moisture reactive material. SMALL FIRE: Obtain advice on use of water. Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid that, in contact with water, emits flammable gases. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep under inert atmosphere. Keep container dry. Do not breathe dust. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 22.99 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 881.4°C (1618.5°F)

Melting Point: 97.8°C (208°F)

Critical Temperature: Not available.

Specific Gravity: 0.97 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Highly reactive with oxidizing agents, acids, moisture. The product reacts violently with water to emit flammable but non toxic gases.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant). Hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Material is destructive to tissue of the mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.3: Material that emits flammable gases on contact with water.

Identification: : Sodium : UN1428 PG: I

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Sodium Massachusetts RTK: Sodium TSCA 8(b) inventory: Sodium CERCLA: Hazardous substances.: Sodium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R17- Spontaneously flammable in air. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 3

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 3

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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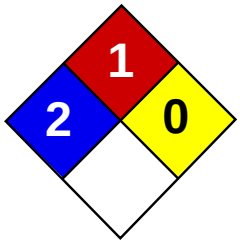

Material Safety Data Sheet
Silver MSDS

Section 1: Chemical Product and Company Identification

Product Name: Silver

Catalog Codes: SLS4222, SLS2005, SLS3427, SLS1210, SLS2632, SLS4054, SLS1837

CAS#: 7440-22-4

RTECS: VW3500000

TSCA: TSCA 8(b) inventory: Silver

CI#: Not applicable.

Synonym:

Chemical Formula: Ag

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Silver	7440-22-4	100

Toxicological Data on Ingredients: Silver: ORAL (LD50): Acute: 100 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact: No known effect on skin contact, rinse with water for a few minutes.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Splash goggles. Lab coat.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (mg/m3) from OSHA (PEL) TWA: 0.01 (mg/m3) from OSHA NIOSH Australia: TWA: 0.1 (mg/m3)Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder. Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 107.87 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2212°C (4013.6°F)

Melting Point: 961°C (1761.8°F)

Critical Temperature: Not available.

Specific Gravity: 10.4 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Is not dispersed in cold water, hot water.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 100 mg/kg [Mouse].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Very hazardous in case of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Silver Pennsylvania RTK: Silver Minnesota: Silver Massachusetts RTK: Silver New Jersey: Silver TSCA 8(b) inventory: Silver TSCA 8(a) PAIR: Silver TSCA 8(d) H and S data reporting: Silver SARA 313 toxic chemical notification and release reporting: Silver: 1% CERCLA: Hazardous substances.: Silver: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC): R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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MATERIAL SAFETY DATA SHEET

Polyaromatic Hydrocarbons

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION	
IDENTITY Decanter Tank Tar Sludge Polyaromatic Hydrocarbons (TDG name - Toxic Solid, organic NOS (Waste) (Pyrene)	**DATE PREPARED** February 7, 2007
SYNONYMS, CHEMICAL NAMES, COMMON NAMES Aromatics, PAH, Yellow Sludge	**USE:** Waste Sludge
MANUFACTURER'S NAME Cancarb Ltd.	**EMERGENCY TELEPHONE NUMBER (Health)** (403) 502-6614
ADDRESS P.O. Box 1000, Station M Calgary, Alberta Canada, T2P 4K5	**TELEPHONE NUMBER – TECHNICALINFORMATION** (403)-527-1121

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS			
HAZARDOUS COMPONENTS	**OSHA PEL**	**ACGIH TLV**	**%/wt**
Variable blend of Polynuclear Aromatic Hydrocarbons (PAHs) plus inert solids in water. Concentrations will vary depending upon the extent of product dryness. Hazardous ingredients may include:			
Pyrene (CAS# 129-00-0)	0.2 mg m^{3*}	None established	<7%
Benzo (g,h,i) Fluoroanthrene (CAS# 203-12-3)	None established	None established	<6%
Fluoroanthene (CAS# 206-44-0)	None established	None established	<4%
Phenanthrene (CAS# 85-01-8)	0.2 mg/m^{3*}	None established	<2%
Cyclopenta(d,e,f)Phenanthrene (CAS#203-64-5)	None established	None established	<2%
Anthracene (CAS# 120-12-7)	0.2 mg/m^{3*}	None established	<1%
Benzo(a)Pyrene (CAS# 50-32-8)		None established	<0.1%
Benzo(a)Anthracene (CAS# 56-55-3)	0.2 mg/m^{3*}	None established	<0.1%
Benzo(b)Fluoroanthene CAS # 205-99-2)	None established	None established	<0.1%
Benzo(j)Fluoroanthene (CAS# 205-82-3)	None established	None established	<0.1%
Benzo(k)Fluoroanthene (CAS# 207-08-9)	None established	None established	<0.1%
Indeno(1,2,3)Pyrene (CAS# 193-39-5)	None established	None established	<0.1%
	None established		
*Coal Tar Pitch Volatile. Remaining components are not hazardous.			

EMERGENCY OVERVIEW
Black, brown or yellow aqueous sludge May cause skin and eye irritation Suspected carcinogenic components.

SECTION 3 -HAZARDS IDENTIFICATION

PRIMARY ROUTE(s) OF EXPOSURE: Skin; Eyes. Inhalation if Sludge is Dry

IRRITATION DATA: May cause irritation to skin and eyes and burns to skin with sunlight..

INHALATION:

ACUTE: Not a likely route of exposure in sludge state. Mist may cause respiratory irritation.

CHRONIC: Repeated and prolonged exposure may cause toxicity to the liver and blood. Suspected carcinogenicity .

SKIN CONTACT:

ACUTE: Prolonged and repeated contact may cause irritation. Contact in the presence of sunlight may enhance irritant effects leading to skin burns..

CHRONIC: Systemic toxicity. Suspected carcinogenicity.

EYE CONTACT:

ACUTE: May be irritating, resulting in tearing, reddening, and swelling.

CHRONIC: None known.

INGESTION:

ACUTE: May cause gastric irritation and disturbance.

CHRONIC: Chronic effects of phenanthrene ingestion include liver effects; chronic effects of pyrene ingestion include muscle contraction or spasticity and blood changes; effects of chronic fluoranthene ingestion include kidney, urethra, and bladder effects.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

Persons with pre-existing skin disorders may be at increased risk from exposure.

SECTION 4 - EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove from exposure to fresh air immediately. If breathing has stopped, give artificial respiration. Oxygen may be given if breathing is difficult. Get medical attention.

SKIN CONTACT: Remove contaminated clothing and shoes immediately. Wash affected area with soap and water until no evidence of the chemical remains. Get medical attention if irritation develops.

EYE CONTACT: Flush thoroughly with water for at least 15 minutes, occasionally lifting the upper and lower lids, until no evidence of the chemical remains. Get medical attention if irritation develops.

INGESTION: Do not induce vomiting. Treat symptomatically and supportively. Get medical attention if irritation develops.

SECTION 5 - FIRE FIGHTING MEASURES

FLASH POINT: None	**FLAMMABLE LIMITS:**	**LEL:** Not applicable	**UEL:** Not applicable

AUTOIGNITION TEMPERATURE: Will not ignite as aqueous solution. If dried, will support combustion.

EXTINGUISHING MEDIA

Water spray, foam, or dry chemical powder. Carbon dioxide may be ineffective on large fires.

SPECIAL FIRE FIGHTING PROCEDURES

Firefighters should wear full protective NIOSH approved self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS

None Known.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Stop discharge and control spill to avoid discharge to the environment. Use wet vacuum to limit spreading and place in suitable container for further handling and disposal. For dry material avoid generation of dust, use limited wetting to prevent spreading and use wet vacuum. Place in metal drum for disposal.

SECTION 7 - HANDLING AND STORAGE

Handling: KEEP WET. Do not allow to dry. Place wet vacuum discharge in metal drum. Empty drum into settling pond tanks. Avoid prolonged or repeated skin contact. Observe good personal and industrial hygiene practices.

Storage: Do not freeze.

SECTION 8 – EXPOSURE CONTROLS, PERSONAL PROTECTION

RESPIRATORY PROTECTION

Where airborne concentrations may exceed guidelines for permissible air concentrations, choose a respirator in accordance with OSHA Respirator Standard 29 CFR 1910.134. (i.e. organic vapor and P100 cartridges, powered air hoods.

VENTILATION

Use general dilution or local exhaust ventilation to maintain exposure below the exposure limits.

PROTECTIVE GLOVES

Choose appropriate gloves in accordance with OSHA Personal Protective Equipment Standard 29 CFR 1910.132.

EYE PROTECTION:

Safety glasses with side shields or choose in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT

Appropriate protective clothing to minimize repeated and prolonged skin contact. (i.e. Sarnex or Coated Sarnex).

RECOMMENDED EXPOSURE LIMITS

OH&S, OSHA and ACGIH have not set exposure limits for this waste mixture.
See Section 2 for exposure guidelines for the components of this waste.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES			
BOILING POINT	100° C	**SPECIFIC GRAVITY**	> 1
pH	Not available	**FREEZING POINT**	0° C
VAPOR PRESSURE (mm Hg)	Same as Water	**SOFTENING POINT**	Not applicable
VAPOR DENSITY (Air = 1)	Not available	**EVAPORATION RATE**	Not applicable
SOLUBILITY IN WATER	PAHs low solubility		
SOLUBILITY	Dry material soluble in hydrocarbon solvents		
COEFFICIENT OF WATER/OIL DISTRIBUTION:	Not available .		
APPEARANCE AND ODOR:	Black, Brown or Yellow Sludge.		

SECTION 10 - STABILITY AND REACTIVITY			
STABILITY	**Unstable**		**Conditions to Avoid**
	Stable	X	None Known. Stable under normal temperature and pressure.
INCOMPATIBILITY (Materials to Avoid) Strong oxidizing agents.			
HAZARDOUS DECOMPOSITION PRODUCTS Thermal decomposition may release toxic and/or hazardous gases from dried sludge.			
HAZARDOUS	**May Occur**		**Conditions to Avoid**
POLYMERIZATION	**Will Not Occur**	X	None known.

SECTION 11 - TOXICOLOGICAL INFORMATION

This waste sludge has not been tested for acute or chronic toxicity. The following data is for its components >1%:

Pyrene	Oral LD_{50} (mouse): 800 mg/kg
	Inhalation LC_{50} (rat): 170 mg/m^3
Fluoranthene	Oral LD_{50} (rat): 2 gm/kg
	Dermal LD_{50}(rabbit): 3180 mg/kg
Phenanthrene	Oral LD_{50} (mouse): 700 mg/kg

TARGET ORGANS: Skin and eyes

CARCINOGENICITY: Some low level PAH components have been identified as suspected carcinogens by IARC and ACGIH. These include benzo(a)anthracene, benzo(a)pyrene, benz(b,j&k)fluoranthene, and indeno(1,2,3-cd) pyrene.

TUMORIGENIC DATA (RTECS): Phenanthrene, Clclopenta (def) phenanthrene, Benzo fluoranthrene, Pyrene, and fluoranthene.

MUTAGEN DATA (RTECS): Phenanthrene, Cyclopenta (def) phenanthrene, Pyrene, Benzo fluoroanthrene, Fluoranthene, Benzo (ghi) fluoranthene.

OTHER EFFECTS:

PAHs contained in the sludge have the property of photoallergenicity. In the presence of sunlight, these materials have the capacity to irritate the skin to a much greater degree, possibility leading to skin burns, than exposure without sunlight.

SECTION 12 - ECOLOGICAL INFORMATION

Sludge has not been tested for ecotoxicity.

SECTION 13 - DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable federal, provincial, and local environmental regulations. Residual solids may be present in any containers used to handle this sludge. Do not reuse for food, clothing or products for human or animal consumption.

SECTION 14 - TRANSPORT INFORMATION

PROPER SHIPPING NAME	TDG CLASSIFICATION	TDG UN/NA
Waste Type 97 Decantar Tank Tar Sludge	6.1 PG II	UN 9397

SECTION 15 - REGULATORY INFORMATION

OSHA: This material is classified as hazardous under OSHA regulations.

WHMS: This material is considered a D2A, D2B Controlled Product.
This material has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

IDL: The following components are on the Canadian Ingredient Disclosure List:

Pyrene
Fluoranthene
Benzanthracene
Phenanthrene
Indeno (1,2,3-cd) pyrene
Benzopyrene
Naphthalene
Anthacene

SARA Title III - Toxic chemicals list 40 CFR 372.65:

Pyrene
Naphthalene
Anthracene

CERCLA Toxic Chemicals List 40 CFR 302:

Pyrene	RQ: 5000 pounds
Fluoranthene	RQ: 100 pounds
Benzanthrcene	RQ: 10 pounds
Phenanthrene	RQ: 5000 pounds
Indeno (1,2,3-cd) pyrene	RQ: 100 pounds
Benzopyrene	RQ: 1 pound
Naphthalene	RQ: 100 pounds
Anthracene	RQ: 5000 pounds

RCRA Hazardous Waste Codes 40 CFR 261.24, 261.33 :

Fluoranthene	U120
Benzanthracene	U108
Indeno(1,2,3-cd)pyrene	U137
Benzopyrene	U022
Naphthalene	U165

SECTION 16 - OTHER INFORMATION

HMIS Ratings:

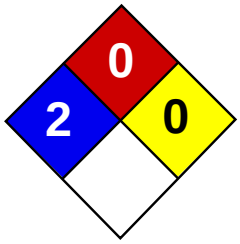
Health	2*
Flammability	1
Reactivity	0

where 0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

This MSDS was prepared by: CANCARB Health, Safety & Environment Department
Telephone Number (403) 527-1121

R: 45; 36/37/38
S: 36/37/39

The information and recommendations set forth herein are made in good faith and are believed to be accurate as of the date of preparation. CANCARB makes no warranty, either express or implied, with respect to this information and disclaims all liability from reliance thereon.



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to skin. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion. Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode. Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion. Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable. TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Insoluble in Ammonia. Soluble in dilute Nitric Acid. Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. Causes damage to the following organs: skin. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc: LDL [Rat] - Route: Oral; Dose: 5000 mg/kg LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Nickel dust and fume can irritate skin. Eyes: Nickel dust and fume can irritate eyes. Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis. Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation). Chronic Potential Health Effects: Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis. Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count). Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy.

Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis. Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal Connecticut hazardous material survey.: Nickel metal Illinois toxic substances disclosure to employee act: Nickel metal Illinois chemical safety act: Nickel metal New York release reporting list: Nickel metal Rhode Island RTK hazardous substances: Nickel metal Pennsylvania RTK: Nickel metal Michigan critical material: Nickel metal Massachusetts RTK: Nickel metal Massachusetts spill list: Nickel metal New Jersey: Nickel metal New Jersey spill list: Nickel metal Louisiana spill reporting: Nickel metal California Director's List of Hazardous Substances: Nickel metal TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R43- May cause sensitization by skin contact. S22- Do not breathe dust. S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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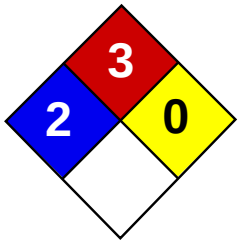

Material Safety Data Sheet
Methyl tert-butyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl tert-butyl ether

Catalog Codes: SLM2152

CAS#: 1634-04-4

RTECS: KN5250000

TSCA: TSCA 8(b) inventory: Methyl tert-butyl ether

CI#: Not available.

Synonym:

Chemical Name: Methyl tert-Butyl Ether

Chemical Formula: C5-H12-O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl {tert-}butyl ether	1634-04-4	100

Toxicological Data on Ingredients: Methyl tert-butyl ether: ORAL (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 224°C (435.2°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 2.5% UPPER: 15.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Characteristic. (Strong.)

Taste: Not available.

Molecular Weight: 88.15 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 55.2°C (131.4°F)

Melting Point: -109°C (-164.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.7405 (Water = 1)

Vapor Pressure: 245 mm of Hg (@ 20°C)

Vapor Density: 3.1 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:

Soluble in methanol, diethyl ether. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 4000 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 23576 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Extremely hazardous in case of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Methyl tert-butyl ether : UN2398 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Methyl tert-butyl ether Massachusetts RTK: Methyl tert-butyl ether TSCA 8(b) inventory: Methyl tert-butyl ether SARA 313 toxic chemical notification and release reporting: Methyl tert-butyl ether CERCLA: Hazardous substances.: Methyl tert-butyl ether

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Material Safety Data Sheet

Mercury

MSDS# 14020

Section 1 - Chemical Product and Company Identification

MSDS Name:	Mercury
Catalog Numbers:	13-410, 13-411, 13-480, 13-481, 13-482, 13-485, 13501, M139-1LB, M139-5LB, M140-14LB, M140-1LB, M140-5LB, M141-1LB, M141-6LB
Synonyms:	Colloidal mercury; Hydrargyrum; Metallic mercury; Quick silver; Liquid silver.

Company Identification:	Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	201-796-7100
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#:	7439-97-6
Chemical Name:	Mercury
%:	100
EINECS#:	231-106-7

Hazard Symbols: T+ N

Risk Phrases: 61 26 48/23 50/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! Corrosive. This substance has caused adverse reproductive and fetal effects in animals. May be absorbed through intact skin. May cause central nervous system effects. May cause liver and kidney damage. Inhalation of fumes may cause metal-fume fever. Possible sensitizer. Toxic if inhaled. Causes irritation and possible burns by all routes of exposure. Target Organs: Blood, kidneys, central nervous system, liver, brain.

Potential Health Effects

Eye:	Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.
Skin:	May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes skin irritation and possible burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion:	May cause severe and permanent damage to the digestive tract. May cause perforation of the digestive tract. May cause effects similar to those for inhalation exposure. May cause systemic effects.
Inhalation:	Causes chemical burns to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause respiratory sensitization.
	May cause liver and kidney damage. May cause reproductive and fetal effects. Effects may be delayed. Chronic

Chronic: exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, personality changes. Chronic ingestion may cause accumulation of mercury in body tissues. Prolonged or repeated exposure may cause inflammation of the mouth and gums, excessive salivation, and loosening of the teeth.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

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

Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Treat symptomatically and supportively. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.

Antidote: The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

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

Extinguishing Media: Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 3; flammability: 0; instability: 0;

Section 6 - Accidental Release Measures

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

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes. Do not breathe vapor.

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

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Mercury	0.025 mg/m3; Skin - potential significant contribution to	0.05 mg/m3 TWA (vapor) 10 mg/m3 IDLH	0.1 mg/m3 Ceiling

	overall exposure by the cutaneous route			

OSHA Vacated PELs: Mercury: 0.05 mg/m3 TWA (vapor)

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Personal Protective Equipment

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

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: silver

Odor: odorless

pH: Not available

Vapor Pressure: 0.002 mm Hg @ 25C

Vapor Density: 7.0

Evaporation Rate: Not available

Viscosity: 15.5 mP @ 25 deg C

Boiling Point: 356.72 deg C (674.10°F)

Freezing/Melting Point: -38.87 deg C (-37.97°F)

Decomposition Temperature: Not available

Solubility in water: Insoluble

Specific Gravity/Density: 13.59 (water=1)

Molecular Formula: Hg

Molecular Weight: 200.59

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: High temperatures, incompatible materials.

Incompatibilities with Other Materials: Metals, aluminum, ammonia, chlorates, copper, copper alloys, ethylene oxide, halogens, iron, nitrates, sulfur, sulfuric acid, oxygen, acetylene, lithium, rubidium, sodium carbide, lead, nitromethane, peroxyformic acid, calcium, chlorine dioxide, metal oxides, azides, 3-bromopropyne, methylsilane + oxygen, tetracarbonylnickel + oxygen, boron diiodophosphide.

Hazardous Decomposition Products: Mercury/mercury oxides.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 7439-97-6: OV4550000

LD50/LC50: RTECS: Not available. Other:

Carcinogenicity: Mercury - IARC: Group 3 (not classifiable)

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity:
Fish: Rainbow trout: LC50 = 0.16-0.90 mg/L; 96 Hr; Unspecified
Fish: Bluegill/Sunfish: LC50 = 0.16-0.90 mg/L; 96 Hr; Unspecified
Fish: Channel catfish: LC50 = 0.35 mg/L; 96 Hr; Unspecified
Water flea Daphnia: EC50 = 0.01 mg/L; 48 Hr; Unspecified

Other: Harmful to aquatic life in very low concentrations.

Section 13 - Disposal Considerations

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

Section 14 - Transport Information

US DOT
Shipping Name: MERCURY
Hazard Class: 8
UN Number: UN2809
Packing Group: III
Canada TDG
Shipping Name: MERCURY
Hazard Class: 8
UN Number: UN2809
Packing Group: III

USA RQ: CAS# 7439-97-6: 1 lb final RQ; 0.454 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T+ N

Risk Phrases:

R 61 May cause harm to the unborn child.

R 26 Very toxic by inhalation.

R 48/23 Toxic : danger of serious damage to health by prolonged exposure through inhalation.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 7439-97-6: 3

Canada

CAS# 7439-97-6 is listed on Canada's DSL List

Canadian WHMIS Classifications: D2A, E

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 7439-97-6 is listed on Canada's Ingredient Disclosure List

US Federal

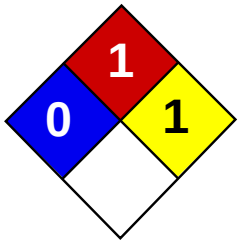
TSCA

CAS# 7439-97-6 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 6/15/1999

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



Material Safety Data Sheet
Magnesium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Magnesium

Catalog Codes: SLM4408, SLM2263, SLM3637

CAS#: 7439-95-4

RTECS: OM2100000

TSCA: TSCA 8(b) inventory: Magnesium

CI#: Not applicable.

Synonym: Magnesium ribbons, turnings or sticks

Chemical Name: Magnesium

Chemical Formula: Mg

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Magnesium	7439-95-4	100

Toxicological Data on Ingredients: Magnesium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Flammable in presence of acids, of moisture. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of acids, of moisture.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Magnesium turnings, chips or granules, ribbons, are flammable. They can be easily ignited. They may reignite after fire is extinguished. Produces flammable gases on contact with water and acid. May ignite on contact with water or moist air. Magnesium fires do not flare up violently unless moisture is present.

Special Remarks on Explosion Hazards: Reacts with acids and water to form hydrogen gas with is highly flammable and eplosive

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage:
Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Moisture sensitive. Dangerous when wet.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 24.31 g/mole

Color: Silver-white

pH (1% soln/water): Not applicable.

Boiling Point: 1100°C (2012°F)

Melting Point: 651°C (1203.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.74 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in hot water. Insoluble in cold water. Insoluble in chromium trioxides, and mineral acids, alkalies. Slightly soluble with decomposition in hot water. Soluble in concentrated hydrogen fluoride, and ammonium salts.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, incompatible materials, water or moisture, moist air.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Violent chemical reaction with oxidizing agents. Reacts with water to create hydrogen gas and heat. Must be kept dry. Reacts with acids to form hydrogen gas which is highly flammable and explosive. Magnesium forms hazardous or explosive mixtures with aluminum and potassium perchlorate; ammonium nitrate; barium nitrate, barium dioxide and zinc; beryllium oxide; boron phosphodiiodide; bromobenzyl trifluoride; cadmium cyanide; cadmium oxide; calcium carbide; carbonates; carbon tetrachloride; chlorine; chlorine trifluoride; chloroform; cobalt cyanide; copper cyanide; copper sulfate(anhydrous), ammonium nitrate, potassium chlorate and water; cupric oxide; cupric sulfate; fluorine; gold cyanide; hydrogen and calcium carbonate; hydrogen iodide; hydrogen peroxide; iodine; lead cyanide; mercuric oxide; mercury cyanide; methyl chloride; molybdenum trioxide; nickel cyanide; nitric acid; nitrogen dioxide; oxygen (liquid); performic acid; phosphates; potassium chlorate; potassium perchlorate; silver nitrate; silver oxide; sodium perchlorate; sodium peroxide; sodium peroxide and carbon dioxide; stannic oxide; sulfates; trichloroethylene; zinc cyanide; zinc oxide.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation by mechanical action. May get mechanical injury or embedding of chips/particles in skin. The particles that are embedded in the wounds may retard healing. Eyes: May cause eye irritation by mechanical action. Mechanical injury may occur. Particles or chips may embed in eye and retard healing. Inhalation: Low hazard for ususal industrial handling. It may cause respiratory tract irritation. However, it is unlikely due to physical form. When Magnesium metal is heated during welding or smelting process, Metal Fume Fever may result from inhalation of magnesium fumes. Metal Fume Fever is a flu-like condition consisting of fever, chills, sweating, aches, pains, cough, weakness, headache, nausea, vomiting, and breathing difficulty. Other symptoms may include metallic taste, increased white blood cell count. There is no permanent ill-effect. Ingestion: Low hazard for usual industrial handling. There are no known reports of serious industrial poisonings with Magnesium. Ingeston of large amounts of chips, turnings or ribbons may cause gastrointestinal tract irritation with nausea, vomiting, and diarrhea. Acute ingestion may also result in Hypermagnesia. Hypermagnesia may cause hypotension, bradycardia, CNS depression, respiratory depression, and impairment of neuromuscular transmission (hyporeflexia, paralysis).

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Magnesium UNNA: 1869 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Magnesium Rhode Island RTK hazardous substances: Magnesium Pennsylvania RTK: Magnesium Massachusetts RTK: Magnesium Massachusetts spill list: Magnesium New Jersey: Magnesium TSCA 8(b) inventory: Magnesium

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid. CLASS B-6: Reactive and very flammable material.

DSCL (EEC):
R11- Highly flammable. R15- Contact with water liberates extremely flammable gases. S7/8- Keep container tightly closed and dry. S43- In case of fire, use dry chemical. Never use water.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 3

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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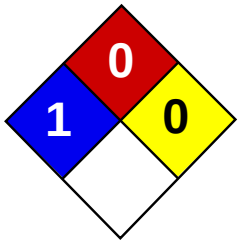

Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m3) from OSHA (PEL) [United States] TWA: 0.03 (mg/m3) from NIOSH [United States] TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

pH (1% soln/water): Not applicable.

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/01/2010 12:00 PM

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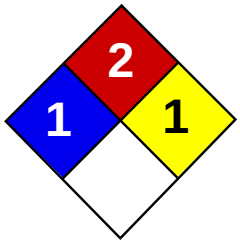

Material Safety Data Sheet
Iron Metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Iron Metal

Catalog Codes: SLI2047, SLI1996

CAS#: 7439-89-6

RTECS: NO4565500

TSCA: TSCA 8(b) inventory: Iron Metal

CI#: Not applicable.

Synonym:

Chemical Name: Iron

Chemical Formula: Fe

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Iron Metal, powder	7439-89-6	100

Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to liver, cardiovascular system, upper respiratory tract, pancreas. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Chlorine Trifluoride reacts with iron with incandescence. Powdered iron reacts with fluorine below redness with incandescence. Reduced iron decomposes with nitrogen dioxide @ ordinary temperature with incandescence. Reacting mass formed by mixture of phosphorus and iron can become incandescent when heated. This material is flammable in powder form only.

Special Remarks on Explosion Hazards: Material in powdered form can explode when exposed to heat or flame

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe dust. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Moisture sensitive.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder.)

Odor: Odorless.

Taste: Tasteless.

Molecular Weight: 55.85 g/mole

Color: Black to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 3000°C (5432°F)

Melting Point: 1535°C (2795°F)

Critical Temperature: Not available.

Specific Gravity: Density: 7.86 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, ignition sources, incompatible materials, water/moisture, air, dust generation.

Incompatibility with various substances:
Reactive with oxidizing agents, acids. Slightly reactive to reactive with moisture.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Hot iron(wire) burns in Chlorine gas. Violent decompositon of hydrogen peroxide (53% by weight or greater) may be caused by contact with iron. Readily oxidizes in moist air forming rust. Reactive with halogens. Incompatible with acetaldehyde, ammonium peroxodisulfate, chloroformamidinum, chloric acid, ammonium nitrate, dinitorgen tetroxide, nitryl fluoride, polystyrene, sodium acetylide, potassium dichromate, peroxyformic acid, sulfuric acid, sodium carbide. Readily attacked by dilute mineral acids and or attacked or dissolved by organic acids. Not appreciably attacked by cold sulfuric acid, or nitric acid, but is attacked by hot acids.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 30000 mg/kg [Rat].

Chronic Effects on Humans: May cause damage to the following organs: liver, cardiovascular system, upper respiratory tract, pancreas.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Iron metal filings or dust: May cause skin irritation by mechanical action. Iron metal wire: Not likely to cause skin irritation Eyes: Iron metal filings or dust: Can irritate eyes by mechanical action. Iron metal wire: No hazard. Will not cause eye irritation. Inhalation: Iron dust: Can irritate the respiratory tract by mechanical action. Iron metal wire or filings: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Iron metal wire: Not an ingestion hazard: Iron metal filings or dust: The amount of ingested iron which constitutes a toxic dose is not well defined. Proposed toxic doses of elemental iron are 20 mg/kg for gastrointestinal irritation to greater than 60 mg/kg for systemic toxicity. Gastrointestinal effects are the first signs to appear, with hemorrhagic vomiting and diarrhea, hematochezia, abdominal pain, lethargy, metabolic acidosis, coagulaopathy, shock, coma and convulsions developing from 0 to 6 hours after ingestion. Leukocytosis may also occur. An asymptomatic phase may ensue at 6 to 12 hours postingestion, followed by hypoglycemia or hyperglycemia, hepatic and renal failure, severe acidosis, cyanosis, fever, CNS depression (lethargy, restlessness and/or confusion seizures), hypotension, and cardiovascular collapse/cardiac failure in 12 to 48 hours. Hepatic cirrhosis, gastrointestinal scarring and/or strictures may arise in 2 to 6 weeks. It may also cause an anaphylactoid reaction. Non-cardiogenic pulmonary edema also develop in severe cases of iron intoxication. Chronic Potential Health Effects: Inhalation: Chronic inhalation of iron dust can lead to accumulation in the lungs and a characteristic stippled appearance on X-rays. This condition, called SIDEROSIS, is considered benign in that it does not interfere with lung function and does not predispose to other disease. Chronic inhalation of iron dust may also cause fibrosis in the lungs. Ingestion: Clinical signs of iron overload appear when the total body iron is 5 to 10 times higher than normal. Neurobehavioral defects including depression, decreased activity, habituation, reflex startle, and conditioned avoidance response performance may occur. However, similiar effects were also seen in iron defficiency. It is therefore likely that these behavioral effects are secondary to general toxicity. High serum iron levels may be associated with an increased risk of fatal acute myocardial infarction (MI). Skin: Prolonged or repeated contact may cause hypersensivity.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Metal powder, flammable, n.o.s. (Iron metal powder) UNNA: 3089 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California Director's List of Hazardous Substances: Iron Metal TSCA 8(b) inventory: Iron Metal

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS B-4: Flammable solid.

DSCL (EEC):
R11- Highly flammable. S16- Keep away from sources of ignition - No smoking. S22- Do not breathe dust.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 2

Reactivity: 1

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 2

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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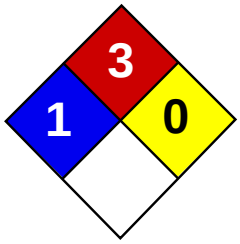

Material Safety Data Sheet
Hexanes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Hexanes

Catalog Codes: SLH2335, SLH2032

CAS#: 110-54-3

RTECS: MN9275000

TSCA: TSCA 8(b) inventory: Hexane

CI#: Not applicable.

Synonym:

Chemical Name: Hexane

Chemical Formula: C6-H14

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Hexanes	110-54-3	98.5-99.9

Toxicological Data on Ingredients: Hexane: ORAL (LD50): Acute: 25000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to peripheral nervous system, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 225°C (437°F)

Flash Points: CLOSED CUP: -22.5°C (-8.5°F). (TAG)

Flammable Limits: LOWER: 1.15% UPPER: 7.5%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards:
Extremely flammable liquid and vapor. Vapor may cause flash fire.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid, insoluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves (impervious).

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 500 (ppm) from OSHA (PEL) [United States] Inhalation TWA: 1800 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 176 (mg/m3) from ACGIH (TLV) [United States] SKIN TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 500 STEL: 1000 (ppm) from ACGIH (TLV) [United States] Inhalation TWA: 1760 STEL: 3500 (mg/m3) from ACGIH (TLV) [United States] Inhalation Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Gasoline-like or petroleum-like (Slight.)

Taste: Not available.

Molecular Weight: 86.18g/mole

Color: Clear Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 68°C (154.4°F)

Melting Point: -95°C (-139°F)

Critical Temperature: Not available.

Specific Gravity: 0.66 (Water = 1)

Vapor Pressure: 17.3 kPa (@ 20°C)

Vapor Density: 2.97 (Air = 1)

Volatility: Not available.

Odor Threshold: 130 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.9

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources, incompatibles.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Hexane can react vigorously with strong oxidizers (e.g. chlorine, bromine, fluorine)

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 25000 mg/kg [Rat]. Acute toxicity of the gas (LC50): 48000 ppm 4 hours [Rat].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: peripheral nervous system, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects based on animal data. May be tumorigenic based on animal data. May affect genetic material. Passes through the placental barrier in animal.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause mild skin irritation. It can be absorbed through the skin in harmful amounts. Eyes: May cause mild eye irritation. Inhalation: May be harmful if inhaled. Inhalation of vapors may cause respiratory tract irritation. Overexposure may affect, brain, spinal cord, behavior/central and peripheral nervous systems (lightheadness, dizziness, hallucinations, paralysis, blurred vision, memory loss, headache, euphoria, general anesthetic, muscle weakness, numbness of the extremeties, asphyxia, unconciousness and possible death), metabolism, respiration, blood, cardiovascular system, gastrointestinal system (nausea) Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation with abdominal pain and nausea. May also affect the liver, blood, brain, peripheral and central nervous systems. Symptoms of over exposure by ingestion are similar to that of overexposure by inhalation.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Hexane UNNA: 1208 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Hexanes Illinois toxic substances disclosure to employee act: Hexanes Illinois chemical safety act: Hexanes New York release reporting list: Hexanes Rhode Island RTK hazardous substances: Hexanes Pennsylvania RTK: Hexanes Florida: Hexanes Minnesota: Hexanes Massachusetts RTK: Hexanes Massachusetts spill list: Hexanes New Jersey: Hexanes New Jersey spill list: Hexanes Louisiana spill reporting: Hexanes TSCA 8(b) inventory: Hexanes SARA 313 toxic chemical notification and release reporting: Hexanes CERCLA: Hazardous substances.: Hexanes: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. R38- Irritating to skin. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R62- Possible risk of impaired fertility. R65- Harmful: may cause lung damage if swallowed. R67- Vapors may cause drowsiness or dizziness. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S29- Do not empty into drains. S33- Take precautionary measures against static discharges. S36/37- Wear suitable protective clothing and gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets. S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves (impervious). Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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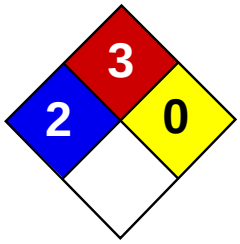

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

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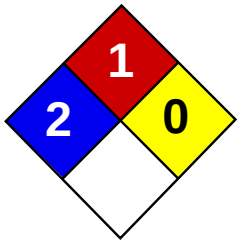

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Copper MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper

Catalog Codes: SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

CAS#: 7440-50-8

RTECS: GL5325000

TSCA: TSCA 8(b) inventory: Copper

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Cu

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Copper	7440-50-8	100

Toxicological Data on Ingredients: Copper LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH [1990] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 63.54 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2595°C (4703°F)

Melting Point: 1083°C (1981.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.94 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Copper Massachusetts RTK: Copper TSCA 8(b) inventory: Copper CERCLA: Hazardous substances.: Copper

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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Material Safety Data Sheet

Version 4.4
Revision Date 05/24/2013
Print Date 02/25/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Chloromethane
Product Number	:	295507
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
Flammable gas, Compressed Gas, Target Organ Effect, Carcinogen, Teratogen

Target Organs

Kidney, Liver, Central nervous system

GHS Classification
Flammable gases (Category 1)
Gases under pressure (Liquefied gas)
Carcinogenicity (Category 2)
Reproductive toxicity (Category 2)
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, Liver, Urogenital tract

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H351	Suspected of causing cancer.
H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child.
H373	May cause damage to organs (Central nervous system, Liver, Urogenital tract) through prolonged or repeated exposure if inhaled.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P281	Use personal protective equipment as required.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.

HMIS Classification

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	4
Physical hazards:	3

NFPA Rating

Health hazard:	1
Fire:	4
Reactivity Hazard:	0

Potential Health Effects

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms	:	Methyl chloride
Formula	:	CH_3Cl
Molecular Weight	:	50.49 g/mol

Component		Concentration
Chloromethane		
CAS-No.	74-87-3	90 100 %
EC-No.	200-817-4	
Index-No.	602-001-00-7	

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. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of an oxidizing gas (eg air), a source of ignition, and when the concentration of the gas is between the lower and upper explosive limits. Keep away from heat/sparks/open flame/hot surface/oxidizing gas. No smoking.

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

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Clean up promptly by sweeping or vacuum.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Contents under pressure. Moisture sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Chloromethane	74-87-3	TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Central Nervous System impairment Liver & kidney damage Testicular damage Teratogenic effects Not classifiable as a human carcinogen Danger of cutaneous absorption			
		STEL	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Central Nervous System impairment Liver & kidney damage Testicular damage Teratogenic effects Not classifiable as a human carcinogen Danger of cutaneous absorption			
	Potential Occupational Carcinogen See Appendix A			
		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.18-1969			
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.18-1969			
		Peak	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.18-1969			
		STEL	100 ppm 205 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	50 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants -

			105 mg/m3	1910.1000
	See Table Z-2			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) 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.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

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, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	compressed liquefied gas
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -97 °C (-143 °F) - lit.
Boiling point	-24.2 °C (-11.6 °F) - lit.
Flash point	no data available
Ignition temperature	632 °C (1,170 °F)
Auto-ignition	632.0 °C (1,169.6 °F)

temperature	
Lower explosion limit	7 %(V)
Upper explosion limit	17.4 %(V)
Vapour pressure	5,060.9 hPa (3,796.0 mmHg) at 20.0 °C (68.0 °F)
Density	0.915 g/cm3 at 25 °C (77 °F)
Water solubility	5.32 g/l at 25 °C (77 °F) - soluble
Partition coefficient: n-octanol/water	log Pow: 0.91
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evapouration 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
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Strong oxidizing agents, Iron

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 - 1,800 mg/kg

Inhalation LC50
LC50 Inhalation - rat - male and female - 4 h - > 21,800 mg/m3

Dermal LD50
no data available

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 sensitisation
no data available

Germ cell mutagenicity

Genotoxicity in vivo - rat - male - Inhalation - negative
DNA damage DNA repair

Carcinogenicity

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Chloromethane)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

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)
Inhalation - May cause damage to organs through prolonged or repeated exposure. - Central nervous system, Liver, Urogenital tract

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Dizziness, Drowsiness, Incoordination., Blurred vision, Headache, Nausea, Vomiting

Synergistic effects
no data available

Additional Information
RTECS: PA6300000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 550 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - 200 mg/l - 48 h Method: OECD Test Guideline 202

Persistence and degradability

Biodegradability	aerobic Result: 100 % - Readily biodegradable.

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1063 Class: 2.1
Proper shipping name: Methyl chloride
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1063 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: METHYL CHLORIDE
Marine pollutant: No

IATA
UN number: 1063 Class: 2.1
Proper shipping name: Methyl chloride
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

OSHA Hazards
Flammable gas, Compressed Gas, Target Organ Effect, Carcinogen, Teratogen

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

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

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Sudden Release of Pressure Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Chloromethane	74-87-3	2009-09-11

16. OTHER INFORMATION

Further information

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

Material Safety Data Sheet

Version 5.3
Revision Date 01/10/2013
Print Date 02/03/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Carbon tetrachloride
Product Number	:	319961
Brand	:	Sigma-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, Target Organ Effect, Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption

Target Organs

Liver, Kidney, Eyes, Nerves., HeartLiver, Kidney, Eyes, Nerves., Heart

Other hazards which do not result in classification
Rapidly absorbed through skin.

GHS Classification
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 3)
Acute toxicity, Dermal (Category 3)
Skin irritation (Category 3)
Eye irritation (Category 2B)
Carcinogenicity (Category 2)
Specific target organ toxicity - repeated exposure (Category 1)
Acute aquatic toxicity (Category 3)
Chronic aquatic toxicity (Category 3)
Hazardous to the ozone layer (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H316	Causes mild skin irritation.
H320	Causes eye irritation.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

H412	Harmful to aquatic life with long lasting effects.
H420	Harms public health and the environment by destroying ozone in the upperatmosphere

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P311	Call a POISON CENTER or doctor/ physician.

HMIS Classification

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

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	Toxic 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	:	Tetrachloromethane
Formula	:	CCl_4 CCl_4
Molecular Weight	:	153.82 g/mol

Component		Concentration
Tetrachloromethane		
CAS-No.	56-23-5	-
EC-No.	200-262-8	
Index-No.	602-008-00-5	

4. FIRST AID MEASURES

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

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

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

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

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

Further information
The product itself does not burn.

6. ACCIDENTAL RELEASE MEASURES

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

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

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Tetrachloromethane	56-23-5	TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Liver damage Suspected human carcinogen Danger of cutaneous absorption			
		STEL	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Liver damage Suspected human carcinogen Danger of cutaneous absorption			
		ST	2 ppm 12.6 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential Occupational Carcinogen See Appendix A			
		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.17-1967			
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.17-1967			
		Peak	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.17-1967			

		TWA	2 ppm 12.6 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) 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.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 240 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

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	liquid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -23 °C (-9 °F) - lit.
Boiling point	76 - 77 °C (169 - 171 °F) - lit.
Flash point	does not flash
Ignition temperature	no data available
Auto-ignition temperature	no data available
Lower explosion limit	no data available

Upper explosion limit	no data available
Vapour pressure	45 hPa (34 mmHg) at 0.3 °C (32.5 °F) 120 hPa (90 mmHg) at 19.8 °C (67.6 °F) 14,549 hPa (10,913 mmHg) at 24 °C (75 °F)
Density	1.594 g/cm3 at 25 °C (77 °F)
Water solubility	0.8461 g/l at 20 °C (68 °F)
Partition coefficient: n-octanol/water	log Pow: 2.83 at 25 °C (77 °F)
Relative vapor density	no data available
Odour	sweet
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
Strong oxidizing agents

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 - 2,350 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 4 h - 8000 ppm

Dermal LD50
LD50 Dermal - rabbit - > 20,000 mg/kg

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h - Draize Test

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation - 24 h - Draize Test

Respiratory or skin sensitization

Germ cell mutagenicity
no data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification. Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Tetrachloromethane)
NTP:	Reasonably anticipated to be a human carcinogen (Tetrachloromethane)
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)
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Vomiting, Diarrhoea, Abdominal pain, Nausea, Dizziness, Headache, Damage to the eyes., Liver injury may occur., Kidney injury may occur., Exposure to and/or consumption of alcohol may increase toxic effects., Contact with skin can cause:, Pain, Erythema, hyperemia

Synergistic effects
no data available

Additional Information
RTECS: FG4900000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality LC50 - Danio rerio (zebra fish) - 24.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 35 mg/l - 48 h Method: OECD Test Guideline 202
Toxicity to algae	Growth inhibition EC50 - Algae - 20 mg/l - 72 h Method: OECD Test Guideline 201

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d Bioconcentration factor (BCF): 30

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.

Harmful to aquatic life with long lasting effects.

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: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride
Reportable Quantity (RQ): 10 lbs
Marine Pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1846 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: CARBON TETRACHLORIDE
Marine Pollutant: Marine pollutant

IATA
UN number: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Toxic by inhalation., 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
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

California Prop. 65 Components

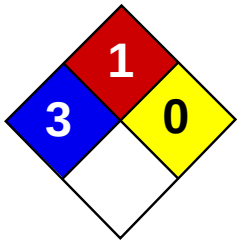
WARNING! This product contains a chemical known to the State of	CAS-No.	Revision Date

California to cause cancer. Tetrachloromethane	56-23-5	2007-09-28

16. OTHER INFORMATION

Further information

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



Health	3
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Cadmium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cadmium

Catalog Codes: SLC3484, SLC5272, SLC2482

CAS#: 7440-43-9

RTECS: EU9800000

TSCA: TSCA 8(b) inventory: Cadmium

CI#: Not applicable.

Synonym:

Chemical Name: Cadmium

Chemical Formula: Cd

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cadmium	7440-43-9	100

Toxicological Data on Ingredients: Cadmium: ORAL (LD50): Acute: 2330 mg/kg [Rat.]. 890 mg/kg [Mouse]. DUST (LC50): Acute: 50 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, liver. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 570°C (1058°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Non-flammable in presence of open flames and sparks, of heat, of oxidizing materials, of reducing materials, of combustible materials, of moisture.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 112.4 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 765°C (1409°F)

Melting Point: 320.9°C (609.6°F)

Critical Temperature: Not available.

Specific Gravity: 8.64 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Reacts violently with potassium.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 890 mg/kg [Mouse]. Acute toxicity of the dust (LC50): 229.9 mg/m3 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP. The substance is toxic to kidneys, lungs, liver.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: An allergen. 0047 Animal: embryotoxic, passes through the placental barrier.

Special Remarks on other Toxic Effects on Humans: May cause allergic reactions, exzema and/or dehydration of the skin.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport:

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cadmium California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cadmium Pennsylvania RTK: Cadmium Massachusetts RTK: Cadmium TSCA 8(b) inventory: Cadmium SARA 313 toxic chemical notification and release reporting: Cadmium CERCLA: Hazardous substances.: Cadmium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R26- Very toxic by inhalation. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 04:29 PM

Last Updated: 05/21/2013 12:00 PM

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Material Safety Data Sheet

Version 4.2
Revision Date 10/29/2012
Print Date 02/25/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Barium
Product Number	:	237094
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
Water Reactive, Irritant

GHS Classification
Substances, which in contact with water, emit flammable gases (Category 2)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H261	In contact with water releases flammable gases.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

Precautionary statement(s)

P231 + P232	Handle under inert gas. Protect from moisture.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P422	Store contents under inert gas.

HMIS Classification

Health hazard:	2
Flammability:	3
Physical hazards:	1

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	1
Special hazard.:	W

Potential Health Effects

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula	:	Ba
Molecular Weight	:	137.33 g/mol

Component		Concentration
Barium		
CAS-No.	7440-39-3	-
EC-No.	231-149-1	

4. FIRST AID MEASURES

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

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

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

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

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

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Dry powder Carbon dioxide (CO2)

Extinguishing media which shall not be used for safety reasons
Water

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. - Barium oxide

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. 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.

Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. 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. Keep away from sources of ignition - No smoking.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Barium	7440-39-3	TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen			

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

Skin and body protection
impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	Rods
Colour	grey

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 725 °C (1,337 °F) - lit.
Boiling point	1,640 °C (2,984 °F) - lit.
Flash point	not applicable
Ignition temperature	no data available

Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	3.6 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Reacts violently with water.

Conditions to avoid
Exposure to moisture.

Materials to avoid
Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO2), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Barium oxide
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

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

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

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

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.

Synergistic effects
no data available

Additional Information
RTECS: CQ8370000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1400 Class: 4.3 Packing group: II EMS-No: F-G, S-O
Proper shipping name: BARIUM
Marine pollutant: No

IATA
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium

15. REGULATORY INFORMATION

OSHA Hazards
Water Reactive, Irritant

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

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

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

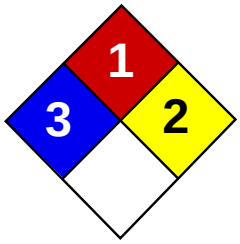
California Prop. 65 Components

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

16. OTHER INFORMATION

Further information

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



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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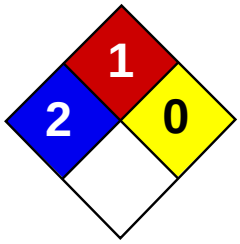
Last Updated: 05/21/2013 12:00 PM



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Antimony MSDS

Section 1: Chemical Product and Company Identification

Product Name: Antimony

Catalog Codes: SLA1453, SLA4462

CAS#: 7440-36-0

RTECS: CC4025000

TSCA: TSCA 8(b) inventory: Antimony

CI#: Not available.

Synonym: Stibium

Chemical Name: Not available.

Chemical Formula: Sb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Antimony	7440-36-0	100

Toxicological Data on Ingredients: Antimony: ORAL (LD50): Acute: 7000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, kidneys, lungs, the nervous system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In

case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 121.75 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 1635°C (2975°F)

Melting Point: 630°C (1166°F)

Critical Temperature: Not available.

Specific Gravity: 6.691 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 7000 mg/kg [Rat].

Chronic Effects on Humans: Causes damage to the following organs: blood, kidneys, lungs, the nervous system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Antimony powder UNNA: UN2871 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Antimony Massachusetts RTK: Antimony TSCA 8(b) inventory: Antimony

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 11:19 AM

Last Updated: 05/21/2013 12:00 PM

Material Safety Data Sheet

Version 3.4
Revision Date 09/10/2012
Print Date 02/05/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	4-Methylphenol
Product Number	:	442418
Brand	:	Supelco
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
Highly toxic by inhalation, Toxic by ingestion, Toxic by skin absorption

Target Organs

Central nervous system, Lungs, Eyes, Liver, Kidney

GHS Classification
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 2)
Acute toxicity, Dermal (Category 3)
Acute aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301 + H311	Toxic if swallowed or in contact with skin
H330	Fatal if inhaled.
H401	Toxic to aquatic life.

Precautionary statement(s)

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P280	Wear protective gloves/ protective clothing.
P284	Wear respiratory protection.
P310	Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard:	3
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard: 3
Fire: 2
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be fatal 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 : p-Cresol
4-Methylphenol

Formula : C_7H_8O
Molecular Weight : 108.14 g/mol

Component		Concentration
p-Cresol		
CAS-No.	106-44-5	-
EC-No.	203-398-6	
Index-No.	604-004-00-9	

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

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.

hygroscopic Air and light sensitive. Handle and store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
p-Cresol	106-44-5	TWA	5 ppm 22 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
Remarks	Skin contact does contribute to exposure.			
		TWA	5 ppm 22 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin contact does contribute to exposure.			
		TWA	5 ppm 22 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Skin contact does contribute to exposure.			
		TWA	2.3 ppm 10 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	20 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Upper Respiratory Tract irritation 2010 Adoption Not classifiable as a human carcinogen Danger of cutaneous absorption			

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	crystalline
Colour	colourless

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 32 - 34 °C (90 - 93 °F) - lit.
Boiling point	202 °C (396 °F) - lit.
Flash point	85.0 °C (185.0 °F) - closed cup
Ignition temperature	559 °C (1,038 °F)
Autoignition temperature	559.0 °C (1,038.2 °F)
Lower explosion limit	1.1 %(V)
Vapour pressure	1.3 hPa (1.0 mmHg) at 20.0 °C (68.0 °F)
Density	1.034 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 1.94
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, Bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 207.0 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Other changes. Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Ulceration or bleeding from stomach.

Inhalation LC50
LC50 Inhalation - rat - 1 h - > 710 mg/m3

Dermal LD50
LD50 Dermal - rabbit - 301.0 mg/kg
Remarks: Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands. Kidney, Ureter, Bladder:Other changes.

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Severe eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

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

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, laryngitis, Dizziness, Cardiovascular effects., Muscle cramps/spasms., Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Synergistic effects
no data available

Additional Information
RTECS: GO6475000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - other fish - 16.00 - 24.00 mg/l - 24 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 7.9 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 1.4 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
Does not bioaccumulate.

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

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

Toxic to aquatic life.

no data available

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: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3455 Class: 6.1 (8) Packing group: II EMS-No: F-A, S-B
Proper shipping name: CRESOLS, SOLID
Marine pollutant: No

IATA
UN number: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid

15. REGULATORY INFORMATION

OSHA Hazards
Highly toxic by inhalation, 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
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

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

16. OTHER INFORMATION

Further information

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

Material Safety Data Sheet

Version 5.0
Revision Date 12/18/2012
Print Date 02/05/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	3-Methylphenol
Product Number	:	442391
Brand	:	Supelco
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
Combustible Liquid, Target Organ Effect, Toxic by ingestion, Toxic by skin absorption, Corrosive

Target Organs

Central nervous system, Lungs, Liver, Kidney, Eyes

GHS Classification
Flammable liquids (Category 4)
Acute toxicity, Oral (Category 3)
Acute toxicity, Dermal (Category 3)
Skin corrosion (Category 1A)
Serious eye damage (Category 1)
Acute aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H227	Combustible liquid
H301 + H311	Toxic if swallowed or in contact with skin
H314	Causes severe skin burns and eye damage.
H401	Toxic to aquatic life.

Precautionary statement(s)

P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard: 3
Chronic Health Hazard: *
Flammability: 2
Physical hazards: 0

NFPA Rating

Health hazard: 3
Fire: 2
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin	Toxic if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : m-Cresol
3-Methylphenol

Formula : C_7H_8O
Molecular Weight : 108.14 g/mol

Component		Concentration
m-Cresol		
CAS-No.	108-39-4	-
EC-No.	203-577-9	
Index-No.	604-004-00-9	

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

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

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

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

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

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
m-Cresol	108-39-4	TWA	2.3 ppm 10 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	20 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Upper Respiratory Tract irritation 2010 Adoption Not classifiable as a human carcinogen Danger of cutaneous absorption			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) 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.

Full contact
Material: Chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 480 min
Material tested:Camapren® (KCL 722 / Aldrich Z677493, Size M)

Splash protection
Material: Nitrile rubber

Minimum layer thickness: 0.2 mm
Break through time: 32 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). 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	liquid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 8 - 10 °C (46 - 50 °F) - lit.
Boiling point	203 °C (397 °F) - lit.
Flash point	86 °C (187 °F) - closed cup
Ignition temperature	558 °C (1,036 °F)
Auto-ignition temperature	no data available
Lower explosion limit	1.06 %(V)
Upper explosion limit	1.35 %(V)
Vapour pressure	< 1 hPa (< 1 mmHg) at 20 °C (68 °F)
Density	1.034 g/cm3 at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapor density	3.73 - (Air = 1.0)
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
Heat, flames and sparks.

Materials to avoid
Oxidizing agents, Bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 242 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Peritonitis.

Inhalation LC50
no data available

Dermal LD50
Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Severe eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

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

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion	Toxic if swallowed.
Skin	Toxic if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Cough, Shortness of breath, Headache, Nausea

Synergistic effects
no data available

Additional Information
RTECS: GO6125000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 8.9 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 18.8 mg/l - 48 h
	EC50 - Daphnia magna (Water flea) - 25 mg/l - 24 h

Persistence and degradability

Biodegradability	Biotic/Aerobic
	Biotic/Aerobic

Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d Bioconcentration factor (BCF): 17
	Leuciscus idus (Golden orfe) - Bioconcentration factor (BCF): 20

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

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

Toxic to aquatic life.

no data available

13. DISPOSAL CONSIDERATIONS

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2076 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, liquid
Reportable Quantity (RQ): 100 lbs
Marine Pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2076 Class: 6.1 (8) Packing group: II EMS-No: F-A, S-B
Proper shipping name: CRESOLS, LIQUID
Marine Pollutant: No

IATA
UN number: 2076 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, liquid

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid, Target Organ Effect, Toxic by ingestion, Toxic by skin absorption, Corrosive

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

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

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

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

16. OTHER INFORMATION

Further information

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

Material Safety Data Sheet

1,3-Butadiene

Section 1. Chemical product and company identification

Product name : 1,3-Butadiene

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

Synonym : α,γ-Butadiene; trans-Butadiene; Biethylene; Bivinyl; Buta-1,3-diene; Butadiene; Divinyl; Erythrene; Pyrrolylene; Vinylethylene; (E)-CH2=CHCH=CH2; Butadieen; Buta-1,3-dieen; Butadien; Buta-1,3-dien; NCI-C50602

MSDS # : 001008

Date of Preparation/Revision : **6/6/2013.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. [COLORLESS LIQUEFIED COMPRESSED GAS WITH GASOLINE-LIKE ODOR.]

Emergency overview : WARNING!

FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CANCER HAZARD - CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.

Keep away from heat, sparks and flame. Do not puncture or incinerate container. May cause target organ damage, based on animal data. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Keep container closed.

Contact with rapidly expanding gases can cause frostbite.

Target organs : May cause damage to the following organs: the reproductive system, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

Routes of entry : Inhalation

Potential acute health effects

Eyes : Contact with rapidly expanding gas may cause burns or frostbite.

Skin : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Acts as a simple asphyxiant.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects

Carcinogenicity : Can cause cancer. Risk of cancer depends on duration and level of exposure.

Target organs : May cause damage to the following organs: the reproductive system, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
1,3-Butadiene	106-99-0	100	**ACGIH TLV (United States, 3/2012).** TWA: 4.4 mg/m³ 8 hour(s). TWA: 2 ppm 8 hour(s). **OSHA PEL (United States, 6/2010).** STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s).

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Flammable.

Auto-ignition temperature : 419.85°C (787.7°F)

Flash point : Closed cup: -76.15°C (-105.1°F).

Flammable limits : Lower: 2% Upper: 11.5%

Products of combustion : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Fire hazards in the presence of various substances : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Fire-fighting media and instructions : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

1,3-butadiene

ACGIH TLV (United States, 3/2012).
TWA: 4.4 mg/m³ 8 hour(s).
TWA: 2 ppm 8 hour(s).
OSHA PEL (United States, 6/2010).
STEL: 5 ppm 15 minute(s).
TWA: 1 ppm 8 hour(s).
OSHA PEL 1989 (United States, 3/1989).
STEL: 5 ppm 15 minute(s).
TWA: 1 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 54.1 g/mole

Molecular formula : C4-H6

Boiling/condensation point : -4.4°C (24.1°F)

Melting/freezing point : -108.9°C (-164°F)

Critical temperature : 151.9°C (305.4°F)

Vapor pressure : 21.35 (psig)

Vapor density : 1.87 (Air = 1)

Specific Volume (ft^3/lb) : 7.2098

Gas Density (lb/ft^3) : 0.621

Section 10. Stability and reactivity

Stability and reactivity : Unstable.

Conditions of instability : Under normal conditions of storage and use, hazardous polymerization will not occur. Unstable. (at high temperature)

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials. Highly reactive or incompatible with the following materials: acids and alkalis.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Hazardous polymerization may occur under certain conditions of storage or use.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
1,3-butadiene	LD50 Oral	Rat	5480 mg/kg	-
	LC50 Inhalation Vapor	Rat	285 g/m3	4 hours
	LC50 Inhalation Vapor	Rat	285000 mg/m3	4 hours
	LC50 Inhalation Gas.	Rat	128000 ppm	4 hours

IDLH : 2000 ppm

Chronic effects on humans : **CARCINOGENIC EFFECTS**: Classified 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by NIOSH, 1 (Proven for humans.) by European Union. Classified A2 (Suspected for humans.) by ACGIH.
MUTAGENIC EFFECTS: Classified 2 by European Union.
May cause damage to the following organs: the reproductive system, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects : Can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Products of degradation : Products of degradation: carbon oxides (CO, CO_2) and water.

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1010	Butadienes, stabilized	2.1	Not applicable (gas).		**Reportable quantity** 10 lbs. (4.54 kg)
TDG Classification	UN1010	Butadienes, stabilized	2.1	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Road or Rail Index** Forbidden
Mexico Classification	UN1010	Butadienes, stabilized	2.1	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: 1,3-butadiene
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: 1,3-butadiene: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements :	1,3-Butadiene	106-99-0	100
Supplier notification :	1,3-Butadiene	106-99-0	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

1,3-Butadiene

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

California Prop. 65 : **WARNING:** This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
1,3-Butadiene	Yes.	Yes.	Yes.	No.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class F: Dangerously reactive material.

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements : FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CANCER HAZARD - CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.

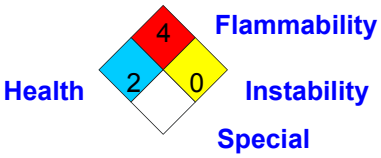
Canada

Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class F: Dangerously reactive material.

Hazardous Material Information System (U.S.A.) :

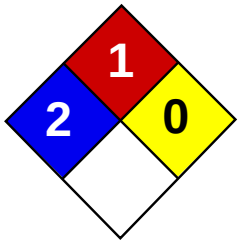
Health	*	2
Flammability		4
Physical hazards		2

National Fire Protection Association (U.S.A.) :



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



Health	2
Fire	1
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
1,1,1-Trichloroethane MSDS

Section 1: Chemical Product and Company Identification

Product Name: 1,1,1-Trichloroethane

Catalog Codes:

CAS#: 71-55-6

RTECS: KJ2975000

TSCA: TSCA 8(b) inventory: 1,1,1-Trichloroethane

CI#: Not available.

Synonym:

Chemical Formula: CH3CCl3

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{1,1,1-}Trichloroethane	71-55-6	100

Toxicological Data on Ingredients: 1,1,1-Trichloroethane: ORAL (LD50): Acute: 9600 mg/kg [Rat]. 6000 mg/kg [Mouse]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 18000 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion. Hazardous in case of skin contact (irritant, permeator), of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 537°C (998.6°F)

Flash Points: Not available.

Flammable Limits: LOWER: 7.5% UPPER: 12.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of oxidizing materials, of acids, of alkalis.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive to explosive in presence of oxidizing materials, of acids, of alkalis.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 350 STEL: 440 CEIL: 440 (ppm) from ACGIH (TLV) [1995] TWA: 1900 STEL: 2460 CEIL: 2380 (mg/m3) from ACGIH [1995]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 133.41 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 74.1°C (165.4°F)

Melting Point: -32.5°C (-26.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.3376 (Water = 1)

Vapor Pressure: 100 mm of Hg (@ 20°C)

Vapor Density: 4.6 (Air = 1)

Volatility: Not available.

Odor Threshold: 400 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 6000 mg/kg [Mouse]. Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 18000 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant, permeator), of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : 1,1,1-Trichloroethane : UN2831 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: 1,1,1-Trichloroethane Massachusetts RTK: 1,1,1-Trichloroethane TSCA 8(b) inventory: 1,1,1-Trichloroethane SARA 313 toxic chemical notification and release reporting: 1,1,1-Trichloroethane CERCLA: Hazardous substances.: 1,1,1-Trichloroethane

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

DSCL (EEC):
R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:31 PM

Last Updated: 05/21/2013 12:00 PM

56 FROST STREET

BROOKLYN, NEW YORK

Remedial Action Work Plan

NYC VCP Number: 16CVCP007K
OER Project Number: 14EHAZ352K

Prepared for:
56 Frost Street, LLC
2917 Avenue I, Brooklyn, NY 11210

Prepared by:

Tenen Environmental
121 West 27th Street, Suite 1004
New York, NY 10001
mahmed@tenen-env.com
(646) 606-2332

AUGUST 20, 2105

REMEDIAL ACTION WORK PLAN

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- Appendix 3 - Soil/Materials Management Plan
- Appendix 4 - Construction Health and Safety Plan

LIST OF ACRONYMS

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

PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

I, Matthew Carroll, 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 56 Frost Street site, VCP Site number 16CVCP007K and OER project Number 14EHAZ352K. 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.

Matthew M. Carroll
Name

091629
PE License Number

Signature

8/20/15
Date

PE Stamp

I, Mohamed Ahmed, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 56 Frost Street site, site number 16CVCP007K and OER project Number 14EHAZ352K. 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.

Mohamed Ahmed
QEP Name

Mohamed Ahmed
QEP Signature

8-20-15
Date

Certification by a Professional Engineer is required. Certification by a Qualified Environmental Professional (QEP) is optional unless the PE and QEP work for separate firms.

EXECUTIVE SUMMARY

56 Frost Street has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 2,315-square foot site located at 56 Frost Street in Brooklyn, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Current Usage

The Site, located at 56 Frost Street in the Greenpoint section of Brooklyn, New York, and is currently identified as Block 2737, Lot 10 on the New York City Tax Map. Figure 1 shows the Site location. Lot 1 is a rectangular-shaped parcel of 2,315 square feet located on the south side of Frost Street, between Lorimer and Leonard Streets. The property has approximately 25 feet of frontage along Frost Street and is approximately 100 feet deep, extending to Meeker Avenue. Another address associated with the Site is 297 Meeker Avenue. The Site is bordered by (describe property) to the north; (describe property) to the south; (describe property) to the east; and (describe property) to the west. A map of the site boundary is shown on Figure 2.

The property is currently vacant after the demolition of the one-story building.

Summary of Proposed Redevelopment Plan

The development project will consist of a new 4-story residential building with a cellar and penthouse. The building will contain a total of eight residential units and will have front and rear yards facing Frost Street and Meeker Avenue. The cellar will for accessory use and mechanical room. The total area of the cellar is 1,500 square feet. The first through forth floors and penthouse will consist of residential units with a total area of 6,374.3 square feet.

The building will have a setback of approximately 18 feet from Meeker Avenue and approximately 8 feet from Frost Street to accommodate landscaping areas in the front and rear yards along Frost Street and Meeker Avenue. The total excavation depth within the footprint of the proposed basement will be approximately 7 feet and 2 inches below grade. The elevation at

Meeker Avenue is approximately two feet higher than Frost Street and the finish slab elevation approximately will match the elevations in each side of the building. An estimated 500 cubic yards (750 tons) of soil will require excavation for the building's cellar and front and rear yard.

Layout of the proposed Site development is presented in Attachment A. The current zoning designation is M1-2 R6B/Special MX-8 mixed district. 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. Elevation of the property is approximately 20 feet.
2. Depth to groundwater is approximately 7 feet below grade at the Site.
3. Groundwater flow is generally northwest.
4. The stratigraphy of the Site, from the surface down, consists of 2 to 9 feet of fill material.
5. Soil/fill samples results were compared to NYSDEC Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill samples collected during the RI showed no exceedances of VOCs, PCBs, or pesticides in any of the samples. Trace concentrations of two VOCs, Methyl tert butyl ether and 4-Methyl-2-pentanone were detected below Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected including including benzo(a)anthracene (max. of 2.2 mg/kg), benzo(a)pyrene (max. of 3.2 mg/kg), benzo(b)fluroanthene(max. of 2.5 mg/kg), and indeno(1,2,3-cd)pyrene (max. of 2.0 mg/kg) exceeding Restricted Residential Use SCOs; and benzo(k)fluoranthene (max. 1.4 of mg/kg), chrysene (max. of 2.4 mg/kg), and 3-Methylphenol 4-Methylphenol (max. of 0.59 mg/kg) exceeding Unrestricted Use SCOs. Several metals including arsenic (max. of 51 mg/kg), barium (630 mg/kg), cadmium (max. of 37 mg/kg), copper (max. of 22,000 mg/kg), lead (max. of 5,600 mg/kg), mercury (max. of 9.1 mg/kg), and zinc (max. of 32,000 mg/kg) exceeded Restricted Residential Use SCOs in shallow and deep samples. The metals, nickel (31 mg/kg) and silver (max. of 29 mg/kg) exceeded Unrestricted Use SCOs in shallow and deep samples. Analytical results for one shallow soil samples analyzed for leachable lead and mercury

indicated that leachable lead was detected at 19 ppm exceeding regulatory limit for hazardous waste of 5 ppm. No leachable mercury was detected.

6. Groundwater samples were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the investigations showed no pesticides or PCBs in any of the samples. One VOC, methyl tert butyl either (MTBE) was found at a concentration of 11 ug/L exceeding its GQS. One SVOC, benzo(b)fluoranthene was found at a concentration of 0.17 ug/L exceeding its GQS. Several metals including antimony (max of 7.58 ug/L), cadmium (max of 22.1 ug/L), copper (max of 988.5 ug/L), iron (445 ug/L), lead (35.12 ug/L), manganese (max of 478 ug/L), sodium (max of 1,430,000 ug/L), and zinc (max of 9,470 ug/L) exceeded their respective GQS.
7. Soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guidance Values Derived by the NYSDOH located 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 213.97 ug/m^3 to 478.45 ug/m^3. Chlorinated VOC 1,1,1-trichloroethane (TCA) was detected in one sample at 2.62 ug/m^3. Carbon tetrachloride, tetrachloroethylene (PCE), and trichloroethylene (TCE) were not detected in any of the samples.

Summary of the Remedy

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establish Track 4 Site-Specific 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(s).
6. Excavation and removal of soil/fill exceeding Track 4 Restricted Residential Use SCOs. For new development, the entire footprint of the proposed building (about 70 % of the property) will be excavated to a depth of 7 feet and 2 inches below grade, with an additional excavation to minimum of two feet for the front and rear courtyard. Additional excavation will be done for hotspot areas. Approximately 750 tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility;
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means and monitoring with a PID. Appropriate segregation of excavated media on-Site;
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of all UST's that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills 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 onsite;

11. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs (if needed);

12. Import of materials to be used for backfill and cover in the areas of the rear and front yards in compliance with this plan and in accordance with applicable laws and regulations;

13. Construction and maintenance of an engineered composite cover consisting of a minimum 4 inch thick cellar concrete slab on top of a minimum 20 mil vapor barrier to prevent human exposure to residual soil/fill remaining under the Site;

14. Installation of a vapor barrier system consisting of vapor barrier beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. The vapor barrier system will consist of a Steetgo 20-mil vapor barrier below the foundation slab and outside all sub-grade foundation sidewalls to grade. The vapor barrier system is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building.

15. Performance of all activities required for the remedial action, including permitting requirements, in compliance with applicable laws and regulations;

16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Submission of an approved Site Management Plan (SMP) in the Remedial Action Plan (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.
18. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this

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

COMMUNITY PROTECTION STATEMENT

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

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

Project Information:

- Site Address: 56 Frost Street
- NYC Voluntary Cleanup Program Project Number: 16CVCP007K

Project Contacts:

- OER Project Manager: Alysha Alfieri, 212-788-8841
- Site Project Manager: Mathew Carroll, (646) 606-2332
- Site Safety Officer: Mohamed Ahmed, (646) 606-2332
- Online Document Repository: http://www.nyc.gov/html/oer/html/repository/RBrooklyn.shtml

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

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

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

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

Site Safety Coordinator. This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of this Community Protection Statement.

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

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

Odor, Dust and Noise Control. This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

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 7:00 a.m. to 6:00 p.m., Monday to 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 or the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document, the NYC Office of Environmental Remediation

Project Manager Alysha Alfieri at (212) 676-0459, 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. A trained and properly qualified environmental professional will supervise all excavation activities.. 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 Brooklyn Public Library: Leonard, located at 81 Devoe Street, Brooklyn, NY 11211.

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

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

56 Frost Street, LLC has enrolled in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 56 Frost Street in the Greenpoint section of Brooklyn, New York (the "Site"), Figure 1. A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND CURRENT USAGE

The Site, located at 56 Frost Street in the Greenpoint section of Brooklyn, New York, and is currently identified as Block 2737, Lot 10 on the New York City Tax Map. Figure 1 shows the Site location. Lot 1 is a rectangular-shaped parcel of 2,315 square feet located on the south side of Frost Street, between Lorimer and Leonard Streets. The property has approximately 25 feet of frontage along Frost Street and is approximately 100 feet deep, extending to Meeker Avenue. Another address associated with the Site is 297 Meeker Avenue. The Site is bordered by (describe property) to the north; (describe property) to the south; (describe property) to the east; and (describe property) to the west. A map of the site boundary is shown on Figure 2.

The property is currently vacant after the demolition of the one-story building.

1.2 PROPOSED REDEVELOPMENT PLAN

The development project will consist of a new 4-story residential building with a cellar and penthouse. The building will contain a total of eight residential units and will have front and

rear yards facing Frost Street and Meeker Avenue. The cellar will be for accessory use and mechanical room. The total area of the cellar is 1,500 square feet. The first through forth floors and penthouse will consist of residential units with a total area of 6,374.3 square feet.

The building will have a setback of approximately 18 feet from Meeker Avenue and approximately 8 feet from Frost Street to accommodate landscaping areas in the front and rear yards along Frost Street and Meeker Avenue. The total excavation depth within the footprint of the proposed basement will be approximately 7 feet and 2 inches below grade. The elevation at Meeker Avenue is approximately two feet higher than Frost Street and the finish slab elevation approximately will match the elevations in each side of the building. An estimated 500 cubic yards (750 tons) of soil will require excavation for the building's cellar and front and rear yard.

Layout of the proposed Site development is presented in Attachment A. The current zoning designation is M1-2 R6B/Special MX-8 mixed district. 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

56 Frost Street Site is bounded to the north by Frost Street, to the south by Meeker Avenue and Brooklyn-Queens Expressway, to the east by a 3-story residential building, and to the west by a mixed commercial and residential 2-story building. The surrounding area is predominantly residential with some mixed residential/commercial use. Based on a review of the OER's Searchable Property Environmental E-Database (SPEED), no schools/universities, medical centers or day care centers listed within a 500-feet radius of the Site. Figure 2 shows the surrounding land usage.

1.4 SUMMARY OF PAST SITE USES AND AREAS OF CONCERN

Tenen Environmental prepared a Phase I Environmental Site Assessment (Phase I) for the Site in December 2013. As indicated in the Phase I, the Site and surrounding areas have been developed urban land since at least 1897. The 1897-1916 Sanborn maps show the Site as mostly

vacant, except for two small buildings, one of which was used to store mineral water. By 1942, the Site had been developed with two larger buildings, one along Frost Street and the second fronting Meeker Avenue. The building on Frost Street is shown as an auto house in 1951; the use is not specified in later maps. By 1951, a welder occupied the southern building, with the later use (maps dated 1979 through 2007) shown as an auto repair shop.

The Phase I revealed no evidence of *recognized environmental conditions* in connection with the property, with the exception of the following:

- Historic use of the Site for welding and auto repair operations;
- Historic use of the north adjacent property as a brass foundry and large-scale dry cleaning operation;
- Use of the east adjacent lot as a gasoline service station with underground petroleum storage tanks;
- An open LTANKS case approximately 0.3 mile from the Site with documented offsite free product migration; and
- An open NY SPILLS listing pertaining to a release of approximately 8,000 gallons of petroleum from a feeder line located approximately 0.06 mile from the Site.

1.5 SUMMARY OF WORK PERFORMED UNDER THE REMEDIAL INVESTIGATION

Tenen Environmental performed the following scope of work at the Site in (insert date):

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed four (4) soil borings across the Site, and collected 9 soil samples for chemical analysis from the soil borings;
3. Installed three (3) groundwater monitoring wells throughout the site to establish groundwater flow and collected three (3) groundwater samples for chemical analysis to evaluate chemical analysis.

1.6 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called "*Remedial Investigation Report, 56 Frost Street*", dated February, 2014 (RIR).

1. Elevation of the property is approximately 20 feet.
2. Depth to groundwater is approximately 7 feet below grade at the Site.
3. Groundwater flow is generally northwest.
4. Bedrock is approximately at 165 feet below ground surface
5. The stratigraphy of the Site, from the surface down, consists of 2 to 9 feet of fill material.
6. Soil/fill samples results were compared to NYSDEC Unrestricted Use (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill samples collected during the RI showed no exceedances of VOCs, PCBs, or pesticides in any of the samples. Trace concentrations of two VOCs, Methyl tert butyl ether and 4-Methyl-2-pentanone were detected below Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected including including benzo(a)anthracene (max. of 2.2 mg/kg), benzo(a)pyrene (max. of 3.2 mg/kg), benzo(b)fluroanthene(max. of 2.5 mg/kg), and indeno(1,2,3-cd)pyrene (max. of 2.0 mg/kg) exceeding Restricted Residential Use SCOs; and benzo(k)fluoranthene (max. 1.4 of mg/kg), chrysene (max. of 2.4 mg/kg), and 3-Methylphenol 4-Methylphenol (max. of 0.59 mg/kg) exceeding Unrestricted Use SCOs. Several metals including arsenic (max. of 51 mg/kg), barium (630 mg/kg), cadmium (max. of 37 mg/kg), copper (max. of 22,000 mg/kg), lead (max. of 5,600 mg/kg), mercury (max. of 9.1 mg/kg), and zinc (max. of 32,000 mg/kg) exceeded Restricted Residential Use SCOs in shallow and deep samples. The metals, nickel (31 mg/kg) and silver (max. of 29 mg/kg) exceeded Unrestricted Use SCOs in shallow and deep samples. Analytical results for one shallow soil samples analyzed for leachable lead and mercury indicated that leachable lead was detected at 19 ppm exceeding regulatory limit for hazardous waste of 5 ppm. No leachable mercury was detected.
7. Groundwater samples were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples collected during the investigations showed no pesticides or PCBs in any of the samples. One VOC, methyl

tert butyl either (MTBE) was found at a concentration of 11 ug/L exceeding its GQS. One SVOC, benzo(b)fluoranthene was found at a concentration of 0.17 ug/L exceeding its GQS. Several metals including antimony (max of 7.58 ug/L), cadmium (max of 22.1 ug/L), copper (max of 988.5 ug/L), iron (445 ug/L), lead (35.12 ug/L), manganese (max of 478 ug/L), sodium (max of 1,430,000 ug/L), and zinc (max of 9,470 ug/L) exceeded their respective GQS.

8. Soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guidance Values Derived by the NYSDOH located 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 213.97 ug/m^3 to 478.45 ug/m^3. Chlorinated VOC 1,1,1-trichloroethane (TCA) was detected in one sample at 2.62 ug/m^3. Carbon tetrachloride, tetrachloroethylene (PCE), and trichloroethylene (TCE) were not detected in any of the samples.

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of small amounts of hazardous waste is anticipated 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 or surface water contamination.

Groundwater

- Remove contaminant sources causing impact to groundwater.
- Prevent direct exposure to contaminated 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 Remedial Action Objectives (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 alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives (including a Track 1 scenario) are evaluated, as follows:

Alternative 1 involves:

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. This alternative would require excavation across the entire

Site to a minimum depth of 9 feet below ground surface. If soil/fill containing analytes at concentrations above Unrestricted Use SCOs is still present at the base of the excavation, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs. Footings and foundations for the proposed building would be constructed after the removal of contaminated soil and the importation of clean backfill to achieve required grade prior to construction.

- No Engineering or Institutional Controls are required for a Track 1 cleanup, but a vapor barrier would be installed beneath the 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 a part of the new development.

Alternative 2 involves:

- Establishment of Track 4 Site-Specific SCOs.
- Removal of all soil/fill exceeding Track 4 Site-Specific SCOs and confirmation that Track 4 Site-Specific SCOs have been achieved with post-excavation endpoint sampling. Excavation for the planned basement level would take place to a depth of at least 7 feet and 2 inches below grade. Therefore, if soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of all soil required for construction of the new building is complete, additional excavation will be performed to meet Track 4 Site-Specific SCOs.
- Placement of a final cover over the entire Site to prevent exposure to remaining soil/fill;
- Placement of a soil vapor barrier beneath the building 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; and

- 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 assigns must comply with the approved SMP; and
- The property will continue to be registered with an E-Designation at the NYC Buildings Department.

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 will consist of at least two feet of clean cover, a concrete building foundation and a paved parking area will be installed over the entire Site to prevent any residents from exposure to contaminated materials. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan and continued "E" designation of property 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 the contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan (CHASP), a Soil and Materials Management Plan, and Community Air Monitoring Plan (CAMP). Groundwater is present, at a minimum, 7 feet and 2 inches below grade and will be encountered during development. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier below the new building's basement slab.

3.2. BALANCING CRITERIA

Compliance with Standards, Criteria and Guidance (SCGs)

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

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and ROAs 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 slab and continuing the vapor barrier around the foundations 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 below the new building's slab and continuing the vapor barrier along the foundation side 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 removal of soil and excavation to depths of 7 feet and 2 inches below grade within the footprint of the proposed building. Short term effects could be higher for Alternative 1 because of additional soil removal from front and backyard areas to achieve Unrestricted Use SCOs. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Focused attention to means and methods during the 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 33, 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.

Both alternatives would employ appropriate measures to prevent short-term impacts, including 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, by establishing Engineering Controls including a vapor barrier and composite cover system across the Site; by establishing Institutional Controls to ensure long-term management including use restrictions, a Site Management Plan and continued registration as E-designated 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 continued high level of protection in perpetuity.

Reduction of toxicity, mobility, or volume of contaminated material

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

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

Alternative 1 would provide maximum reduction of toxicity, mobility and volume of contaminated material on-Site by excavation and removal of all soils that exceed the Track 1 unrestricted use SCOs.

Alternative 2 would remove all or most of the historic fill at the Site, and any remaining on-Site soil beneath the new building will 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.

Both alternatives are both feasible and implementable. They use identical standard materials and services and well-established technology. The reliability of each remedy is high. There are no special difficulties associated with any of the activities proposed but will require a long period of time to accomplish due to the large quantity of soil and fill material that would require removal.

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.

If the entire site will be excavated to the depth of 9 feet to meet Track 1 Unrestricted Use SCOs in Alternative 1, dewatering activities will take place to depress the water table for 3 to 4

feet. Since the new development calls for the excavation and removal of soil to the depth of 7 feet and 2 inches below grade within the proposed building footprint to accommodate one basement to meet Track 4 - Site-Specific SCOs in Alternative 2, minimal or no dewatering will be required. The capital costs associated with Alternative #1 are much higher than Alternative #2 due to more soil and fill material being excavated/imported and the need for dewatering activities.

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 observations by the project team, both alternatives will be acceptable to the community. This RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternative and the selected remedial action. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 1.

Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The proposed redevelopment of the Site is compatible with its current zoning and is consistent with recent development patterns. Following remediation, the Site will meet either

Track 1 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are appropriate for its planned residential use. Both alternatives for remedial action at the site are comparable with respect to the proposed use and to land uses in the vicinity of the Site. The proposed use is consistent with the existing zoning designation for the property and is consistent with recent development patterns. The Site is surrounded by residential and commercial properties and the proposed alternative provides comprehensive protection of public health and the environment for these uses. Improvements in the current environmental condition of the property achieved by the alternatives are also consistent with the City's goals for cleanup of contaminated land and bringing such properties into productive reuse. The alternatives are equally protective of natural resources and cultural resources. This RAWP will be subject to public review under the NYC VCP and will provide the opportunity for detailed public input on the land use factors described in this section. This public comment will be considered by OER prior to approval of this plan.

Sustainability of the Remedial Action

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

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

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

The preferred remedial action alternative is Alternative 2, the Track 4 Alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establish Track 4 Site-Specific 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(s).
6. Excavation and removal of soil/fill exceeding Track 4 Restricted Residential Use SCOs. For new development, the entire footprint of the proposed building (about 70 % of the property) will be excavated to a depth of 7 feet and 2 inches below grade, with an additional excavation to minimum of two feet for the front and rear courtyard. Additional excavation will be done for hotspot areas. Approximately 750 tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility;

7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means and monitoring with a PID. Appropriate segregation of excavated media on-Site;

8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.

9. Removal of all UST's that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills 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 onsite;

11. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs (if needed);

12. Import of materials to be used for backfill and cover in the areas of the rear and front yards in compliance with this plan and in accordance with applicable laws and regulations;

13. Construction and maintenance of an engineered composite cover consisting of a minimum 4 inch thick cellar concrete slab on top of a minimum 20 mil vapor barrier to prevent human exposure to residual soil/fill remaining under the Site;

14. Installation of a vapor barrier system consisting of vapor barrier beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. The vapor barrier system will consist of a Stego 20-mil vapor barrier below the foundation slab and outside all sub-grade foundation sidewalls to grade. The vapor barrier system is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building.

15. Performance of all activities required for the remedial action, including permitting requirements, in compliance with applicable laws and regulations;
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Submission of an approved Site Management Plan (SMP) in the Remedial Action Plan (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.
18. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

The following Track 4 Site-Specific SCO's will be:

Contaminant	Site-Specific SCO's
Total SVOCs	250 ppm
Arsenic	23 ppm
Lead	1,000 ppm
Mercury	2.5 ppm

The SCOs for this Site are listed in above Table. Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 3. The location of planned excavations is shown in Figure 3.

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

Estimated Soil/Fill Removal Quantities

The location of planned excavation is show in Figure 3. The total quantity of soil/fill expected to be excavated and disposed off-Site is 750 tons. For each disposal facility to be used in the remedial action, a letter from the developer/QEP to the receiving facility requesting approval for disposal and a letter back to the developer/QEP providing approval for disposal will be submitted to OER prior to any transport and disposal of soil at a facility.

The proposed disposal locations for Site-derived impacted materials will be determined at a later date. Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

END-POINT SAMPLING

End-point samples will be analyzed for compounds and elements as described below utilizing the following methodology:

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

New York State ELAP certified labs will be used for all end-point sample analyses. Labs performing 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.

CONFIRMATION END-POINT SAMPLING

Removal actions for development purposes under this plan will be performed in conjunction with confirmation end-point soil sampling. Three (3) confirmation samples will be collected from the base of the excavation at locations to be determined by OER. To evaluate attainment of Track 4 Site-specific SCOs, analytes will include those for which SCOs have been developed, including list SCO analytes, i.e. “SVOCs, arsenic, lead, and mercury” according to analytical methods described above. If Track 1 Unrestricted Use SCOs are pursued, samples will be analyzed for VOCs, SVOCs, pesticides, PCBs and metals according to analytical methods described above.

HOTSPOT END-POINT SAMPLING

End-point samples will be collected from the sidewalls and base of excavation at each of the four hotspot locations identified in the Remedial Investigation, according to the procedure listed below. Hotspots include SB1 for arsenic, lead, and mercury; SB2 for arsenic, lead, and mercury; SB3 for arsenic, lead, and mercury; and SB4 for arsenic and lead. End-point samples will be analyzed for SCO trigger parameters.

For any hotspots identified during this remedial program, including any hotspots identified during the remedial action, hotspot removal actions will be performed to ensure that hotspots are fully removed and end-point samples will be collected at the following frequency:

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

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

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

Quality Assurance/Quality Control

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

One duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. One trip blank will be submitted to the laboratory with each shipment of soil samples.

Import of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. . Imported soil will meet the lower of:

- Track 2 Restricted Residential Use SCO's, and
- Groundwater Protection Standards in Part 375-6.8.

The estimated quantity of soil to be imported into the Site for backfill and cover soil is 70 tons. A map of soil backfill placement locations is shown in Figure 3.

Reuse of Onsite Soils

Soil reuse is not planned on this project.

4.3 ENGINEERING CONTROLS

Engineering Controls were employed in the remedial action to address residual contamination remaining at the site. The Site has three primary Engineering Control Systems. These are:

- A composite cover system consisting of a 4-inch thick concrete slab (underlain by the vapor barrier); and a

- A minimum 20 mil thick vapor barrier.
- Two feet of fill and topsoil cover at the rear and front yards where landscaping is planned.

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:

- 2-feet of clean cover soil will be used in the areas of front and rear yards; and
- A minimum of 4-inch thick concrete slab underlain by the vapor barrier.

The layout and details of the cover system are included in Attachment B. The concrete building slab layout details is shown on drawing A-400.00. The composite cover system is a permanent engineering control for the Site.

The composite cover system is a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR.

Vapor Barrier

Migration of potential soil vapors into the building will be prevented with the combined installation of the concrete cellar slab and vapor barrier. A vapor barrier will be installed over the sub-base material prior to pouring the basement slab. The vapor barrier will extend over the entire footprint of the building to be constructed on-Site. A Stego 20-mil vapor barrier (or OER approved equivalent with a minimum 20-mil thickness) will be installed to mitigate the potential for vapor intrusion to occupied areas of the Site building. The vapor barrier will be applied to the bottom of the basement slab and along the foundation sidewalls.

Attachment C provides the vapor barrier manufacturer's specifications and RA certified building plans with the extent of the vapor barrier installation details (penetrations, joints, etc.)

shown with respect to the proposed foundation, footings, etc. All vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, in accordance with 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 Remedial Action Report will include photographs (maximum of two photos per page) of the installation process, PE 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 implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR. The property will continue to be registered with an E-Designation by the NYC Buildings Department.

Institutional Controls for this remedial action are:

- The property will continue to be registered with an E-Designation by the NYC Buildings Department. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter

the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(l)(3).

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

4.5 SITE MANAGEMENT PLAN

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The 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 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 Brownfield Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) reporting.

Site management activities, reporting, and EC/IC certification will be scheduled by OER on a periodic basis to be established in the SMP and will be subject to review and modification by

OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by March 31 of the year following the reporting period.

4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

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

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 QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Sources

Currently the property is vacant after the demolition of the one-story building built around 1942. The soil under the building is composed of urban fill material that contains coal ash, cinders and brick fragments. However, based on the results of the pre-remediation soil and groundwater sampling and post-remediation soil vapor sampling, the contaminants of concern are:

Soil:

- SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluroanthene, and indeno(1,2,3-cd)pyrene exceeded their Restricted Residential Use SCOs;
- Metals including arsenic, barium, cadmium, copper, lead, mercury, and zinc exceeded Restricted Residential Use SCOs. Analytical results for one shallow soil samples analyzed for leachable lead and mercury indicated that leachable lead was detected at 19 ppm

exceeding regulatory limit for hazardous waste of 5 ppm. No leachable mercury was detected.

Groundwater:

- Only one VOC, MTBE, and one SVOC, benzo(b)fluoranthene, were detected in one groundwater sample above the Class GA Standards;
- Eight metals, antimony, cadmium, copper, iron, lead, manganese, sodium, and zinc were detected above their respective GQS.

Soil Vapor:

- Petroleum VOCs detected at low concentrations including benzene, toluene, ethylbenzene, and xylenes; and
- CVOC, 1,1,1-trichloroethane detected at a low concentration.

Nature, Extent, Fate and Transport of Contaminants

SVOCs and metals were detected in the shallow and deep site soils. Lead and copper were also detected in the groundwater under the site. VOC (MTBE, 11 ug/L) and one SVOC (benzo(b)fluoranthene, 0.17 ug/L) were detected in one groundwater sample. Gasoline-related constituents (ethylbenzene, toluene, xylene and n-hexane) were detected in soil vapor above the NYSDOH-referenced indoor air background concentration.

Potential Routes of Exposure

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and

will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

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

Existence of Human Health Exposure

Current Conditions: The potential for exposure to historic fill is limited because site is capped by the existing building. Groundwater is marginally contaminated but is not exposed at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site and there is no potential exposure.

Construction/ Remediation Activities: Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils and groundwater, as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with any exposed impacted soil, and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan, 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. Potential post-remediation exposures to on-Site residents from soil vapors migrating on-Site from an off-Site source remain a concern after the remedial action. A vapor barrier will prevent any exposure to existing and potential 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 capped with existing building. Onsite receptors are limited to trespassers and Site representatives. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives and visitors. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents, workers, and visitors.

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

1. Commercial Businesses (up to 0.25 mile) – existing and future
2. Residential Buildings (up to 0.25 mile) – existing and future
3. Building Construction/Renovation (up to 0.25 mile) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to .25 mile) – existing and future
5. Schools (up to .25 mile) – existing and future

Overall Human Health Exposure Assessment

The QHHEA indicated that potential exposure pathways appear to exist only during the current unremediated phase and during the remedial action phase. There is no complete exposure pathway under future conditions after the Site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide impervious surface cover cap, and a subsurface vapor barrier/water proofing system for the building. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. During remedial construction, on-site and off-site exposures to dust from contaminated soils will be addressed through dust controls, and through the implementation of the community air monitoring program and a construction health and safety plan.

After the remedial action is complete, there will be no remaining exposure pathways. The composite cover system and a vapor barrier, and long-term site management (if required) will prevent any remaining exposure pathways from being complete.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Mohamed Ahmed, Ph.D., Senior Geologist and Matthew Carroll, P.E., Project Manager of Tenen Environmental. The aforementioned personnel will provide oversight and consultation regarding the remedial action. Matthew Carroll, P.E., Project Manager of Tenen Environmental will provide consultation regarding the CAMP. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Matthew Carroll, PE and Mohamed Ahmed, Ph.D., of Tenen Environmental, respectively.

5.2 SITE SECURITY

Site access will be controlled by gated entrances to the fenced site after the completion of the on-site building demolition..

5.3 WORK HOURS

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

5.4 CONSTRUCTION HEALTH AND SAFETY PLAN

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be Mohamed Ahmed. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour

refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

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

5.5 COMMUNITY AIR MONITORING PLAN

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

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

of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

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

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

5.6 AGENCY APPROVALS

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

5.7 SITE PREPARATION

Pre-Construction Meeting

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

Mobilization

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

Utility Marker Layouts, Easement Layouts

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

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

Dewatering

No or minimal dewatering is anticipated during the construction of the proposed building. A New York City Department of Environmental Protection (NYCDEP) de-watering permit will be obtained if dewatering is required and dewatering fluid is directed to the sewer system. All dewatering fluid will be disposed in accordance with federal, state and local regulations.

Equipment and Material Staging

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

Stabilized Construction Entrance

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

Truck Inspection Station

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

Extreme Storm Preparedness and Response Contingency Plan

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

extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; lose 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 by collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles

will be contained and damaged stockpile covers will be replaced. Storm-water control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped it this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

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

5.8 TRAFFIC CONTROL

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

1. From 56 Frost Street, get on I-278 West from Meeker Avenue and Marcy Avenue;
2. Follow I-278 W to Tillary Street. Take exit 29 from I-278 West;
3. Follow Manhattan Bridge/Manhattan Bridge Lower Roadway and Canal Street to Holland Tunnel in Manhattan;
4. Continue on Holland Tunnel. Drive from NJ-139 W to Jersey City;
5. Follow Newark-Jersey City Turnpike, Fish House Rd and Pennsylvania Avenue to Jacobus Avenue in Kearny; and
6. Clean Earth is located at 115 Jacobus Avenue, Kearny, NJ 07032

5.9 DEMOBILIZATION

Demobilization will include:

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

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

5.10 REPORTING AND RECORD KEEPING

Daily Reports

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

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

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

Record Keeping and Photo-Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas.

Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

5.11 COMPLAINT MANAGEMENT

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

5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

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

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

6.0 REMEDIAL ACTION REPORT

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

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

- The RAWP and Remedial Investigation Report will be included as appendices to the RAR;
- Reports and supporting material will be submitted in digital form and final PDF's will include bookmarks for each appendix.

Remedial Action Report Certification

I, Matthew Carroll, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the 56 Frost Street site, site number 16CVCP007K. I certify to the following:

- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated [date] and Stipulations in a letter dated [date] 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.

Name

PE License Number

Signature

Date

PE Stamp

I, Mohamed Ahmed, am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 56 Frost Street site, site number 16CVCP007K I certify to the following:

- The OER-approved Remedial Action Work Plan dated August 15, 2012 and Stipulations in a letter dated September 10, 2014 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.

QEP Name

QEP Signature

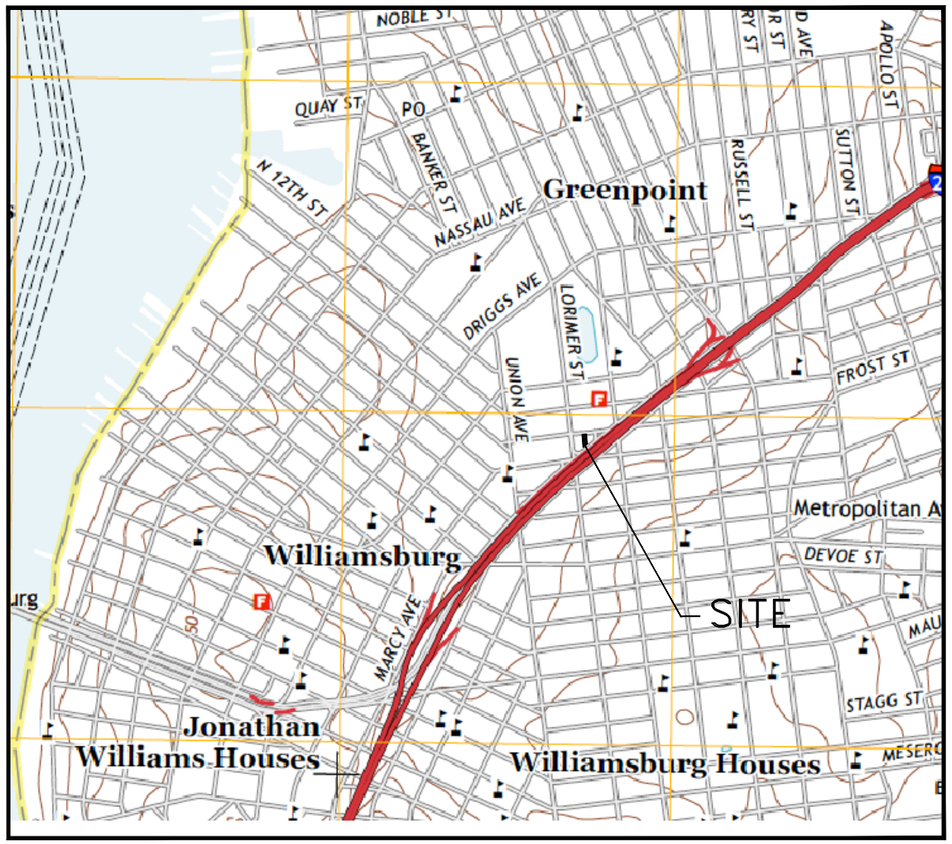
Date

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 3-month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	1
Fact Sheet 2 announcing start of remedy	1	1
Mobilization	2	3
Remedial Excavation	5	3
Demobilization	8	1
Prepare Remedial Action Report	9	3
Submit Remedial Action Report	12	--

Figures



RE: USGS BROOKLYN–NY QUADRANGLE, 2013
http://www.usgs.gov

0 1,500 3,000
SCALE: 1" = 1,500'

RE: DEPARTMENT OF FINANCE, DIGITAL TAX MAP, 2013
http://gis.nyc.gov/taxmap/map.htm

0 100 200
SCALE: 1" = 100'

CLIENT
56 FROST STREET
56 Frost Street
Brooklyn, NY

CONSULTANT
TENEN ENVIRONMENTAL
TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suite 1004
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

DRAWN BY	CHECKED BY	DATE	SCALE:
MC	MM	DECEMBER 2013	AS NOTED

DRAWING TITLE.
SITE LOCATION

DRAWING NO.
Figure 1

LAND USE LEGEND:

- 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

0 125 250
SCALE: 1" = 250'

RE: DEPT OF CITY PLANNING ZOLA, 2014
http://gis.nyc.gov/doitt/nycitymap/template?applicationName=ZOLA

TENEN ENVIRONMENTAL

TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suite 1004
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

56 Frost Street – Brooklyn, NY

Surrounding Land Usage

Figure 2 | March 2014

0 6 12
SCALE: 1" = 12'

DRAWING NOTES:
Site layout based on Proposed Cellar Floor Plan by De-Jan Lu, RA & J Frankl Associates, 9/2/14.

CLIENT
56 Frost Street
Brooklyn, NY

CONSULTANT
TENEN ENVIRONMENTAL
TENEN ENVIRONMENTAL, LLC
121 West 27th Street
Suite 303
New York, NY 10001
O: 646-606-2332
F: 646-606-2379

DRAWN BY: MC
CHECKED BY: MA
DATE: AUGUST 2015
SCALE: AS NOTED

DRAWING TITLE: PROPOSED EXCAVATION AREA
DRAWING NO: Figure 3

Attachment A – Layout of the Proposed Site Development

EXCAVATION AND FOUNDATION NOTES:

1. ALL MATERIAL, FABRICATION, INSTALLATION AND INSPECTION REQUIREMENTS RELATING TO THE FOUNDATIONS SHALL CONFORM TO THE NEW YORK CITY

2. ALL STRUCTURAL WORK SHALL BE COORDINATED AND VERIFIED WITH THE ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING REQUIREMENTS.

3. THE CONTRACTOR SHALL DEMOLISH AND REMOVE EXISTING ELEMENTS AS INDICATED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL REMOVE, TRANSPORT AND DISPOSE OF ALL DEBRIS PROMPTLY.

4. DEMOLITION SHALL BE DONE CAREFULLY. TAKE SPECIAL CARE NOT TO DAMAGE ANY EXISTING UNDERSLAB UTILITIES OR OTHER ELEMENTS NOT DESIGNATED FOR

5. THE CONTRACTOR SHALL PROTECT ALL EXCAVATIONS FROM FLOODING AND EXISTING WATER TABLE AND PROVIDE CONTINUOUS PUMPING AS REQUIRED FOR PERFORMANCE OF WORK. THE DEPTH OF EXCAVATION SHALL NOT BE CARRIED DEEPER THAN SPECIFIED IN THE CONTRACT DOCUMENTS WITHOUT THE ENGINEER OF RECORD'S CONSENT.

6. THE SUBGRADE FOR FOOTINGS AND SLABS SHALL BE INSPECTED AND APPROVED BY THE SOIL INSPECTION AGENCY IMMEDIATELY PRIOR TO PLACING FOUNDATION CONCRETE.

7. THE CONCRETE FOR EACH PILE CAP SHALL BE PLACED IN ONE (1) CONTINUOUS PLACEMENT AS REQUIRED.

8. ALL UNDERPINNING, SHEETING, SHORING OR OTHER SIMILAR CONSTRUCTION REQUIRED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE SUBJECT TO CONTROLLED INSPECTIONS AS REQUIRED BY THE NEW YORK CITY BUILDING CODE. THE CONTRACTOR SHALL RETAIN A LICENSED PROFESSIONAL ENGINEER TO PROVIDE ALL NECESSARY DESIGNS AND REQUIRED INSPECTIONS.

9. DO NOT PLACE CONCRETE WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE CONCRETE

10. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT (HORIZONTAL AND VERTICAL) OF EXISTING OR NEW CONSTRUCTION, INSIDE OR OUTSIDE THE PROJECT LIMITS.

11. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO CONTROL ICE, FROST, SURFACE AND SUBSURFACE WATER SO THAT THE FOUNDATION WORK IS PERFORMED ON DRY SUBGRADE.

12. NEW EXCAVATION SHALL NOT UNDERMINE NOR DISTURB ANY EXISTING ADJACENT FOOTINGS. NEW FOOTINGS SHALL BE SUPPORTED IN A MANNER TO MAINTAIN AN EXCAVATION SLOPE BETWEEN THE BOTTOM OF FOOTINGS AND EXCAVATION OF ONE VERTICAL TO TWO HORIZONTAL.

13. REROUTE ANY UNDERGROUND UTILITIES IF REQUIRED.

14. ALL FILL REQUIRED BELOW ANY PORTION OF THE STRUCTURE SHALL BE COMPACTED IN 8" LIFTS TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY PER ASTM D-1557. REMOVE UNSUITABLE FILL AND REPLACE WITH CONTROLLED FILL AS REQUIRED FOR SOUND PLACEMENT OF FOUNDATIONS.

15. PROVIDE CONTINUOUS WATER STOPS IN ALL WALL AND CURB CONSTRUCTION

16. SEE ARCHITECTURAL DRAWINGS FOR ALL WATERPROOFING AND DAMPROOFING

17. THE PERIMETER OF THE GENERAL EXCAVATION SHALL BE RETAINED BY A TEMPORARY SOIL/ROCK RETENTION SYSTEM. THE DESIGN, INSTALLATION, MAINTENANCE AND REMOVAL (WHERE REQUIRED) SHALL BE THE COMPLETE AND SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT OF EXISTING OR NEW CONSTRUCTION INSIDE OR OUTSIDE THE PROJECT LIMITS, CAUSED BY CONSTRUCTION TECHNIQUES OR MOVEMENTS OF THE SOIL/ROCK RETENTION SYSTEM, IS THE RESPONSIBILITY OF THE CONTRACTOR.

18. THE CONTRACTOR SHALL COORDINATE ALL ELEMENTS OF THE SOIL/ROCK RETENTION SYSTEM WITH ALL ELEMENTS OF THE PERMANENT BUILDING.

19. ALL EXCAVATION SHALL BE BASED ON ENGINEERING DRAWINGS PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK AND RETAINED BY THE CONTRACTOR. THE DRAWINGS SHALL INCLUDE PLANS AND SECTIONS OF EXCAVATION SEQUENCES. THE EXCAVATION SEQUENCES SHALL BE CONTROLLED TO MATCH THE REQUIREMENT OF THE DESIGN OF THE SOIL

20. THE GENERAL EXCAVATION SHALL CONSIST OF EXCAVATING AND REMOVING THE EXISTING SURFICIAL FILL MATERIALS TO REACH THE DESIRED SUBGRADE LEVEL. THE EXPOSED SUBGRADE SHOULD BE PROOFROLLED AND COMPACTED TO A FIRM AND UNYIELDING CONSISTENCY. THE EXCAVATION FOR FOOTINGS, PITS, ETC. SHALL BE EXCAVATED ON AN INDIVIDUAL, LOCALIZED BASIS DOWN FROM THE SLAB-ON-GRADE SUBGRADE LEVEL. EACH EXCAVATION SHALL BE TRIM,

21. ALL EXCAVATION BELOW THE SLAB LEVEL REQUIRED FOR PITS SHALL BE RETAINED BY LOCALIZED SOIL RETENTION SYSTEMS AS MAY BE NECESSARY BASED ON A DESIGN USING APPROPRIATE EARTH AND HYDRAULIC PRESSURES AND OTHER CONSTRUCTION LOADINGS.

22. THE CONTRACTOR SHALL PROVIDE POSITIVE PROTECTION (MAT/SHEET COVERINGS) FOR ALL EXCAVATION SLOPES TO PROTECT SLOPES FROM INSTABILITY AND DETERIORATION DUE TO RAIN, WIND OR SNOW/ICE.

STRUCTURAL CONCRETE NOTES:

1. ALL FOUNDATION, WALLS AND SLAB ON GRADE CONCRETE SHALL BE NORMAL WEIGHT CONCRETE WEIGHING 145 PCF HAVING A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS AND A MAXIMUM WATER-CEMENT RATIO OF 0.4 (+25%).

2. METAL DECK CONCRETE SHALL BE LIGHTWEIGHT WITH A 28 - DAY COMPRESSIVE STRENGTH OF 3,500 PSI (+25%).

3. STRUCTURAL CONCRETE SHALL CONTAIN A WATER-REDUCING, PLASTICIZING ADMIXTURE. ALL CONCRETE EXPOSED TO WEATHER SHALL CONTAIN AN AIR-ENTRAINING ADMIXTURE.

4. ALL CONCRETE WORK: MIXES, INSPECTIONS AND FORMWORK SHALL CONFORM TO THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

5. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR DESIGN OF CONCRETE MIXES AND FOR MAINTAINING STRENGTH AND PROPER SLUMP DURING CONSTRUCTION. CONCRETE MIXES SHALL BE DESIGNED IN ACCORDANCE WITH METHOD I OR METHOD II AS SPECIFIED IN SECTION 27-605 OF THE NEW YORK CITY BUILDING CODE AND SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. NO CONCRETE SHALL BE PLACED UNTIL CONCRETE MIXES HAVE BEEN APPROVED BY ENGINEER.

6. REINFORCING BARS SHALL BE DEFORMED STEEL BARS COMPLYING WITH ASTM A615, GRADE 60.

7. WELDED WIRE FABRIC SHALL COMPLY WITH ASTM A185 AND SHALL HAVE A MINIMUM YIELD STRENGTH OF 70,000 PSI.

8. CONCRETE SLABS SHALL HAVE A MONOLITHIC FINISH AND SHALL BE SCREENED, COMPACTED BY ROLLING OR TAMPING, FLOATED OFF AND GRADED AS REQUIRED. AFTER SUFFICIENT HARDENING IT SHALL BE PROTECTED AND CURED. START CURING AS SOON AS POSSIBLE WITHOUT MARKING FINISH. COVER SLABS WITH REINFORCED PAPER AS REQUIRED. KEEP SURFACE CONTINUOUSLY MOIST FOR SEVEN DAYS OR USE A CURING COMPOUND.

9. ALL REINFORCEMENT SHALL BE DETAILED AND PLACED IN ACCORDANCE WITH ACI MANUAL OF STANDARD PRACTICE, UNLESS OTHERWISE NOTED.

10. CHECKED SHOP DRAWING SHOWING REINFORCING DETAILS, INCLUDING STEEL SIZES, SPACING AND PLACEMENT, SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO FABRICATION.

11. SUBMIT DETAILED DRAWINGS SHOWING THE LOCATIONS OF ALL CONSTRUCTION JOINTS, CURBS, SLAB DEPRESSION, SLEEVES, OPENINGS, ETC.

12. REINFORCING SPLICES SHALL COMPLY WITH ACI 318, BUT SHALL IN NO CASE BE LESS THAN 40 DIAMETERS, UNLESS OTHERWISE NOTED.

13. WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AND TIED SECURELY.

14. WHERE REQUIRED, DOWELS SHALL MATCH SIZE AND NUMBER OF MAIN REINFORCING, UNLESS OTHERWISE NOTED.

15. PROVIDE POCKETS AND DOWELS FOR ALL BEAMS FRAMING INTO FOUNDATION WALLS, PIERS AND BUTTRESSES.

16. DO NOT PLACE CONCRETE WITHOUT APPROVED SHOP DRAWINGS.

17. CONFORM TO ACI HOT AND COLD WEATHER CONCRETING.

18. PROVIDE ADDITIONAL BARS AROUND ALL FLOORS AND WALL OPENINGS, AS PER TYPICAL OPENING DETAIL.

19. CONSTRUCTION JOINTS IN ALL MAT SLABS SHALL NOT BE FURTHER APART THAN 20 FEET IN ANY DIRECTION. CONSTRUCTION JOINTS IN WALLS SHALL NOT BE FURTHER APART THAN 40 FEET.

20. ALL CONSTRUCTION JOINTS SHALL BE CLEANED AND MOISTENED IMMEDIATELY PRIOR TO PLACING NEW CONCRETE.

21. BAR SUPPORTS IN CONTACT WITH EXPOSED SURFACES SHALL BE PLASTIC TIPPED.

22. NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.

23. SEE ARCHITECTURAL, HVAC, ELECTRICAL AND PLUMBING DRAWINGS FOR ADDITIONAL WALL/SLAB OPENINGS.

STRUCTURAL NOTES

1. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE CITY OF NEW YORK.

2. COORDINATE THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL AND M/E/P DRAWINGS.

3. EXISTING CONDITIONS, ELEVATORS, DIMENSIONS AND SYSTEMS SHOWN ON PLANS ARE BASED ON LIMITED FIELD OBSERVATIONS. THE CONTRACTOR SHALL FIELD-VERIFY ALL DETAILS, DIMENSIONS AND ASSUMPTIONS PRIOR TO ANY WORK. WHERE EXISTING CONDITIONS DIFFER FROM OR PRECLUDE THE EXECUTION OF THE OUTLINED DETAILS, THE ENGINEER SHALL BE NOTIFIED.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL FINAL FIELD-VERIFIED DIMENSIONS AND SHALL SUBMIT FIELD-VERIFIED DIMENSIONED SHOP DRAWINGS.

5. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER. STAGING AND SEQUENCE OF SHORING, BRACING OR OTHER CONSTRUCTION REQUIRED FOR SUCH WORK SHALL BE PREPARED IN THE FORM OF SHOP OR DETAIL DRAWINGS AND CALCULATIONS.

6. DO NOT FABRICATE ANY WORK WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS FOR ALL STRUCTURAL WORK, AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE STRUCTURAL WORK.

7. CONTRACTOR TO PROTECT AT ALL TIMES EQUIPMENT, PIPES AND OTHER EXPOSED OR EMBEDDED ITEMS ON THE SITE AGAINST DAMAGE. REROUTE AS REQUIRED PER M/E/P DRAWINGS.

NOTES OF MONITORING PROCEDURES

1. BEFORE START OF UNDERPINNING OPERATIONS, SET UP SURVEY MARKERS AT 4 LOCATIONS ON THE EXTERIOR OF THE WALL TO BE UNDERPINNED. MARKERS SHALL BE LOCATED APPROXIMATELY 1st/ FLOOR LEVEL AND SHALL BE EQUALLY SPACED ALONG THE WALL.
2. ESTABLISH BASE LINE VERTICAL AND HORIZONTAL PARAMETERS TO ALL MARKERS PRIOR TO START OF EXCAVATION.
3. CONDUCT HORIZONTAL AND VERTICAL MONITORING OF MARKERS AT THE END OF EACH UNDERPINNING PHASE BUT DO NOT EXCEED 2 DAYS BETWEEN MEASUREMENTS.
4. MAINTAIN RECORDS OF EACH AND EVERY MONITORING MEASUREMENT. PROVIDE REPORTS OF RESULTS WITHIN 24 HOURS OF SURVEY.
5. REPORT IMMEDIATELY TO THE ENGINEER ANY MOVEMENT GREATER THAN 1/4" FROM THE INITIAL STATE.
6. AFTER COMPLETION OF UNDERPINNING OPERATION, CONDUCT BI-WEEKLY MONITORING FOR A PERIOD OF ONE MONTH.
7. SURVEYOR TO SUBMIT SIGNED AND SEALED REPORT TO ENGINEER (ENGINEER WILL CERTIFY TO DOB).

GENERAL NOTES - EXCAVATION & SHORING

1. TEN DAYS PRIOR STARTING WORK, CONTACT THE NEW YORK STATE UNDERGROUND UTILITIES PROTECTIVE ORGANIZATION (1-800-962-7962) TO MARK LOCATIONS OF EXISTING UTILITIES. LOCATE ALL ADJACENT UTILITIES BY THE TEST HOLES PRIOR TO EXCAVATION OR INSTALLATION OF SOLDIER BEAMS. RELOCATE SHEETING OR INTERFERING UTILITIES AS REQUIRED. VERIFY LOCATION OF ALL ADJACENT UTILITIES AND FOUNDATION PILES.

2. MAINTAIN SAFE CLEARANCE BETWEEN ANY OVERHEAD OR UNDERGROUND UTILITIES AND CRANE , HOE, OR DRILL RIG BOOMS DURING INSTALLATION OF SOLDIER BEAMS, TIEBACK ANCHORS, AND WALES.

3. INSTALL SOLDIER BEAMS IN THE LOCATIONS AND THE DEPTHS REQUIRED. ADJUST LOCATIONS FOR SOLDIER BEAMS AS REQUIRED TO AVOID EXISTING UTILITIES

4. A SAFETY HANDRAIL AND KICKBOARD SHALL BE INSTALLED ALONG THE TOPS OF THE SHEETING WALLS PER OSHA STANDARDS PRIOR TO A MAXIMUM EXCAVATION DEPTH OF 4 FEET.

5. EXCAVATE AND INSTALL TIMBER LAGGING IN 5' MAXIMUM VERTICAL LIFTS TO APPROXIMATELY 1.5' BELOW THE DIAG. BRACING. DECREASE HEIGHT OF LAGGING LIFTS IF REQUIRED TO MAINTAIN A STABLE VERTICAL FACE. LAGGING MAY BE TUCKED BEHIND OR BE ATTACHED TO THE FLANGES OF THE SOLDIER BEAMS. LAGGING SHALL BE 3" NOMINAL THICKNESS, UNTREATED, MIXED HARDWOODS. EACH LIFT OF LAGGING SHALL BE BACKFILLED AS NECESSARY SO THAT THE SOIL IS TIGHT AGAINST THE LAGGING.

6. INSTALL 1 1/2" LOUVER BLOCKS BETWEEN TIMBER LAGGING BOARDS. IF REQUIRED, PACK LOUVER SPACE WITH STRAW OR POROUS GEOTEXTILE FABRIC TO CONTROL GROUND WATER LEAKAGE AND PREVENT SOIL LOSS FROM BEHIND THE LAGGING.

7. CONTINUE EXCAVATING AND LAGGING TO SUBGRADE AND CONSTRUCT THE PROPOSED FOUNDATION.

8. DURING BACKFILL, THE TOPS OF THE SOLDIER BEAMS SHALL BE CUT OFF AND REMOVED TO 3 FEET BELOW FINAL GRADE.

9. STRUCTURAL MEMBERS OF EQUIVALENT OR GREATER STRENGTH MAY BE SUBMITTED FOR THOSE SHOWN.ENGINEER SHALL BE NOTIFIED OF PROPOSED MEMBER SUSTITUTING PRIOR TO THEIR INSTALLATION.

CONTROLLED INSPECTIONS REQUIRED:

1.ALL CONTROLLED INSPECTION SHALL BE CONDUCTED BY A SPECIAL INSPECTION AGENCY RETAINED BY THE CONTRACTOR SUCH AGENCY SHELL BE REGISTERED WITH

AND EMPLOY SPECIAL INSPECTOR

2. THE CONTRACTOR MUST NOTIFY THE INSPECTOR FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

3.INSPECTIONS UNDER STRUCTURAL APPLICATION

CONCRETE - CAST-IN-PLACE AS PER BC 1704.4
CONCRETE TEST CYLINDERS AS PER BC 1905.6
CONCRETE DESIGN MIX AS PER BC 1905.3
EXCAVATION - SHEETING, SHORING, AND BRACING AS PER BC 1704.19 & BC 3304.4.1

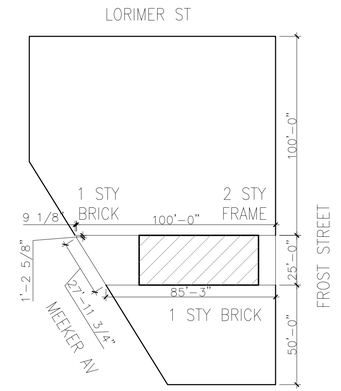
4. SEE ARCH. DRAWINGS FOR ADDITIONAL INSPECTIONS.

PRECONSTRUCTION PREPARATION

1. PRIOR TO START OF WORK, OBTAIN LEGAL AUTHORIZATION FROM NEIGHBORING PROPERTY OWNERS TO ENTER PROPERTY AND PERFORM ALL WORK AS DEPICTED ON THESE DRAWINGS.

2. A PRE-CONSTRUCTION SURVEY SHALL BE PERFORMED ON THE BUILDING TO BE UNDERPINNED BY AN INDEPENDENT PROFESSIONAL. IN ORDER TO DOCUMENT EXISTING CONDITION OF THE BUILDING. PAY ATTENTION TO AND DOCUMENT SIGNS OF EXISTING STRESS INCLUDING CRACKS, SAGGING, TIGHT DOORS,ETC. THE SURVEY SHALL INCLUDE EACH FLOOR BOTH INSIDE AND OUT AND SHALL INCLUDE PICTURES, MEASURMENTS,ETC. LOCATE ALL ADJACENT UTILITIES BY TEST PIT AND NOTIFY ONE CALL PRIOR TO START OF UNDERPINNING.

3. PLEASE REFER TO NOTES OF MONITORING PROCEDURES ON THIS PAGE.



LOCATION PLAN

SCALE: N.T.S.

ADDRESS:
56 FROST ST., BROOKLYN, NY 11211

BLOCK: 2737
LOT : 10

ZONE: M1-2/R6
MAP : 13a

DRAWING LIST:

DRAWING NO.	DRAWING TITLE
SOE-001.00	GENERAL NOTES
SOE-002.00	SOE SECTIONS
SOE-101.00	SOE PLAN

No.	Date	Revision
-	-	-

SHARON ENGINEERING, P.C.
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Project

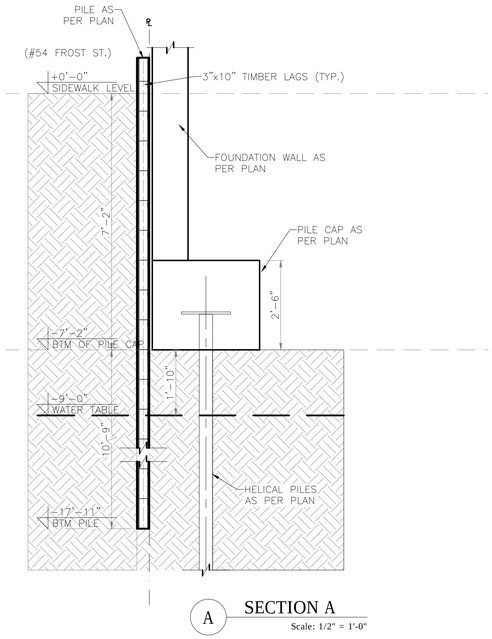
56 FROST STREET
BROOKLYN, NY 11211

Drawing

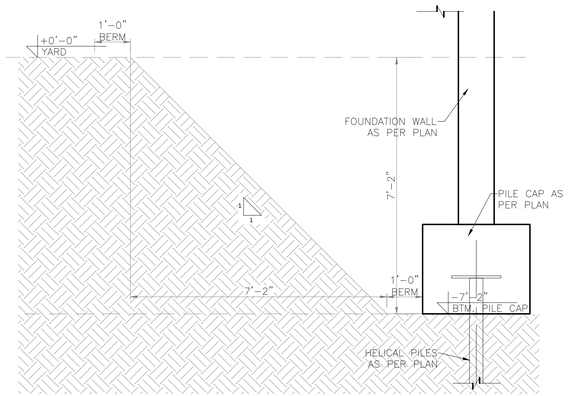
GENERAL NOTES

Seal:

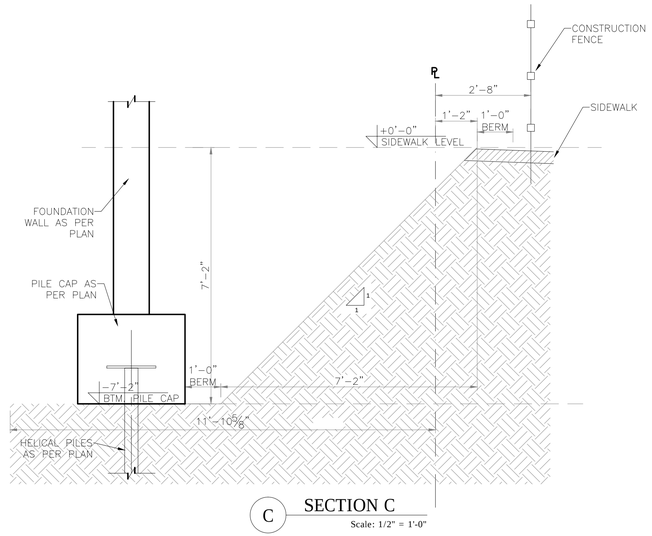
DATE:	06/30/15
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**SOE-001.00**
CAD FILE No:	1 OF 3



A SECTION A
Scale: 1/2" = 1'-0"



B SECTION B
Scale: 1/2" = 1'-0"



C SECTION C
Scale: 1/2" = 1'-0"

No.	Date	Revision
–	–	–

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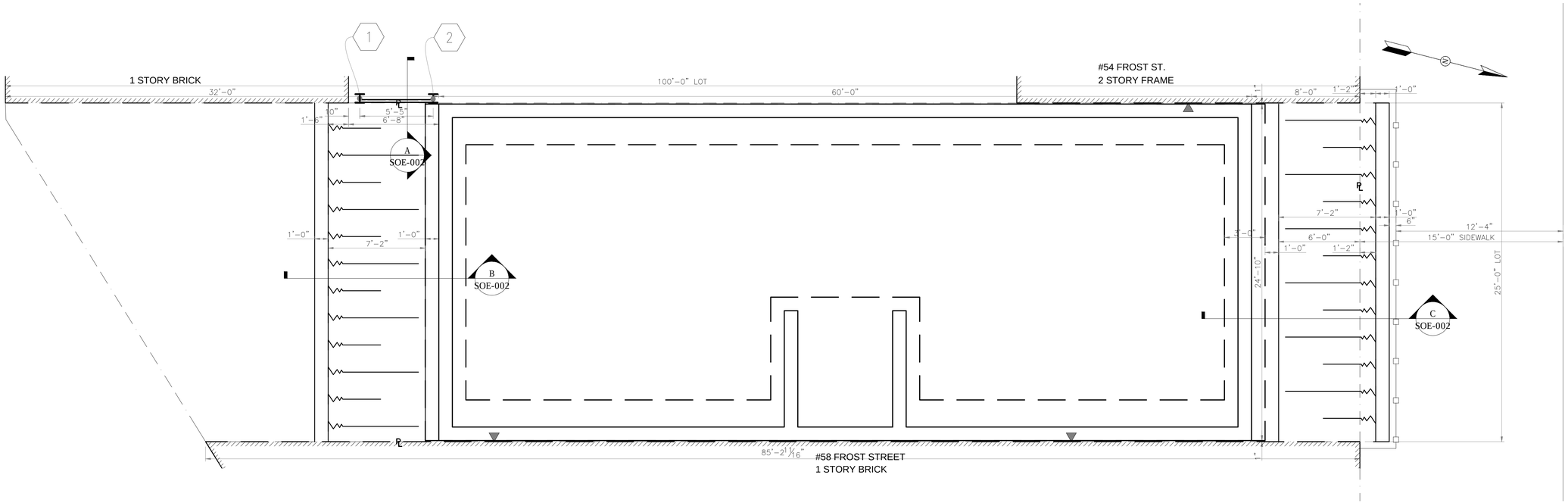
BROOKLYN, NY 11211

Drawing

SOE SECTIONS

Seal:

DATE:	06/30/15
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**SOE-002.00**
CAD FILE No:	2 OF 3



1 SOE PLAN

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

FROST STREET

LEGEND

1. DENOTES SLOPED CUT, MAX SLOPE 1:1
2. H DENOTES NEW STEEL SOLDIER BEAM AS PER SCHEDULE
3. OPTICAL MONITORING POINT

SOLDIER BEAM SCHEDULE			
BEAM NO.	BEAM SIZE.	BEAM LENGTH (FT.)	NOTES
1-2	W8x31	24	

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9. STRUCTURAL MEMBERS OF EQUIVALENT OR GREATER STRENGTH MAY BE SUBMITTED FOR THOSE SHOWN.ENGINEER SHALL BE NOTIFIED OF PROPOSED MEMBER SUSTITUTING PRIOR TO THEIR INSTALLATION.

10. A CONSENT FROM OWNERS OF ADJACENT PROPERTIES SHALL BE OBTAINED IF REQUIRED WORK EXTENTS BEYOND PROPERTY LINE

11. SIDEWALK CLOSING IS REQUIRED FROM DOT.

No.	Date	Revision
–	–	–

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Project

56 FROST STREET
BROOKLYN, NY 11211

Drawing

SITE PLAN

Seal:

DATE:	06/30/15
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**SOE-101.00**
CAD FILE No:	3 OF 3

EXCAVATION AND FOUNDATION NOTES:

1. ALL MATERIAL, FABRICATION, INSTALLATION AND INSPECTION REQUIREMENTS RELATING TO THE FOUNDATIONS SHALL CONFORM TO THE NEW YORK CITY BUILDING CODE.

2. ALL STRUCTURAL WORK SHALL BE COORDINATED AND VERIFIED WITH THE ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING REQUIREMENTS.

3. THE CONTRACTOR SHALL DEMOLISH AND REMOVE EXISTING ELEMENTS AS INDICATED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL REMOVE, TRANSPORT AND DISPOSE OF ALL DEBRIS PROMPTLY.

4. DEMOLITION SHALL BE DONE CAREFULLY. TAKE SPECIAL CARE NOT TO DAMAGE ANY EXISTING UNDERSLAB UTILITIES OR OTHER ELEMENTS NOT DESIGNATED FOR REMOVAL.

5. THE CONTRACTOR SHALL PROTECT ALL EXCAVATIONS FROM FLOODING AND EXISTING WATER TABLE AND PROVIDE CONTINOUS PUMPING AS REQUIRED FOR PERFORMANCE OF WORK. THE DEPTH OF EXCAVATION SHALL NOT BE CARRIED DEEPER THAN SPECIFIED IN THE CONTRACT DOCUMENTS WITHOUT THE ENGINEER OF RECORD'S CONSENT.

6. THE SUBGRADE FOR FOOTINGS AND SLABS SHALL BE INSPECTED AND APPROVED BY THE SOIL INSPECTION AGENCY IMMEDIATELY PRIOR TO PLACING FOUNDATION CONCRETE.

7. THE CONCRETE FOR EACH PILE CAP SHALL BE PLACED IN ONE (1) CONTINUOUS PLACEMENT.

8. ALL UNDERPINNING, SHEETING, SHORING OR OTHER SIMILAR CONSTRUCTION REQUIRED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE SUBJECT TO CONTROLLED INSPECTIONS AS REEQUIRED BY THE NEW YORK CITY BUILDING CODE. THE CONTRACTOR SHALL RETAIN A LICENSED PROFESSIONAL ENGINEER TO PROVIDE ALL NECESSARY DESIGNS AND REQUIRED INSPECTIONS.

9. DO NOT PLACE CONCRETE WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE CONCRETE WORK.

10. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT (HORIZONTAL AND VERTICAL) OF EXISTING OR NEW CONSTRUCTION, INSIDE OR OUTSIDE THE PROJECT LIMITS.

11. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO CONTROL ICE, FROST, SURFACE AND SUBSURFACE WATER SO THAT THE FOUNDATION WORK IS PERFORMED ON DRY SUBGRADE.

12. NEW EXCAVATION SHALL NOT UNDERMINE NOR DISTURB ANY EXISTING ADJACENT FOOTINGS. NEW FOOTINGS SHALL BE SUPPORTED IN A MANNER TO MAINTAIN AN EXCAVATION SLOPE BETWEEN THE BOTTOM OF FOOTINGS AND EXCAVATION OF ONE VERTICAL TO TWO HORIZONTAL.

13. REROUTE ANY UNDERGROUND UNTILITIES IF REQUIRED.

14. ALL FILL REQUIRED BELOW ANY PORTION OF THE STRUCTURE SHALL BE COMPACTED IN 8" LIFTS TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY PER ASTM D-1557. REMOVE UNSUITABLE FILL AND REPLACE WITH CONTROLLED FILL AS REQUIRED FOR SOUND PLACEMENT OF FOUNDATIONS.

15. PROVIDE CONTINUOUS WATER STOPS IN ALL WALL AND CURB CONSTRUCTION JOINTS.

16. SEE ARCHITECTURAL DRAWINGS FOR ALL WATERPROOFING AND DAMPROOFING DETAILS.

17. THE PERIMETER OF THE GENERAL EXCAVATION SHALL BE RETAINED BY A TEMPORARY SOIL/ROCK RETENTION SYSTEM. THE DESIGN, INSTALLATION, MAINTENANCE AND REMOVAL (WHERE REQUIRED) SHALL BE THE COMPLETE AND SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT OF EXISTING OR NEW CONSTRUCTION INSIDE OR OUTSIDE THE PROJECT LIMITS, CAUSED BY CONSTRUCTION TECHNIQUES OR MOVEMENTS OF THE SOIL/ROCK RETENTION SYSTEM, IS THE RESPONSIBILITY OF THE CONTRACTOR.

18. THE CONTRACTOR SHALL COORDINATE ALL ELEMENTS OF THE SOIL/ROCK RETENTION SYSTEM WITH ALL ELEMENTS OF THE PERMANENT BUILDING.

19. ALL EXCAVATION SHALL BE BASED ON ENGINEERING DRAWINGS PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK AND RETAINED BY THE CONTRACTOR. THE DRAWINGS SHALL INCLUDE PLANS AND SECTIONS OF EXCAVATION SEQUENCES. THE EXCAVATION SEQUENCES SHALL BE CONTROLLED TO MATCH THE REQUIREMENT OF THE DESIGN OF THE SOIL RETENTION SYSTEM.

20. THE GENERAL EXCAVATION SHALL CONSIST OF EXCAVATING AND REMOVING THE EXISTING SURFICIAL FILL MATERIALS TO REACH THE DESIRED SUBGRADE LEVEL. THE EXPOSED SUBGRADE SHOULD BE PROOFROLLED AND COMPACTED TO A FIRM AND UNYIELDING CONSISTENCY. THE EXCAVATION FOR FOOTINGS, PITS, ETC. SHALL BE EXCAVATED ON AN INDIVIDUAL, LOCALIZED BASIS DOWN FROM THE SLAB-ON-GRADE SUBGRADE LEVEL. EACH EXCAVATION SHALL BE TRIM, LEVEL SURFACE.

21. ALL EXCAVATION BELOW THE SLAB LEVEL REQUIRED FOR PITS SHALL BE RETAINED BY LOCALIZED SOIL RETENTION SYSTEMS AS MAY BE NECESSARY BASED ON A DESIGN USING APPROPRIATE EARTH AND HYDRAULIC PRESSURES AND OTHER CONSTRUCTION LOADINGS.

22. THE CONTRACTOR SHALL PROVIDE POSITIVE PROTECTION (MAT/SHEET COVERINGS) FOR ALL EXCAVATION SLOPES TO PROTECT SLOPES FROM INSTABILITY AND DETERIORATION DUE TO RAIN, WIND OR SNOW/ICE.

23. ALL PILE MATERIALS AND OPERATIONS SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

24. ALL PILES SHALL BE FRICTION TIMBER PILES AND APPURTENANCES, EXCEPT WHERE NOTED. PILE CAPACITY SHALL BE AS PER PLAN.

25. PERFORM PILE LOAD TESTING AS REQUIRED BY NYC BUILDING CODE.

26. PILES MATERIAL AND INSTALLATION SHALL BE BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

27. ALL PILE INSTALLATION OPERATIONS SHALL BE SUPERVISED BY A LICENSED ENGINEER. THE INSPECTOR SHALL KEEP A COMPLETE RECORD OF THE PILE INSTALLATION OPERATION.

28. TIMBER PILES SHALL BE INSTALLED UNTIL SPECIFIED BEARING CAPACITY.

29. ALL PILES SHOULD BE INSTALLED AS SHOWN ON THE ENGINEER'S PLAN. ALL CHANGES IN PILE LOCATION MUST BE APPROVED BY THE ENGINEER.

30. IF UNDERGROUND OBSTRUCTIONS ARE ENCOUNTERED DURING INSTALLATION, THE CONTRACTOR SHALL HAVE THE OPTION OF REMOVING THE OBSTRUCTION IF POSSIBLE OR RELOCATING THE PILE WITH THE ENGINEER'S APPROVAL. THE LATTER OPTION MAY REQUIRE THE RELOCATION OF ADJACENT PILES.

31. THE PILES SHALL BE DRIVEN USING AN APPROVED HAMMER. THE CONTRACTOR SHALL PROVIDE MONITORING OF ADJACENT BUILDINGS AND REPORT CONDITIONS TO THE ENGINEER, ARCHITECT, AND OWNER. SHOULD VIBRATION EXCEED A PREDETERMINED LEVEL, PREDRILLING OR OTHER METHODS SHALL BE CONSIDERED REFER TO SECTION BELOW.

32. WRITTEN INSTALLATION RECORDS SHALL BE OBTAINED FOR EACH PILE AND SUBMITTED TO THE ENGINEER OF RECORD. THESE RECORDS SHALL INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

A. PROJECT NAME AND/OR LOCATION.
B. DATE AND TIME OF INSTALLATION.
C. LOCATION AND REFERENCE NUMBER OF EACH PILE.
D. PILE LOSS SIGNED AND SEALED BY A LICENSED SURVEYOR OR A PROFESSIONAL ENGINEER.
E. DESCRIPTION OF LEAD SECTION AND EXTENSIONS INSTALLED.
F. OVERALL DEPTH OF INSTALLATIONS REFERENCED FROM BOTTOM OF GRADE BEAM OR PILE CAP.
G. HAMMER ENERGY AND READINGS LOG. CALCULATED BEARING CAPACITY.
PILE TEST RESULTS.
H. PILE DEVIATION PLAN.
I. ANY OTHER RELEVANT INFORMATION RELATING TO THE INSTALLATION.

33. THE CONTRACTOR SHALL NOT POUR ANY PILE CAPS OR BEAMS UNTIL THE ENGINEER OF RECORD AND BUILDING DEPARTMENT HAS APPROVED THE ABOVE DOCUMENTS.

34. ECCENTRICITIES OF "AS-DRIVEN" PILE GROUPS SHALL BE ADJUSTED BY STRAPS, ADDITIONAL REINFORCING OR BY THE DRIVING OF ADDITIONAL PILES AS INDICATED ON REDESIGN SHEETS AS PREPARED BY THE STRUCTURAL ENGINEER. STRUCTURAL REDESIGN AND NEW WORK SHALL BE AT CONTRACTOR'S COST.

STRUCTURAL NOTES

1. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE CITY OF NEW YORK.

2. COORDINATE THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL AND M/E/P DRAWINGS.

3. EXISTING CONDITIONS, ELEVATORS, DIMENSIONS AND SYSTEMS SHOWN ON PLANS ARE BASED ON LIMITED FIELD OBSERVATIONS. THE CONTRACTOR SHALL FIELD-VERIFY ALL DETAILS, DIMENSIONS AND ASSUMPTIONS PRIOR TO ANY WORK. WHERE EXISTING CONDITIONS DIFFER FROM OR PRECLUDE THE EXECUTION OF THE OUTLINED DETAILS, THE ENGINEER SHALL BE NOTIFIED.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL FINAL FIELD-VERIFIED DIMENSIONS AND SHALL SUBMIT FIELD-VERIFIED DIMENSIONED SHOP DRAWINGS.

5. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER. STAGING AND SEQUENCE OF SHORING, BRACING OR OTHER CONSTRUCTION REQUIRED FOR SUCH WORK SHALL BE PREPARED IN THE FORM OF SHOP OR DETAIL DRAWINGS AND CALCULATIONS.

6. DO NOT FABRICATE ANY WORK WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS FOR ALL STRUCTURAL WORK, AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE STRUCTURAL WORK.

7. CONTRACTOR TO PROTECT AT ALL TIMES EQUIPMENT, PIPES AND OTHER EXPOSED OR EMBEDDED ITEMS ON THE SITE AGAINST DAMAGE. REROUTE AS REQUIRED PER M/E/P DRAWINGS.

CONTROLLED INSPECTIONS REQUIRED:

1. ALL CONTROLLED INSPECTIONS SHALL BE CONDUCTED BY A SPECIAL INSPECTION AGENCY" RETAINED BY THE CONTRACTOR. SUCH AGENCY SHALL BE REGISTERED WITH THE N.Y.C. DEPARTMENT OF BUILDING AS QUALIFIED TO CONDUCT SPECIFIED INSPECTIONS AND EMPLOY SPECIAL INSPECTORS.

2. THE CONTRACTOR MUST NOTIFY THE INSPECTOR FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

3. INSPECTIONS UNDER STRUCTURAL APPLICATION

   1. CONCRETE – CAST-INPLACE AS PER BC 1704.4
   2. CONCRETE TEST CYLINDERS AS PER BC 1905.6
   3. CONCRETE DESIGN MIX AS PER BC 1905.3
   4. PILE FOUNDATIONS AND PIERS AS PER 1704.8
   5. FOOTING AND FOUNDATION AS PER 109.3.1

4. ANY REQUIRED INSPECTIONS AND TESTS OF MATERIALS BY THE CONTRACTOR SHALL BE MADE UNDER THE DIRECT SUPERVISION OF A LICENSED ARCHITECT OR ENGINEER RETAINED BY OR ON THE BEHALF OF THE CONTRACTOR WHO SHALL BE ACCEPTABLE TO THE ARCHITECT OR ENGINEER WHO SUPERVISED THE PREPARATION OF THE PLANS.

5. SEE ARCH. DRAWINGS FOR ADDITIONAL INSPECTIONS.

STRUCTURAL CONCRETE NOTES:

1. ALL FOUNDATION, WALLS AND SLAB ON GRADE CONCRETE SHALL BE NORMAL WEIGHT CONCRETE WEIGHING 145 PCF HAVING A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS AND A MAXIMUM WATER-CEMENT RATIO OF 0.4 (+25%).

2. METAL DECK CONCRETE SHALL BE LIGHTWEIGHT WITH A 28 – DAY COMPRESSIVE STRENGTH OF 3,500 PSI (+25%).

3. STRUCTURAL CONCRETE SHALL CONTAIN A WATER-REDUCING, PLASTICIZING ADMIXTURE. ALL CONCRETE EXPOSED TO WEATHER SHALL CONTAIN AN AIR-ENTRAINING ADMIXTURE.

4. ALL CONCRETE WORK: MIXES, INSPECTIONS AND FORMWORK SHALL CONFORM TO THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE.

5. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR DESIGN OF CONCRETE MIXES AND FOR MAINTAINING STRENGTH AND PROPER SLUMP DURING CONSTRUCTION. CONCRETE MIXES SHALL BE DESIGNED IN ACCORDANCE WITH METHOD I OR METHOD II AS SPECIFIED IN SECTION 27-605 OF THE NEW YORK CITY BUILDING CODE AND SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. NO CONCRETE SHALL BE PLACED UNTIL CONCRETE MIXES HAVE BEEN APPROVED BY ENGINEER.

6. REINFORCING BARS SHALL BE DEFORMED STEEL BARS COMPLYING WITH ASTM A615, GRADE 60.

7. WELDED WIRE FABRIC SHALL COMPLY WITH ASTM A185 AND SHALL HAVE A MINIMUM YIELD STRENGTH OF 70,000 PSI.

8. CONCRETE SLABS SHALL HAVE A MONOLITHIC FINISH AND SHALL BE SCREENED, COMPACTED BY ROLLING OR TAMPING, FLOATED OFF AND GRADED AS REQUIRED. AFTER SUFFICIENT HARDENING IT SHALL BE PROTECTED AND CURED. START CURING AS SOON AS POSSIBLE WITHOUT MARKING FINISH. COVER SLABS WITH REINFORCED PAPER AS REQUIRED. KEEP SURFACE CONTINUOUSLY MOIST FOR SEVEN DAYS OR USE A CURING COMPOUND.

9. ALL REINFORCEMENT SHALL BE DETAILED AND PLACED IN ACCORDANCE WITH ACI MANUAL OF STANDARD PRACTICE, UNLESS OTHERWISE NOTED.

10. CHECKED SHOP DRAWING SHOWING REINFORCING DETAILS, INCLUDING STEEL SIZES, SPACING AND PLACEMENT, SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO FABRICATION.

11. SUBMIT DETAILED DRAWINGS SHOWING THE LOCATIONS OF ALL CONSTRUCTION JOINTS, CURBS, SLAB DEPRESSION, SLEEVES, OPENINGS, ETC.

12. REINFORCING SPLICES SHALL COMPLY WITH ACI 318, BUT SHALL IN NO CASE BE LESS THAN 40 DIAMETERS, UNLESS OTHERWISE NOTED.

13. WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AND TIED SECURELY.

14. WHERE REQUIRED, DOWELS SHALL MATCH SIZE AND NUMBER OF MAIN REINFORCING, UNLESS OTHERWISE NOTED.

15. PROVIDE POCKETS AND DOWELS FOR ALL BEAMS FRAMING INTO FOUNDATION WALLS, PIERS AND BUTTRESSES.

16. DO NOT PLACE CONCRETE WITHOUT APPROVED SHOP DRAWINGS.

17. CONFORM TO ACI HOT AND COLD WEATHER CONCRETING.

18. PROVIDE ADDITIONAL BARS AROUND ALL FLOORS AND WALL OPENINGS, AS PER TYPICAL OPENING DETAIL.

19. CONSTRUCTION JOINTS IN ALL MAT SLABS SHALL NOT BE FURTHER APART THAN 20 FEET IN ANY DIRECTION. CONSTRUCTION JOINTS IN WALLS SHALL NOT BE FURTHER APART THAN 40 FEET.

20. ALL CONSTRUCTION JOINTS SHALL BE CLEANED AND MOISTENED IMMEDIATELY PRIOR TO PLACING NEW CONCRETE.

21. BAR SUPPORTS IN CONTACT WITH EXPOSED SURFACES SHALL BE PLASTIC TIPPED.

22. NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.

23. SEE ARCHITECTURAL, HVAC, ELECTRICAL AND PLUMBING DRAWINGS FOR ADDITIONAL WALL/SLAB OPENINGS.

24. SUBMIT TO THE ARCHITECT, PROPOSALS FOR ALL PROCEDURES AND SEQUENCES FOR FORM WORK STRIPPING AND RESHORING SYSTEMS.

25. SEE ARCHITECTURAL DRAWINGS FOR TYPE AND LOCATION OF ALL FLOOR FINISHES, FLOOR DEPRESSIONS AND CURBS.

HELICAL PILE SPECIFICATIONS

1) ALL PILES SHALL BE PATENTED HELICAL PILES AND APPURTENANCES AS MANUFACTURED BY MACLEAN DIXIE AND FURNISHED EXCLUSIVELY BY PREMIUM TECHNICAL SERVICES (1-800-282-7453). ALL HELICAL PILES ARE TO BE INSTALLED BY A FACTORY CERTIFIED INSTALLER, OTHERWISE A CERTIFIED TECHNICIAN FROM PREMIUM TECHNICAL SERVICES MUST BE ON SITE AT ALL TIMES TO WITNESS PILE INSTALLATION. **ALL HELICAL PILES MUST BE ICC APPROVED AND BE IN ACCORDANCE W/ NYC D.O.B. 2014 CODE.**

A. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING.

B. ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.

2) HELICAL PILE LEAD SECTIONS SHALL BE MODEL **175-101214-S7** WITH A **1.75"** ROUND CORNER SQUARED SHAFT AND A **10", 12",** AND **14"** DIAMETER HELIX. LEAD SECTIONS SHALL BE **7'** LONG. ALL HELIX PILE EXTENSIONS SHALL BE **D10 - 1.75" (MIN. 10,000 FT-LB TORQUE RATING)** SOLID ROUND CORNERED SQUARE SHAFT 5, 7 OR 10' LONG DEPENDING ON VERTICAL CLEARANCE. **ALL PILES SHALL INCORPORATE THE PATENTED MACLEAN-DIXIE SQUARE CONNECTIONS.**

3) HELICAL PILES, EXTENSIONS AND APPURTENANCES SHALL BE HOT-DIPPED GALVANIZED STEEL IN ACCORDANCE WITH ASTM A153 (LATEST REVISION) AND **ESR-3032.**

4) ALL PILE INSTALLATION OPERATIONS SHALL BE SUPERVISED BY A LICENSED ENGINEER. THE INSPECTOR SHALL KEEP A COMPLETE RECORD OF THE PILE INSTALLATION OPERATION.

5) HELICAL PILES SHALL BE INSTALLED TO A MINIMUM DEPTH OF **19'** BELOW GRADE BEAM OR **5' PAST ALL UNSUITABLE SOIL LAYERS** AND A MINIMUM TORQUE OF **10,000** FT-LBS. AND A MINIMUM CARRYING CAPACITY OF **50 TONS** ULTIMATE LOAD (FACTORED) SUBJECT TO THE FOLLOWING PROVISIONS:

A) IF THE MINIMUM TORQUE REQUIREMENT HAS NOT BEEN SATISFIED AT THE MINIMUM DEPTH LEVEL, THE CONTRACTOR SHALL HAVE THE FOLLOWING OPTIONS:

a) INSTALL THE PILE DEEPER USING ADDITIONAL EXTENSIONS UNTIL THE SPECIFIED TORQUE LEVEL IS OBTAINED.
b) REMOVE THE EXISTING PILE AND INSTALL A PILE WITH LARGER AND/OR MORE HELICES. THE REVISED PILE SHALL BE INSTALLED BEYOND THE TERMINATION DEPTH OF THE ORIGINAL PILE, AS DIRECTED ENGINEER.
c) ADD ADDITIONAL PILES AS RECOMMENDED BY ENGINEER.

B) IF THE MAXIMUM TORQUE RATING OF THE PILE AND/OR INSTALLING UNIT HAS BEEN REACHED PRIOR TO SATISFYING THE MINIMUM DEPTH REQUIREMENT, THE CONTRACTOR SHALL HAVE , a) THE OPTION TO INCREASE THE TERMINAL TORQUE TO A MAXIMUM OF **10,000** FT. LBS., b)AFTER CONSULTING WITH THE ENGINEER OF RECORD, THE CONTRACTOR MAY REDUCE THE SIZE OF THE HELIX AS REQUIRED TO ACHIEVE THE MINIMUM DEPTH WHILE STILL ACHIEVING THE MINIMUM TORQUE.

6) HELICAL PILES SHOULD BE INSTALLED AS SHOWN ON THE ENGINEER'S PLAN. ALL CHANGES IN PILE LOCATION MUST BE APPROVED BY THE ENGINEER.

7) IF UNDERGROUND OBSTRUCTIONS ARE ENCOUNTERED DURING INSTALLATION, THE CONTRACTOR SHALL HAVE THE OPTION OF REMOVING THE OBSTRUCTION IF POSSIBLE OR RELOCATING THE PILE WITH THE ENGINEER'S APPROVAL. THE LATTER OPTION MAY REQUIRE THE RELOCATION OF ADJACENT PILES.

8) THE HELICAL PILE SHALL BE CONNECTED TO THE STRUCTURE USING A PTS APPROVED STEEL BRACKET OR SLAB-SUPPORTING CHANNEL AS THE CASE MAY BE- AS SHOWN ON ENGINEER'S PLAN. THESE CONNECTION DEVICES SHALL BE CAPABLE OF SAFELY TRANSFERRING THE STRUCTURAL LOADS TO THE HELICAL PILE.

9) WRITTEN INSTALLATION RECORDS SHALL BE OBTAINED FOR EACH HELICAL PILE. THESE RECORDS SHALL INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

a) PROJECT NAME AND/OR LOCATION.
b) NAME OF CONTRACTOR'S FOREMAN OR REPRESENTATIVE WHO WITNESSED THE INSTALLATION.
c) DATE AND TIME OF INSTALLATION.
d) LOCATION AND REFERENCE NUMBER OF EACH PILE.
e) DESCRIPTION OF LEAD SECTION AND EXTENSIONS INSTALLED.
f) OVERALL DEPTH OF INSTALLATIONS REFERENCED FROM BOTTOM OF GRADE BEAM OR FOOTING.
g) TORQUE READING FOR THE LAST THREE FEET OF INSTALLATION IF PRACTICAL. IN LIEU OF THIS REQUIREMENT, THE TERMINAL TORQUE SHALL BE RECORDED AS A MINIMUM.
h) MAKE AND MODEL OF THE EQUIPMENT USED FOR INSTALLATION
i) THE INSTALLATION SPEED (RPM) OF THE HELICAL PILE
j) ABRUPT CHANGES IN INSTALLATION TORQUE
k) ANY OTHER RELEVANT INFORMATION RELATING TO THE INSTALLATION.

10) THE INSTALLER MUST PROVIDE A N.Y.S. LICENSED PROFESSIONAL ENGINEER CERTIFIED PILE LOG.

DRAWING LIST

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
-	10/09/13	Preliminary

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Project

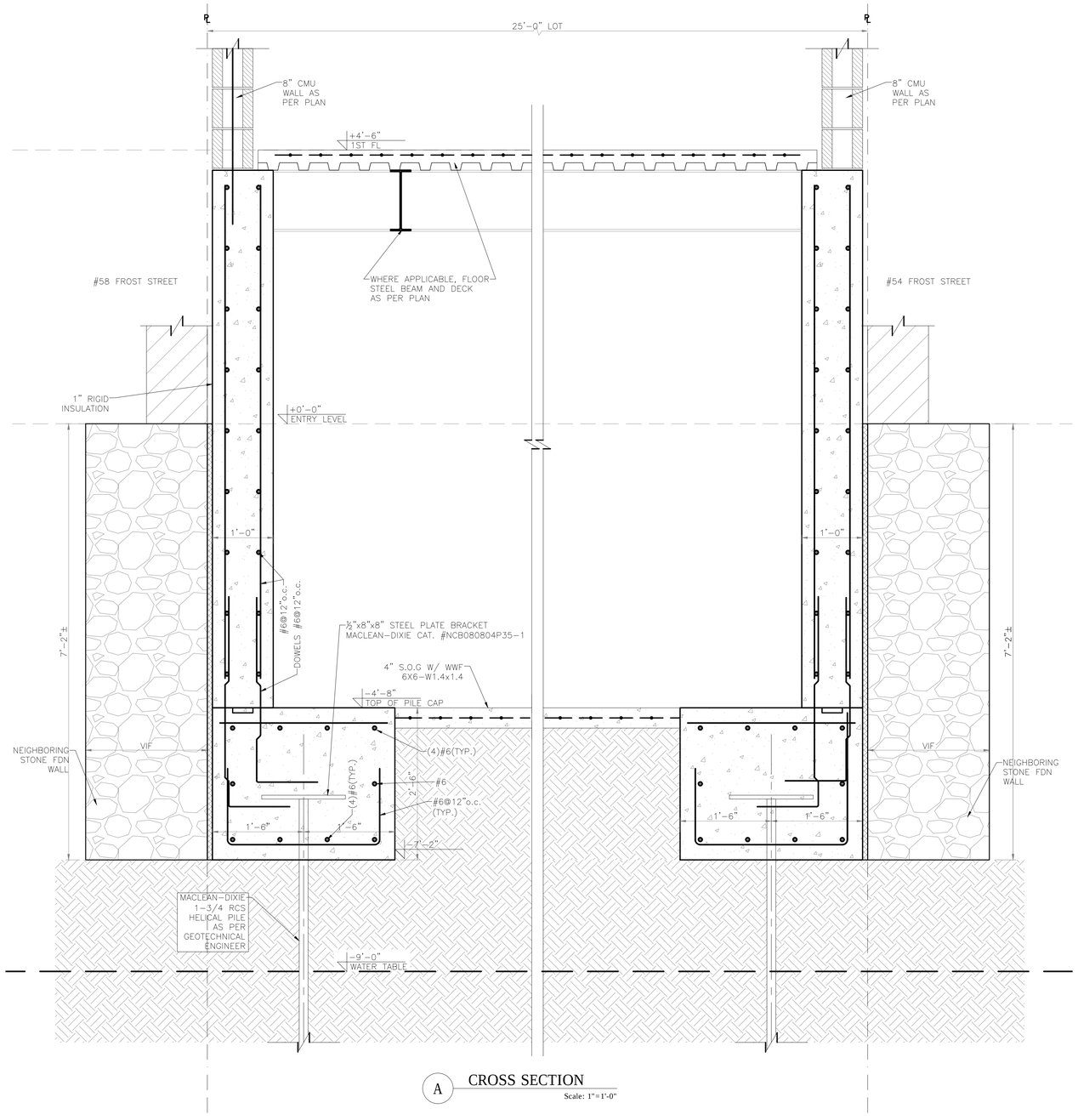
56 FROST STREET
BROOKLYN, NY 11211

Drawing

GENERAL NOTES

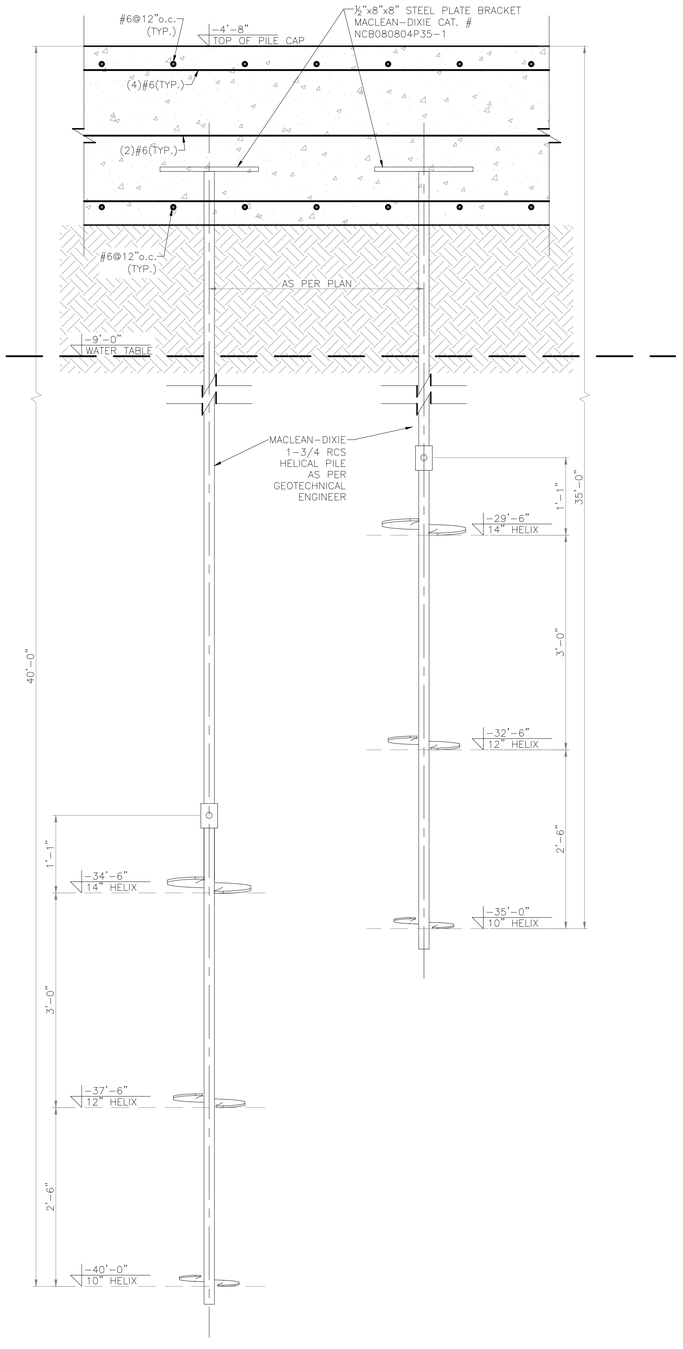
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**FO-001.00**
CAD FILE No:	1 OF 3



A CROSS SECTION

Scale: 1"=1'-0"



B ALTERNATING 35FT. & 40FT. HELICAL PILES (TYP.)

Scale: 1"=1'-0"

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DETAILS

Seal:

STATE OF NEW YORK — RAJIB SHAW SHARON — 065105 — LICENSED PROFESSIONAL ENGINEER

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**FO-002.00**
CAD FILE No:	2 OF 3

LEGEND

- PATTERN — NEW WALL BELOW
- PATTERN — NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

CELLAR PLAN

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

No.	Date	Revision
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CELLAR PLAN

Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**FO-101.00**
CAD FILE No:	3 OF 3

STRUCTURAL STEEL NOTES:

1. STRUCTURAL STEEL SHALL COMPLY WITH ASTM A572 GRADE 50, UNLESS OTHERWISE NOTED.

2. STRUCTURAL STEEL TUBING SHALL COMPLY WITH ASTM A500, UNLESS OTHERWISE NOTED.

3. BOLTS, NUTS AND WASHERS SHALL COMPLY WITH ASTM A325, BOLTS SHALL BE A MINIMUM OF 3/4" DIAMETER, UNLESS OTHERWISE NOTED.

4. SUBMIT SHOP DRAWINGS FOR ALL WORK. DO NOT PROCEED WITH ANY FABRICATION UNTIL THE SHOP DRAWINGS ARE REVIEWED AND APPROVED. SHOP DRAWINGS SHALL BE BASED ON FIELD-VERIFIED CONDITIONS.

5. AFTER FABRICATION, CLEAN STEEL OF ALL RUST, LOOSE MILL, SCALE AND OTHER FOREIGN MATERIALS.

6. ALL WELDING SHALL BE DONE BY QUALIFIED WELDERS AND SHALL CONFORM TO "AWS STRUCTURAL WELDING CODE – STEEL", LATEST EDITION. WELDERS SHALL BE LICENSED BY THE BUILDING SUPERINTENDENT IN ACCORDANCE WITH ALL REQUIREMENTS OF THE CITY OF NEW YORK BUILDING CODE, AND THE RULES AND REGULATIONS OF THE BOARD OF STANDARDS AND APPEALS.

7. WELDING ELECTRODES SHALL BE E70XX FOR NEW CONST. AND E60 LOW HYDROGEN FOR EXISTING.

8. MINIMUM FILLET WELDS SHALL COMPLY WITH AISC, BUT SHALL NOT BE LESS THAN ¼ INCH,UNLESS OTHERWISE NOTED.

9. PROVIDE FIREPROOF BLANKETS AND OTHER FIRE PROTECTION MEASURES AS REQUIRED FOR FIRE SAFETY DURING WELDING.

10. SURFACES OF ALL STEEL THAT IS TO RECEIVE WELDS SHALL BE POWER BRUSHED AND CLEANED THOROUGHLY OF ALL FOREIGN MATTER AND PAINT FOR A DISTANCE OF 2 INCHES FROM EACH SIDE OF THE OUTSIDE LINES OF WELD.

11. ALL NEW INTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP2 Hand Tool Clean
Prime: 10-99 or 4 Versare, 2-3 mils dft
Intermediate: 2H or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

12. ALL EXISTING INTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP2 Hand Tool Clean
Prime: 4 Versare, 2-3 mils dft
Intermediate: 2H or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

13. ALL NEW EXTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP3 Power Tool Clean
Prime: 10-99 or 4 Versare, 2-3 mils dft
Intermediate: 2H or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

14. ALL EXISTING EXTERIOR STEEL SHALL BE PAINTED WITH THE FOLLOWING SYSTEM BY TNEMEC OR EQUAL:

Surface Prep: SSPC-SP3 Power Tool Clean
Prime: 4 Versare, 2-3 mils dft
Intermediate: 2h or 23 Enduratone, 2-3 mils dft
Finish: 2H or 23 Enduratone, 2-3 mils dft

15. OMIT PAINT WHERE SPRAY FIREPROOFING IS USED.

16. FIREPROOFING: PROVIDE ANY OF THE FOLLOWING FOR ALL STEEL (REFER TO ARCH. REQUIREMENTS).

A. 1 ¼" MIN. 1:2 MILL-MIXED GYPSUM-PERLITE PLASTER OVER 3.4 LB. DIAMOND MESH METAL LATH. PROVIDE 1" SPACE FROM BOTT. LEGS TO LATH
B. 5/8" TYPE X GYPSUM WALL BOARD OR VENEER BASE AROUND ANGLES, SEE ARCH. DWGS. FOR THE NUMBER OF LAYERS. ALL EXISTING STEEL FIREPROOFED SHALL BE RESTORED.
C. SPRAY FIREPROOFING
D. RESTORE ALL REMOVED ORIGINAL FIREPROOFING
E. EXPOSED FIREPROOFING SHALL BE PLASTERED TO MATCH EXISTING
F. FOR SPRAY FIREPROOFING REQUIREMENT AT DECK SEE PLAN.

17. STAIR STRINGERS SHALL HAVE FULL PENETRATION WELDED CONNECTIONS ALL AROUND AT CRANKED SEGMENTS.

18. ALL CONNECTIONS SHALL BE DESIGNED BY THE FABRICATOR'S PROFESSIONAL ENGINEER AND SUBMITTED IN SHOP DRAWING FORM FOR REVIEW. BEAM TO BEAM CONNECTORS SHALL BE DESIGNED TO TRANSFER THE REACTION FOR A SIMPLY SUPPORTED, UNIFORMLY LOADED BEAM OF SAME SIZE, SPAN AND (FY) AS LISTED IN THE TABLE OF UNIFORM LOAD CONSTANTS, AISC MANUAL OF STEEL CONSTRUCTION, EIGHTH EDITION, OR FOR THE REACTION SHOWN ON THE FRAMING PLAN, WHICHEVER IS GREATER. WHERE NO REACTION IS SHOWN ON THE FRAMING PLAN, CONNECTION SHALL TRANSFER THE REACTION AS NOTED ABOVE.

MASONRY NOTES

1. MATERIAL:

(A) HOLLOW LOAD BEARING CONCRETE MASONRY AND BRICK UNITS SHALL CONFORM TO ASTM C90, GRADE N, TYPE1. THE MASONRY ASSEMBLY SHALL HAVE AN ULTIMATE COMPRESSIVE STRENGTHS (F'M) OF 1,500 PSI WITH A MINIMUM UNIT STRENGTH OF 4,000 PSI, UNLESS PRISM TESTS ARE CONDUCTED SUCCESSFULLY WITH LOWER STRENGTH CMU.

(B) GROUT FOR LOAD BEARING MASONRY SHALL CONFORM TO ASTM C476-6, WITH A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI

(C) ALL MORTAR SHALL CONFORM TO ASTM C270, TYPE S.

(D) REINFORCING BARS FOR REINFORCED MASONRY SHALL CONFORM TO ASTM A615-60.

2. VERTICAL CELLS TO BE FILLED WITH GROUT SHALL BE ALIGNED TO PROVIDE A CONTINUOUS, UNOBSTRUCTED OPENING OF THE DIMENSIONS SHOWN ON THE PLANS. CELLS WHICH WILL CONTAIN VERTICAL REINFORCEMENT SHALL HAVE A MINIMUM OF TWO (2) INCH CLEAR OPENING. VERTICAL REINFORCING SHALL HAVE A MINIMUM 3/4" CLEARANCE FROM MASONRY.

3. CONTINUOUS WIRE REINFORCING (JOINT REINFORCING) SHALL BE GALVANIZED TRUSS TYPE FABRICATED UNITS WITH A SINGLE PAIR OF 9 GAUGE SIDE RODS AND 9 GAUGE CONTINUOUS DIAGONAL CROSS RODS FABRICATED FROM COLD DRAWN STEEL WIRE COMPLYING WITH ASTM A82. JOINT REINFORCING SHALL BE SPACED AT 16" O.C. VERTICALLY IN ALL MASONRY WALLS.

4. GROUT FOR FILLING REINFORCED OR NON-REINFORCED CELLS SHALL BE FLUID AND PLACED BY ACCEPTABLE GROUTING PROCEDURES. GROUT SHALL BE PLACED IN MAXIMUM FOUR (4) FOOT LIFTS AND CONSOLIDATED IN PLACE BY VIBRATION OR OTHER METHODS WHICH INSURE COMPLETE FILLING OF THE CELLS. ALL CELLS CONTAINING REINFORCING BARS AND/OR ANCHOR BOLTS SHALL BE FULLY GROUTED.

5. ALL REINFORCED CELLS, ALL CELLS BELOW GRADE AND ALL CELLS BELOW FINISHED FLOOR SHALL BE GROUTED SOLID WITH HIGH SLUMP 6" + SUPER PLASTICIZING 3000 PSI PEA GRAVEL CONCRETE.

6. REINFORCING SPLICES SHALL IN NO CASE BE LESS THAN 48 DIAMETERS, OR 2'-0" WHICHEVER IS GREATER, UNLESS OTHERWISE NOTED. BARS SPLICED BY NON-CONTACT LAP SPLICES SHALL NOT BE SPACED TRANSVERSELY FARTHER APART THAN ONE-FIFTH THE REQUIRED LENGTH OF LAP NOR MORE THAN 8 INCHES. THE MINIMUM DISTANCE BETWEEN THE EDGE OF REINFORCING AND THE MASONRY UNITS SHALL NOT BE LESS THAN HALF AN INCH.

7. PROVIDE DOWELS AND MATCH VERTICAL REINFORCING AT ALL CMU WALLS UNLESS OTHERWISE NOTED.

8. MECHANICAL SPLICING IF REQUIRED, SHALL HAVE THE BARS CONNECTED TO DEVELOP AT LEAST 125 PERCENT OF THE SPECIFIED YIELD STRENGTH OF THE BAR. IF MECHANICAL SPLICING IS USED, SUBMIT PRODUCT LITERATURE DESCRIBING STRENGTH AND METHOD OF INSTALLATION.

9. HOLLOW UNITS SHALL BE LAID WITH FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS EXCEPT THAT WEBS SHALL ALSO BE BEDDED WHERE THEY ARE ADJACENT TO CELLS TO BE REINFORCED AND/OR FILLED WITH GROUT, IN THE STARTING COURSE ON FOOTINGS AND SOLID FOUNDATION WALLS AND IN NON-REINFORCED OR GROUTED PIERS, PILASTERS, AND COLUMNS.

10. SOLID MASONRY UNITS SHALL BE LAID WITH FULL HEAD AND BED JOINTS.

11. POINTS OF BEARING SHALL BE ON TWO (2) COURSES OF SOLID MASONRY GROUTED SOLID CONTINUOUSLY.

12. ALL AUTHORIZED CUTTING AND FITTING OF MASONRY, INCLUDING THAT REQUIRED TO ACCOMMODATE THE WORK OF OTHER TRADES, SHALL BE DONE WITH MASONRY SAWS.

13. PROVIDED ADEQUATE, TEMPORARY BRACING AS REQUIRED DURING CONSTRUCTION TO WITHSTAND LATERAL LOADS AND THE PRESSURE OF FLUID GROUT. PROVIDE INTERMEDIATE BRACING AS THE WORK PROGRESSES.

14. CONCRETE MASONRY SHALL BE PROTECTED FROM ABSORBING MOISTURE AND WATER WHILE AT THE PLANT, DURING SHIPMENT AND AT THE SITE DURING CONSTRUCTION.

15. PROVIDE ADDITIONAL (2) #4 CONTINUOUS VERTICAL REINFORCEMENT AT ALL CORNERS AND OPENING JAMBS IN CMU WALLS.

16. REPOINTING SHALL BE TO A MINIMUM OF 3/4" OR MORE IF REQ'D.

17. CONSTRUCTION AND/OR CONTROL JOINT SHALL BE PLACED AS SHOWN ON PLAN.

STRUCTURAL METAL DECK NOTES:

1. FABRICATE METAL DECKING FROM STEEL TYPE ASTM A446, GRADE A, HAVING A MINIMUM YIELD STRENGTH OF 33,000 PSI; HOT DIPPED GALVANIZED.

2. SUBMIT, TO THE ARCHITECT, PUBLISHED MANUFACTURER'S DATA VERIFYING THE SPECIFIC DECK REQUIREMENTS. SUBMIT ENGINEERED AND CHECKED SHOP DRAWINGS INDICATING LOCATION, GAUGE AND SIZE OF EACH PIECE OF DECKING. SHOP DRAWINGS SHALL CLEARLY SHOW FASTENING/WELDING DETAILS TO STRUCTURAL FRAMING, SIDE LAP CONNECTION DETAILS AND SUPPLEMENTARY SUPPORT STEEL AS REQUIRED.

3. FASTEN METAL DECKING AT 12 INCHES MAXIMUM ON CENTER TO THE SUPPORTING STEEL FASTEN SIDE LAPS AT 30 INCHES MAXIMUM ON CENTER.

4. PROVIDE CONTINUOUS SHEET METAL CLOSURES AT ALL SLAB OPENINGS AND SLAB EDGES AND CONTINUOUS DECK CLOSURE AT ALL DECK ENDS.

5. DECK SHALL BE OF A MIN. OF TWO (2) SPANS CONTINUOUS U.O.N.

STRUCTURAL NOTES

1. ALL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE CITY OF NEW YORK.

2. COORDINATE THE STRUCTURAL DRAWINGS WITH THE ARCHITECTURAL AND M/E/P DRAWINGS.

3. EXISTING CONDITIONS, ELEVATORS, DIMENSIONS AND SYSTEMS SHOWN ON PLANS ARE BASED ON LIMITED FIELD OBSERVATIONS. THE CONTRACTOR SHALL FIELD-VERIFY ALL DETAILS, DIMENSIONS AND ASSUMPTIONS PRIOR TO ANY WORK. WHERE EXISTING CONDITIONS DIFFER FROM OR PRECLUDE THE EXECUTION OF THE OUTLINED DETAILS, THE ENGINEER SHALL BE NOTIFIED.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL FINAL FIELD-VERIFIED DIMENSIONS AND SHALL SUBMIT FIELD-VERIFIED DIMENSIONED SHOP DRAWINGS.

5. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER. STAGING AND SEQUENCE OF SHORING, BRACING OR OTHER CONSTRUCTION REQUIRED FOR SUCH WORK SHALL BE PREPARED IN THE FORM OF SHOP OR DETAIL DRAWINGS AND CALCULATIONS.

6. DO NOT FABRICATE ANY WORK WITHOUT APPROVED STRUCTURAL SHOP DRAWINGS FOR ALL STRUCTURAL WORK, AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE STRUCTURAL WORK.

7. CONTRACTOR TO PROTECT AT ALL TIMES EQUIPMENT, PIPES AND OTHER EXPOSED OR EMBEDDED ITEMS ON THE SITE AGAINST DAMAGE. REROUTE AS REQUIRED PER M/E/P DRAWINGS.

CONTROLLED INSPECTIONS REQUIRED:

1.ALL CONTROLLED INSPECTION SHALL BE CONDUCTED BY A SPECIAL INSPECTION AGENCY RETAINED BY THE CONTRACTOR SUCH AGENCY SHELL BE REGISTERED WITH N.Y.C DEPARTMENT OF BUILDINGS AS QUALIFIED TO CONDUCT SPECIFIED INSPECTIONS AND EMPLOY SPECIAL INSPECTOR

2. THE CONTRACTOR MUST NOTIFY THE INSPECTOR FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

3.INSPECTIONS UNDER STRUCTURAL APPLICATION
STRUCTURAL STEEL – WELDING AS PER BC 1704.3.1
STRUCTURAL STEEL – ERECTION & BOLTING AS PER BC 1704.3.2 & BC 1704.3.3
MASONRY AS PER BC 1704.5
STRUCTURAL SAFETY – STRUCTURAL STABILITY AS PER BC 1704.19

4. SEE ARCH. DRAWINGS FOR ADDITIONAL INSPECTIONS.

DRAWING LIST

NO.	DRAWING NO.	DRAWING TITLE
1	S-001.00	GENERAL NOTES
2	S-002.00	TYPICAL STEEL DETAILS
3	S-003.00	TYPICAL FLOOR JOIST DETAILS
4	S-004.00	TYPICAL FLOOR JOIST DETAILS
5	S-005.00	TYPICAL FLOOR JOIST DETAILS
6	S-006.00	TYPICAL LIGHT GAUGE DETAILS
7	S-101.00	1ST FL & 2ND FL FRAMING PLANS
8	S-102.00	3RD FL & 4TH FL FRAMING PLANS
9	S-103.00	PENTHOUSE FL AND BULKHEAD FRAMING PLANS
10	S-201.00	DETAILS

LOADING SCHEDULE

FLOOR	DEAD LOAD (PSF)	SUPERIMPOSED (PSF)	TOTAL DEAD LOAD (PSF)	LIVE LOAD (PSF)	TOTAL LOAD (PSF)
CELLAR	–	–	–	40	40
1ST TO 4TH FL	37	20	57	40	97
1ST FL ENTRY	37	20	57	100	157
PENTHOUSE RES.	37	20	57	40	97
ROOF	41	10	51	100	151
BULKHEAD	30	10	40	50	90
BALCONY	37	10	47	60	107

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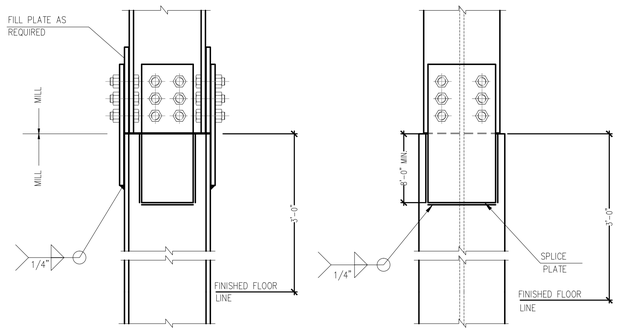
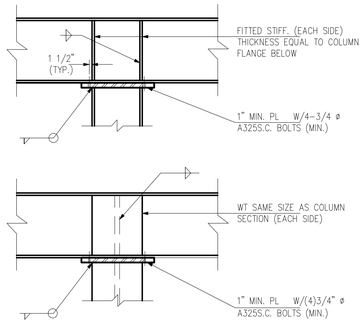


1 TYPICAL COLUMN SPLICE

SCALE: N.T.S.

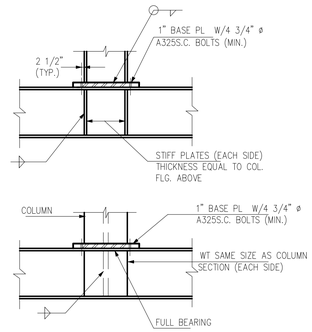
NOTES:

1. PROVIDE COLUMN SPLICE WITH FULL MOMENT CAPACITY AT MOMENT FRAME AND BRACED FRAME



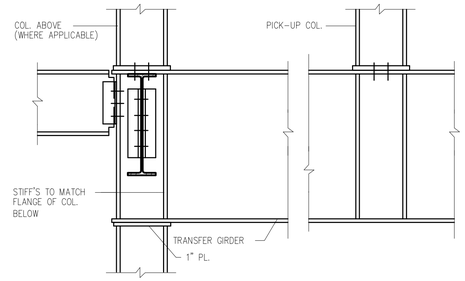
2 TYPICAL DETAIL FOR BEAM OVER COLUMN

SCALE: N.T.S.



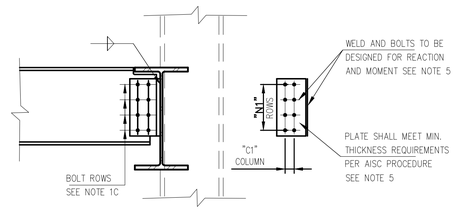
3 TYPICAL DETAIL FOR COLUMN OR POST PICK-UP

SCALE: N.T.S.



4 TYPICAL DETAIL AT COLUMN SUPPORTING TRANSFER GIRDER

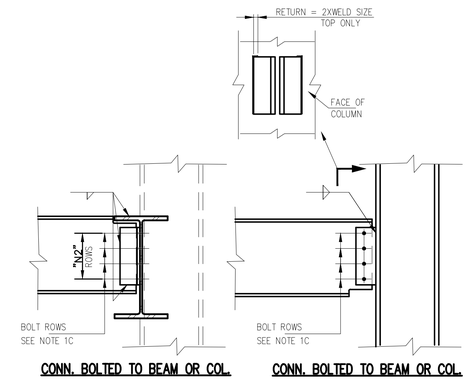
SCALE: N.T.S.



5 SHEAR PLATE CONNECTIONS TO BEAM OR COLUMN

SCALE: N.T.S.

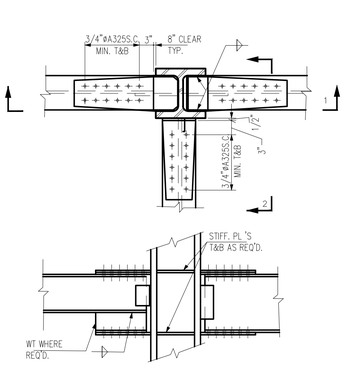
NOTE: CONN. SIMILAR WHEN CONNECTING TO GIRDER OR COLUMN (SHOWN AS DASHED LINE)

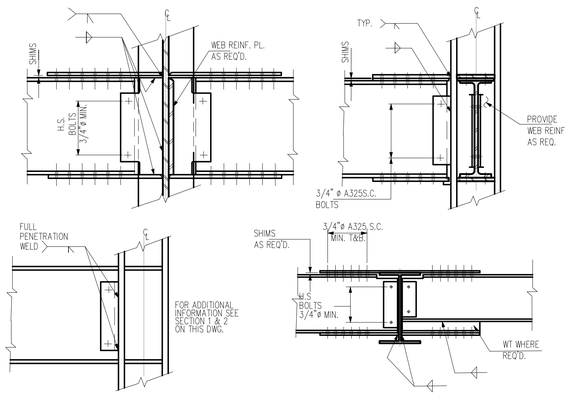


6 DOUBLE ANGLE CONNECTIONS TO BEAM OR COLUMN

SCALE: N.T.S.

NOTE: CONN. SIMILAR WHEN CONNECTING TO GIRDER OR COLUMN (SHOWN AS DASHED LINE)



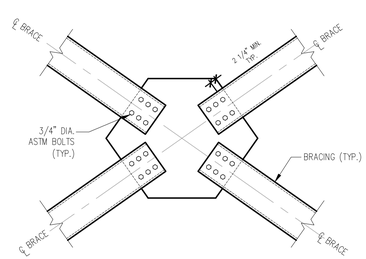


7 TYPICAL MOMENT CONNECTION DETAILS

SCALE: N.T.S.

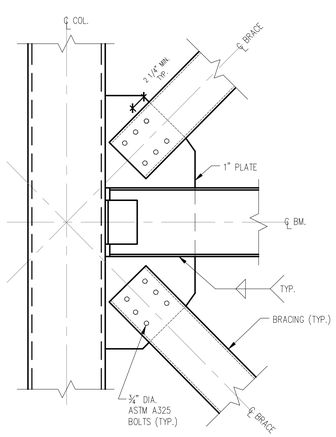
NOTES:

1. WELDS & BOLTS FOR MOM. CONNECTION MUST DEVELOP MOMENTS AS INDICATED ON DRAWINGS.
2. MIN. THICKNESS OF MOMENT PLATES SHALL BE 3/4"
3. WELD MAY BE SUBSTITUTED FOR BOLTS UPON APPROVAL BY ENGINEER OF AN EQUIVALENT DETAIL.
4. PROVIDE WEB REINFORCING WHERE REQUIRED DUE TO WEB CUT FOR CONNECTIONS.
5. PROVIDE COLUMN WEB DOUBLER PLATES AND/OR COLUMN FLANGE STIFFENERS WHERE REQUIRED TO RESIST FORCES FROM MOMENT CONNECTIONS.
6. ALL W.G. MEMBERS TO HAVE FULL CAPACITY MOMENT CONNECTIONS U.O.N.



8 TYPICAL BRACING CONNECTION

SCALE: N.T.S.



9 TYPICAL BRACING CONNECTION

SCALE: N.T.S.

MIN. No OF BOLTS AND MIN. CONNECTION CAPACITY		
BEAM SIZE	"N"	"V"
W36	6	60
W33	6	60
W30	5	50
W27	5	50
W24	4	40
W21	4	40
W18	3	30
W16	3	30
W14	3	30
W12	2	20
W10	2	20
W8	2	20

"V" = MINIMUM CONN. SERVICE LOAD CARRYING CAPACITY IN KIPS. U.O.N.
"N" = MINIMUM NUMBER OF BOLT ROWS

NOTES:

1. SIMPLE SHEAR CONNECTIONS SHALL BE DESIGNED FOR THE REACTION SHOWN ON THE DRAWINGS OR THE GREATEST OF THE FOLLOWING:
   a. FOR COMPOSITE BEAMS, REACTION FROM AISC LRFD UNIFORM LOAD TABLES FOR BEAMS FOR APPLICABLE BEAM MATERIAL MULTIPLIED BY 2.0.
   b. FOR NON-COMPOSITE BEAMS, REACTION FROM AISC LRFD UNIFORM LOAD TABLES FOR BEAMS FOR APPLICABLE BEAM MATERIAL MULTIPLIED BY 1.3
   c. MINIMUM NUMBER OF BOLT ROWS AND MINIMUM CONNECTION CAPACITY, SEE TABLE
2. BOLTS SHALL BE 3/4" DIAMETER A325 MINIMUM (U.O.N.).
3. ALL BOLTS SHALL BE FULLY PRE-TENSIONED.
4. PROVIDE WEB REINFORCING AS REQUIRED DUE TO WEB CUTS, COPES AND ETC.
5. DESIGN OF DOUBLE ANGLE AND SHEAR PLATE CONNECTIONS SHALL BE BASED UPON THE LATEST AISC PROCEDURES SHOWN IN THE AISC MANUAL OF STEEL CONSTRUCTION, VOLUME II CONNECTIONS.
6. FACTOR FOR CONVERSION OF LOADS FROM SERVICE TO ULTIMATE SHALL BE EQUAL TO 1.3.
7. ALTERNATE CONNECTION SYSTEM (SINGLE ANGLE) MAY BE USED AT FILLER BEAM TO BEAM CONNECTIONS ONLY PROVIDED THE DETAILER SUBMITS DESIGN PROCEDURE TO ENGINEER OF RECORD FOR APPROVAL.

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

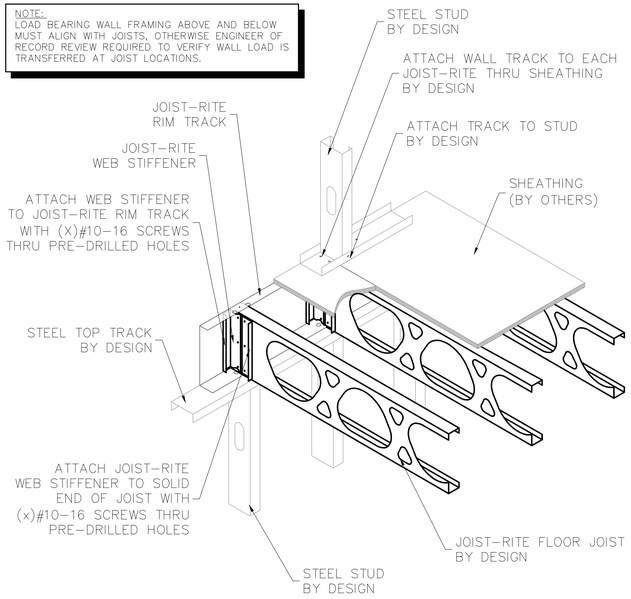
56 FROST STREET
BROOKLYN, NY 11211

Drawing

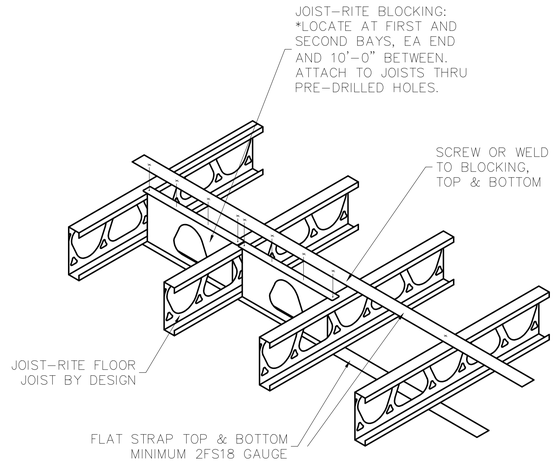
TYPICAL STEEL DETAILS

Seal:

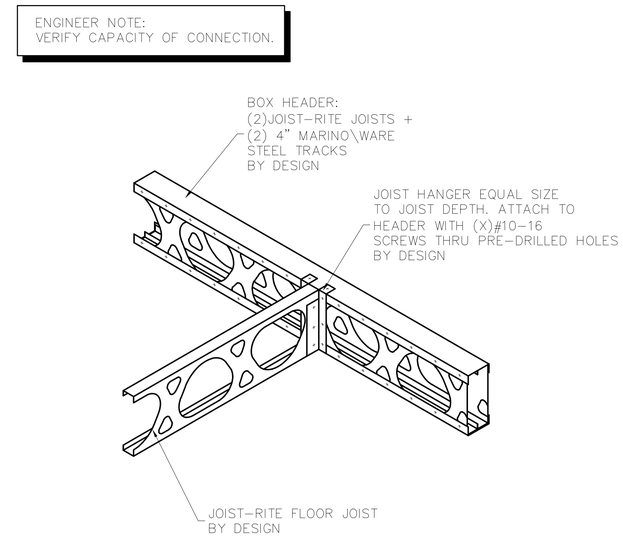
DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-002.00**
CAD FILE No:	2 OF 10



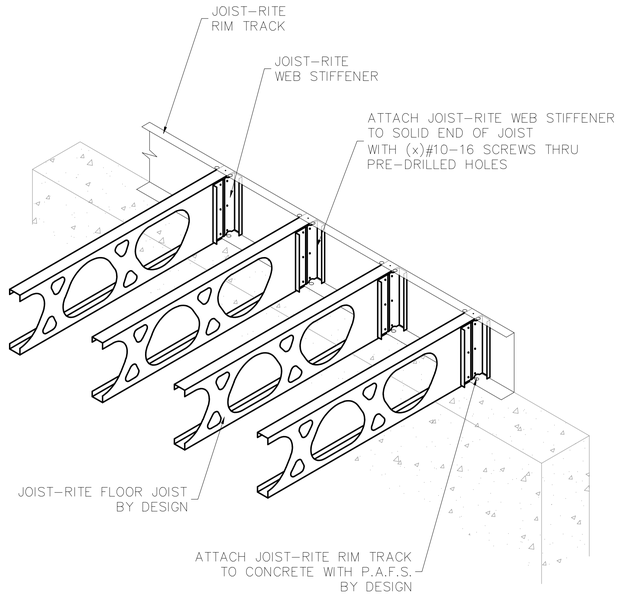
1 **JOIST-RITE BEARING ON STEEL STUD**
SCALE: 1" = 1'-0"



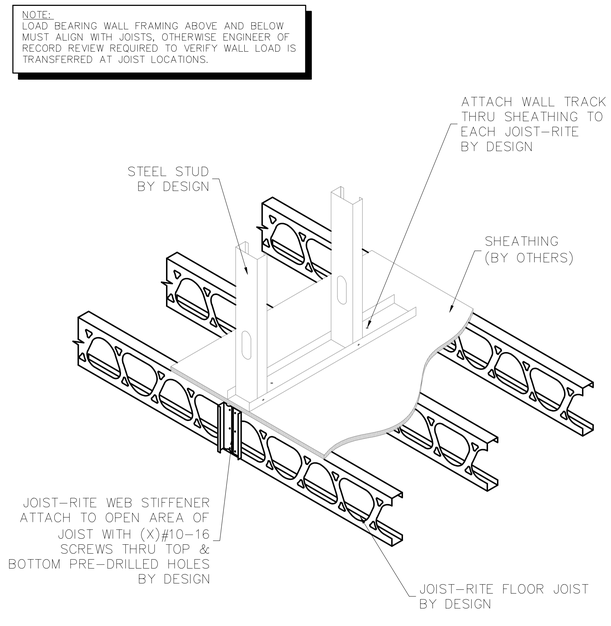
2 **JOIST-RITE BRIDGING AND BLOCKING**
SCALE: 1" = 1'-0"



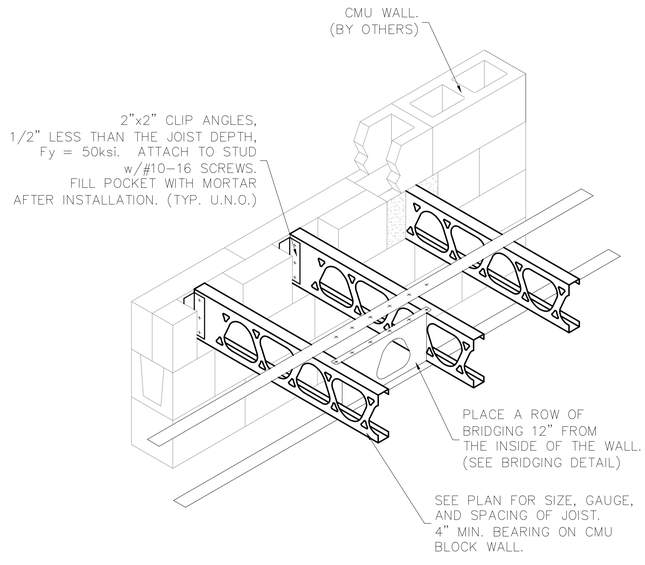
3 **JOIST-RITE TO HEADER DETAIL**
SCALE: 1" = 1'-0"



4 **JOIST-RITE BEARING ON MASONRY**
SCALE: 1" = 1'-0"



5 **BEARING WALL ON JOIST-RITE**
SCALE: 1" = 1'-0"



6 **JOIST-RITE ATTACHMENT**
JOIST BEARING ON POCKETED CMU WALL
SCALE: 1" = 1'-0"

No.	Date	Revision
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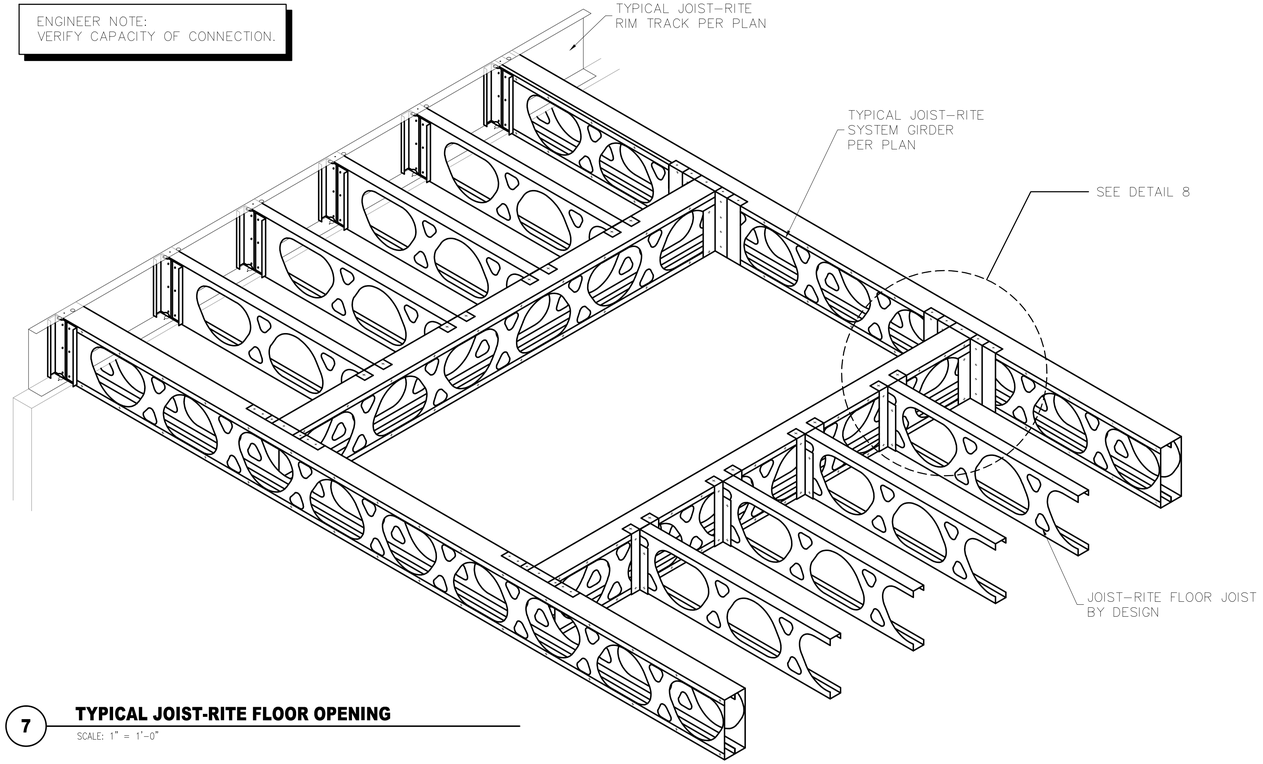
56 FROST STREET
BROOKLYN, NY 11211

Drawing
TYPICAL FLOOR JOIST DETAILS

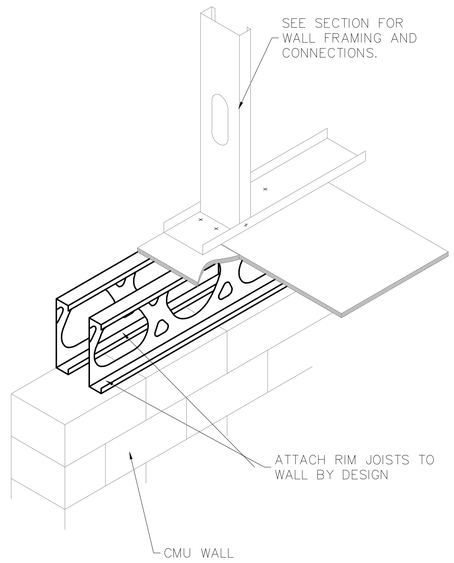
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	S-003.00
CAD FILE No:	3 OF 10

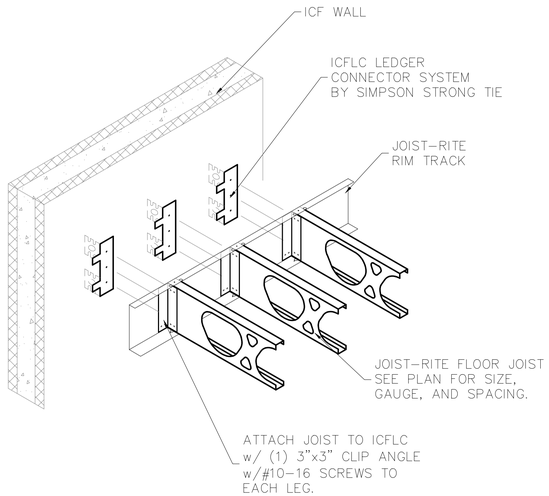
ENGINEER NOTE:
VERIFY CAPACITY OF CONNECTION.



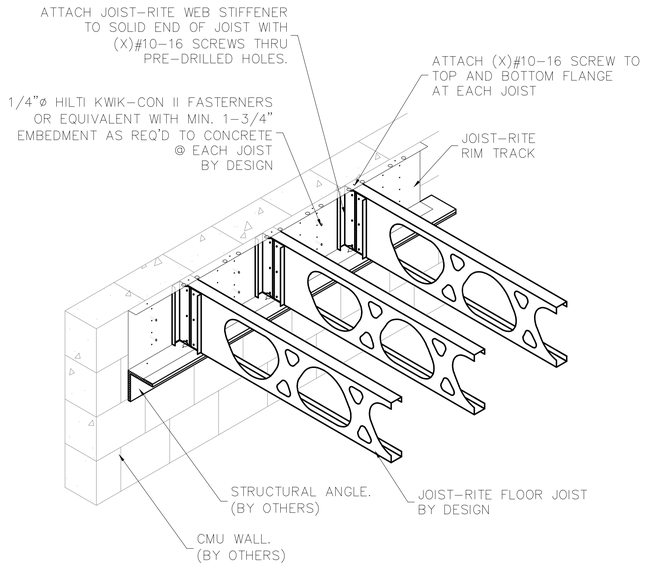
7 **TYPICAL JOIST-RITE FLOOR OPENING**
SCALE: 1" = 1'–0"



8 **DOUBLE JOIST DETAIL - AT EXTERIOR WALL**
SCALE: 1" = 1'–0"

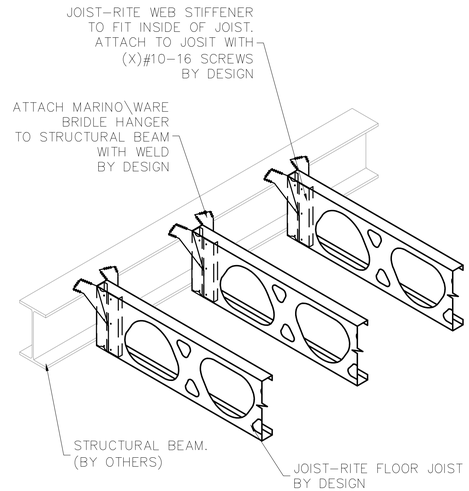


9 **JOIST-RITE CONNECTION TO ICF WALL**
SCALE: 1" = 1'–0"



10 **JOIST-RITE CONNECTION TO CMU WALL**
SCALE: 1" = 1'–0"

ENGINEER NOTE:
VERIFY CAPACITY OF CONNECTION.



11 **JOIST-RITE CONNECTION TO I-BEAM**
SCALE: 1" = 1'–0"

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

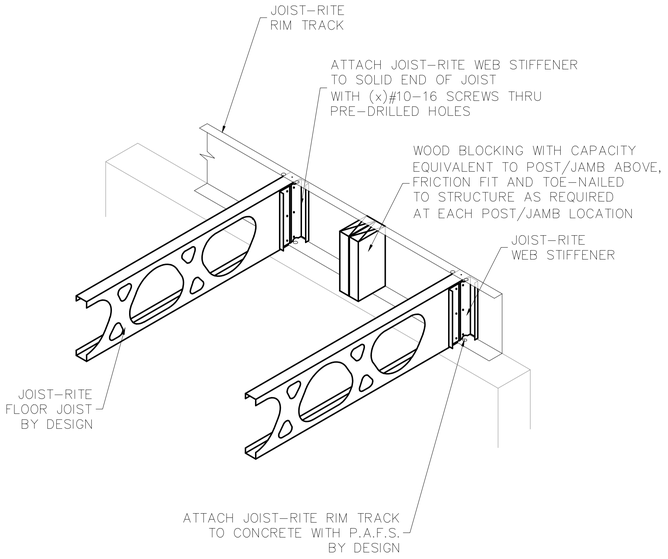
56 FROST STREET
BROOKLYN, NY 11211

Drawing

TYPICAL FLOOR JOIST DETAILS

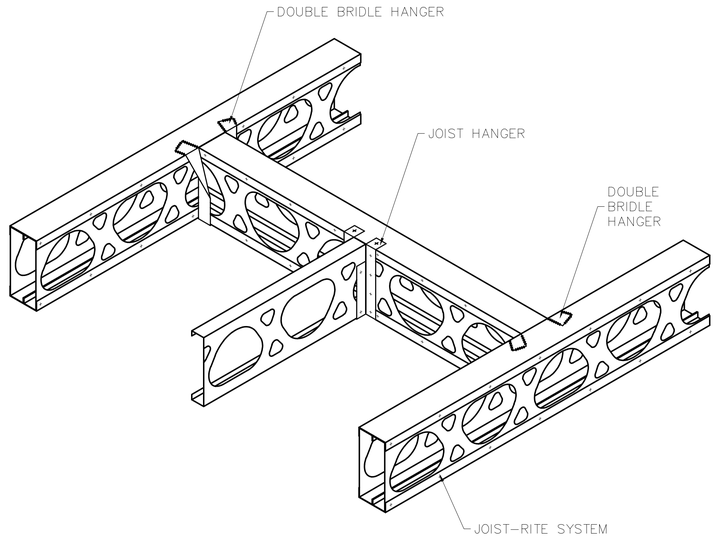
Seal:

DATE:	10/14/14
PROJECT No:	1309–1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-004.00**
CAD FILE No:	4 OF 10



12 **SQUASH BLOCK CONDITION**

USING WOOD STUD
SCALE: 1" = 1'–0"

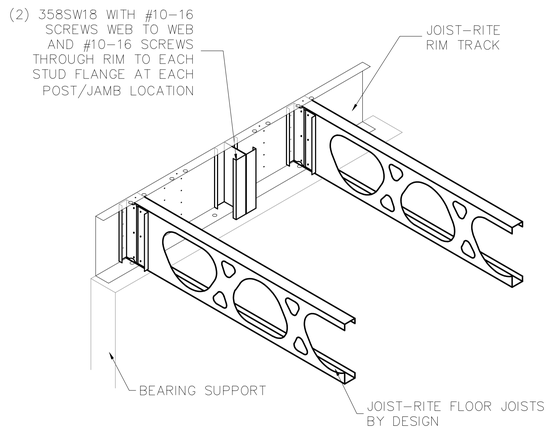


13 **TYPICAL JOIST-RITE DETAIL**

USING DOUBLE BRIDLE HANGER
SCALE: 1" = 1'–0"

NOTE:
LOAD BEARING WALL FRAMING ABOVE AND BELOW MUST ALIGN WITH JOISTS, OTHERWISE E.O.R. REVIEW REQUIRED TO VERIFY WALL LOAD IS TRANSFERRED AT JOIST LOCATIONS.

NOTE:
SQUASH BLOCK CAPACITY = 5973 LBS.
IF ACTUAL LOADS EXCEEDS CAPACITY FURTHER ENGINEERING REVIEW IS REQUIRED.



13 **SQUASH BLOCK CONDITION**

USING STEEL STUD
SCALE: 1" = 1'–0"

No.	Date	Revision
2	07/14/15	Structural update
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56 FROST STREET
BROOKLYN, NY 11211

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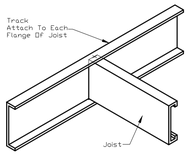
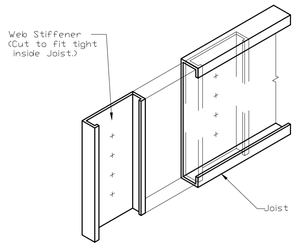
TYPICAL FLOOR JOIST DETAILS

Seal:

DATE:	10/14/14
PROJECT No:	1309–1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-005.00**
CAD FILE No:	5 OF 10

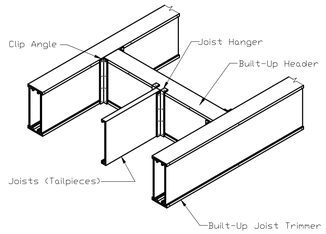


FLOOR SYSTEMS - JOIST END CLOSURE



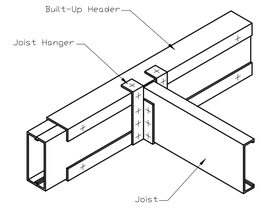
NOTE: NO. OF SCREWS WILL VARY WITH DEPTH OF JOIST

FLOOR SYSTEMS
WEB STIFFENER TYPICAL CONNECTION



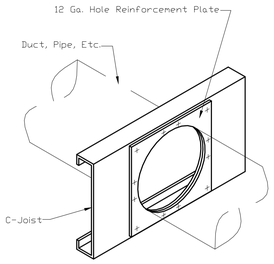
NOTE: FASTEN BUILT-UP MEMBERS TOGETHER AT 12" O.C. MAX.

FLOOR SYSTEMS
TYPICAL FLOOR OPENING FRAMING



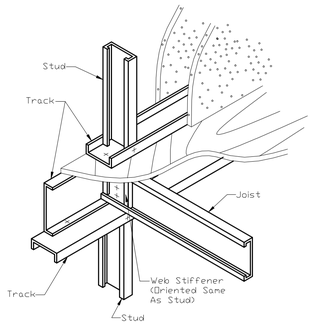
NOTE: 1. FASTEN BUILT-UP MEMBERS TOGETHER AT 12" O.C. MAX.
2. ALL SCREWS MUST BE INSTALLED

FLOOR SYSTEMS - JOIST HANGER CONNECTION



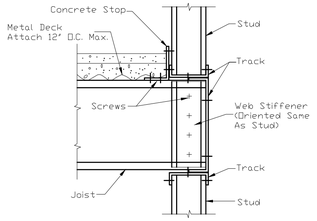
NOTE: 1. ALL SCREWS MUST BE INSTALLED
(OR EQUAL AMOUNT OF WELD)
2. DO NOT TORCH CUT HOLES IN JOIST

FLOOR SYSTEMS - HOLE REINFORCEMENT PLATE



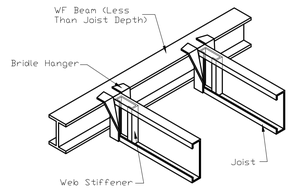
NOTE: 1. ALIGN WEBS OF ALL MEMBERS.
2. ATTACH PLYWOOD TO JOIST AT 12" O.C. IN FIELD
OF BOARD AND 6" O.C. AT ENDS.

FLOOR SYSTEM - EXTERIOR WALL



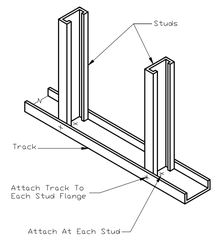
NOTE: 1. NO. OF SCREWS WILL VARY WITH DEPTH OF JOIST
2. ALIGN WEBS OF ALL MEMBERS

FLOOR SYSTEMS - JOIST END FRAMING

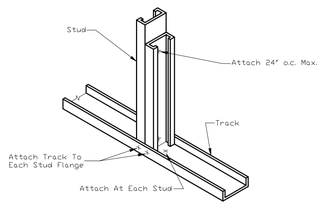


NOTE: 1. WELD, SCREW, OR P.A.F. ATTACH BRIDLE HANGER TO BEAM
2. ATTACH BRIDLE HANGER TO WEB OF JOIST

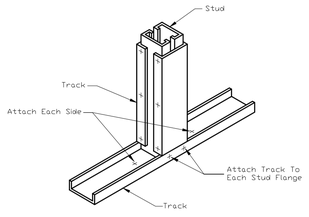
FLOOR SYSTEMS - CONNECTION TO WF BEAM



LOAD BEARING WALL - STUDS IN PLACE

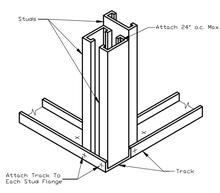


LOAD BEARING WALL - DOUBLED STUDS

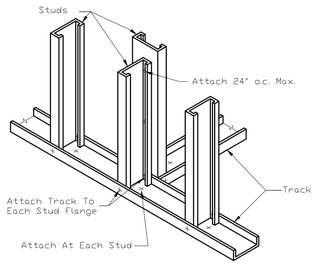


NOTE: FASTEN BUILT-UP MEMBER TOGETHER AT 12" O.C. MAX

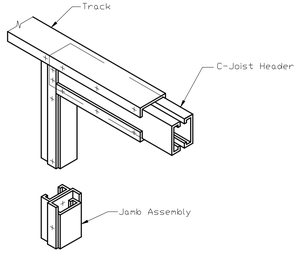
LOAD BEARING WALL - BUILT-UP POST



LOAD BEARING WALL - THREE STUD CORNER

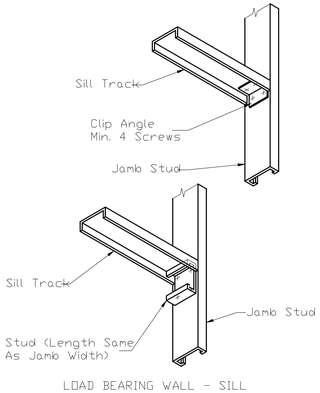


LOAD BEARING WALL - PARTITION INTERSECTION

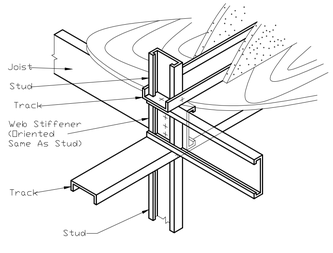


NOTE: FASTEN BUILT-UP MEMBERS TOGETHER AT 12" O.C. MAX.

LOAD BEARING WALL - BEARING HEADER

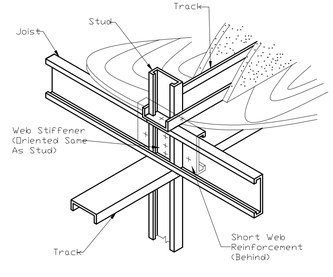


LOAD BEARING WALL - SILL



NOTE: 1. ALIGN WEBS OF ALL MEMBERS
2. ATTACH PLYWOOD TO JOIST AT 12" O.C. IN FIELD
OF BOARD AND 6" O.C. AT ENDS

LOAD BEARING WALL
INTERIOR WALL-LAPPED JOISTS



NOTE: 1. ALIGN WEBS OF ALL MEMBERS
2. ATTACH PLYWOOD TO JOIST AT 12" O.C. IN FIELD
OF BOARD AND 6" O.C. AT ENDS

LOAD BEARING WALL
INTERIOR WALL-CONTINUOUS JOIST

No.	Date	Revision
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E-Mail: RSHARON@SHARONENGINEERING.COM

Project

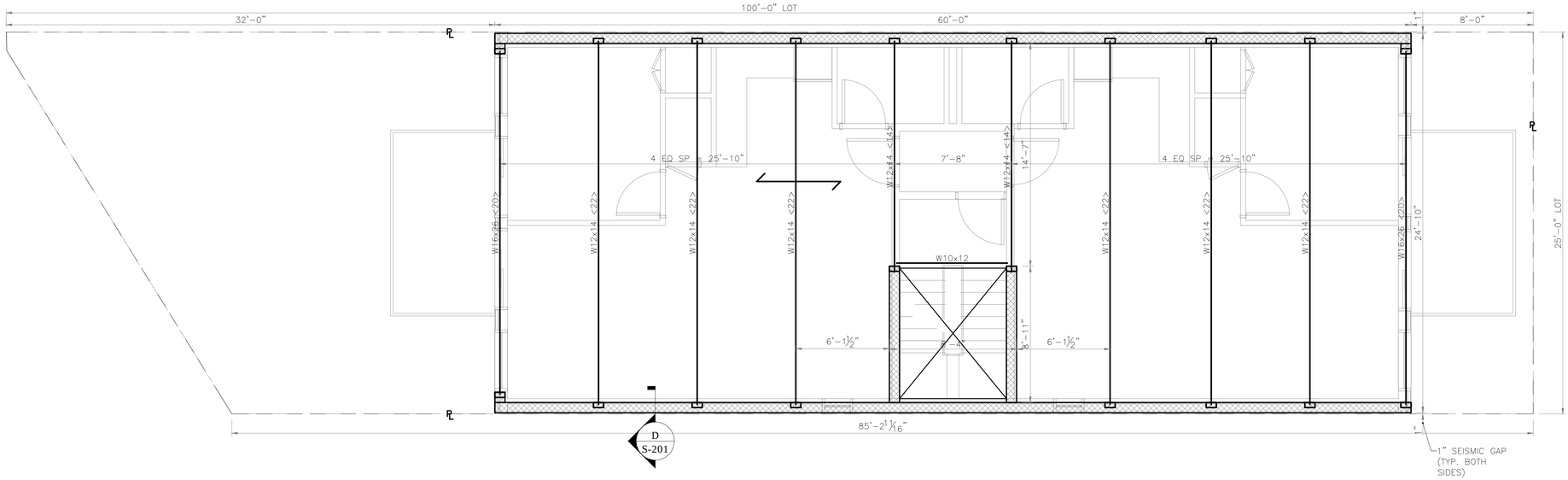
56 FROST STREET
BROOKLYN, NY 11211

Drawing

TYPICAL FLOOR JOIST DETAILS

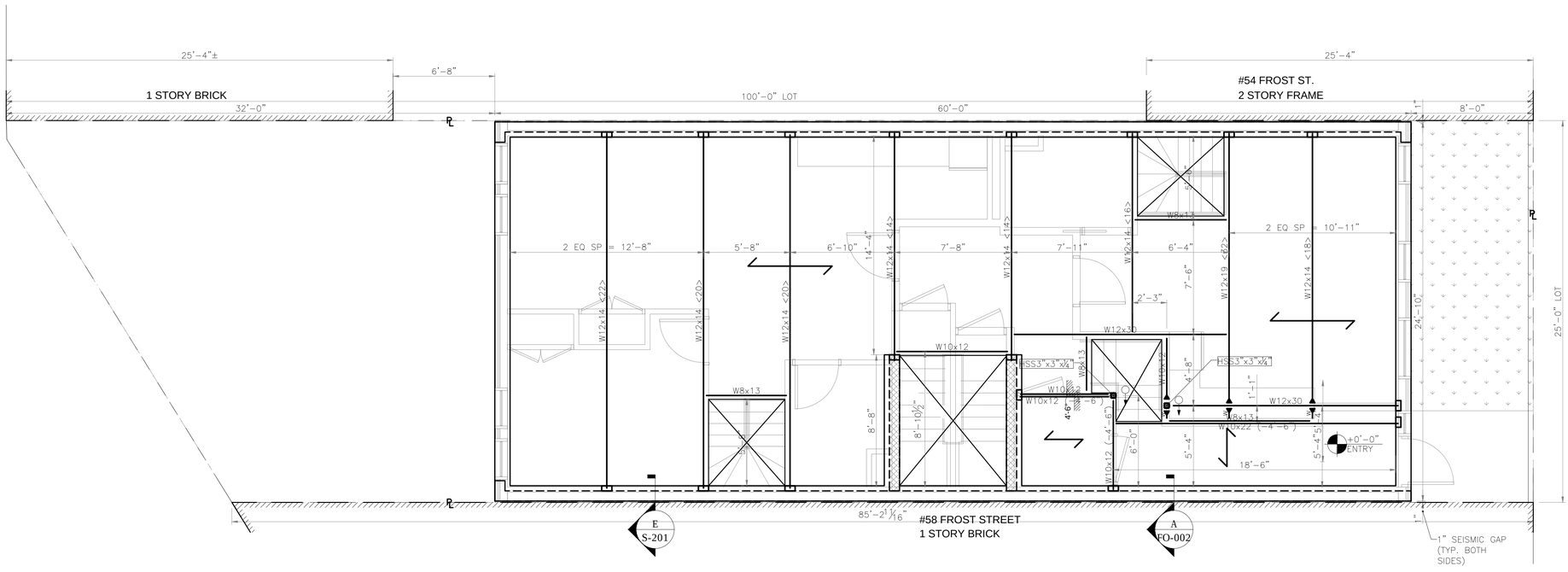
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-006.00**
CAD FILE No:	6 OF 10



2ND FLOOR FRAMING PLAN

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



1ST FLOOR FRAMING PLAN

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

LEGEND

- NEW WALL BELOW
- NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

SHARON ENGINEERING, P.C.
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Project

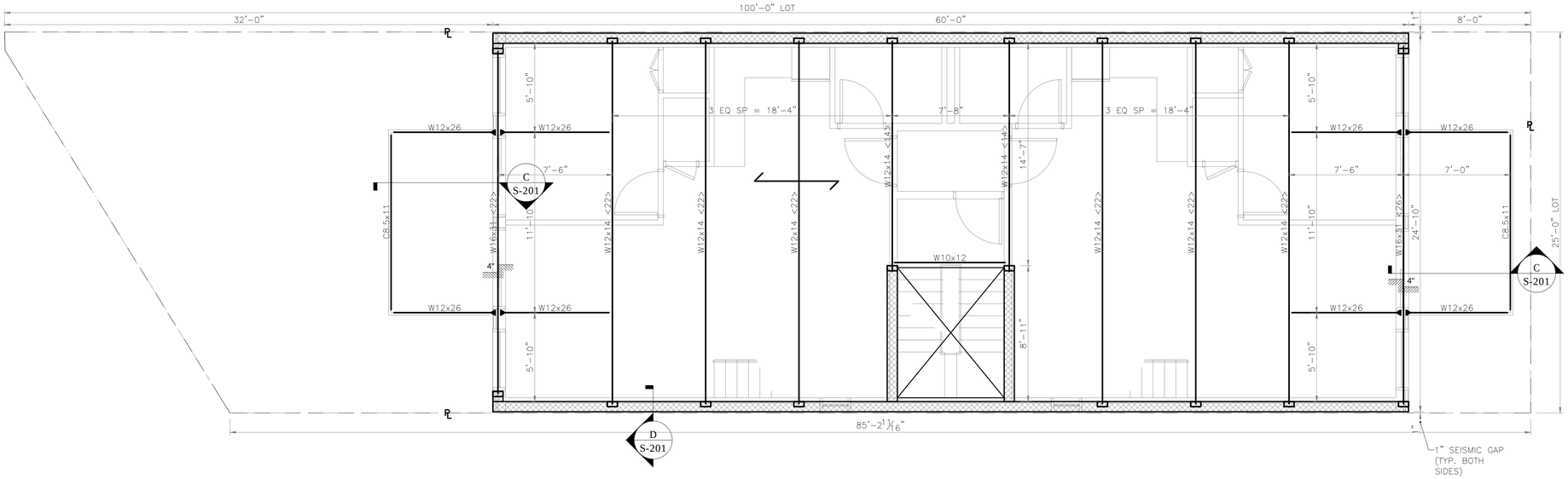
56 FROST STREET
BROOKLYN, NY 11211

Drawing

1ST FL AND 2ND FL FRAMING PLANS

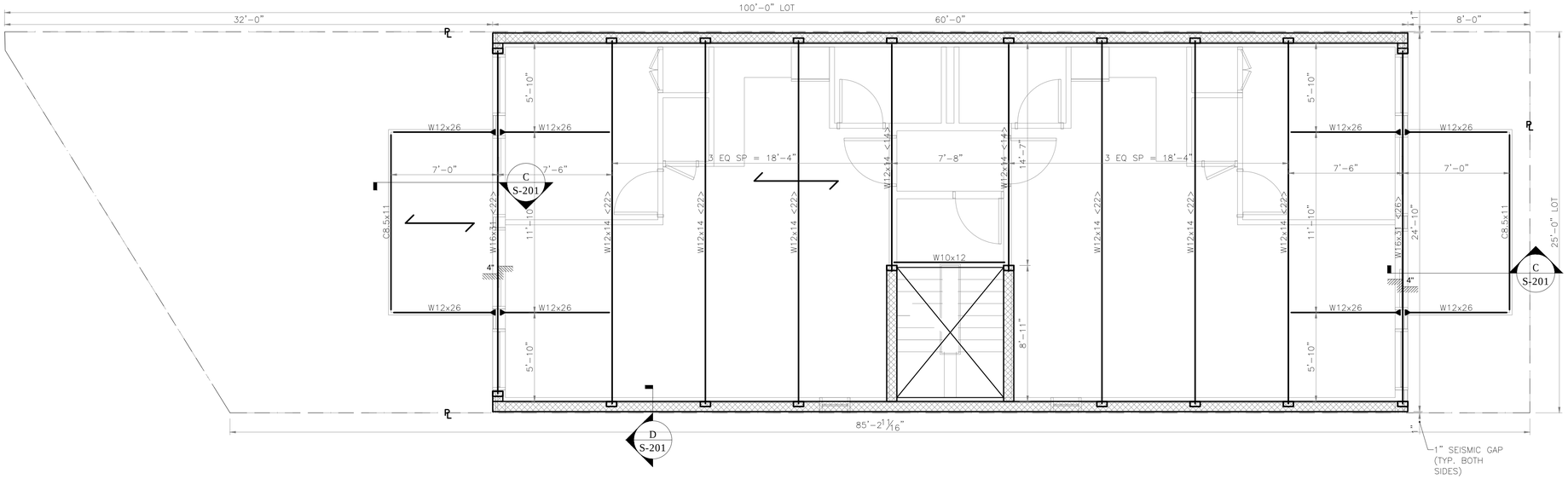
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	**S-101.00**
CAD FILE No:	7 OF 10



4TH FLOOR FRAMING PLAN

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



3RD FLOOR FRAMING PLAN

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

LEGEND

- PATTERN — NEW WALL BELOW
- PATTERN — NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

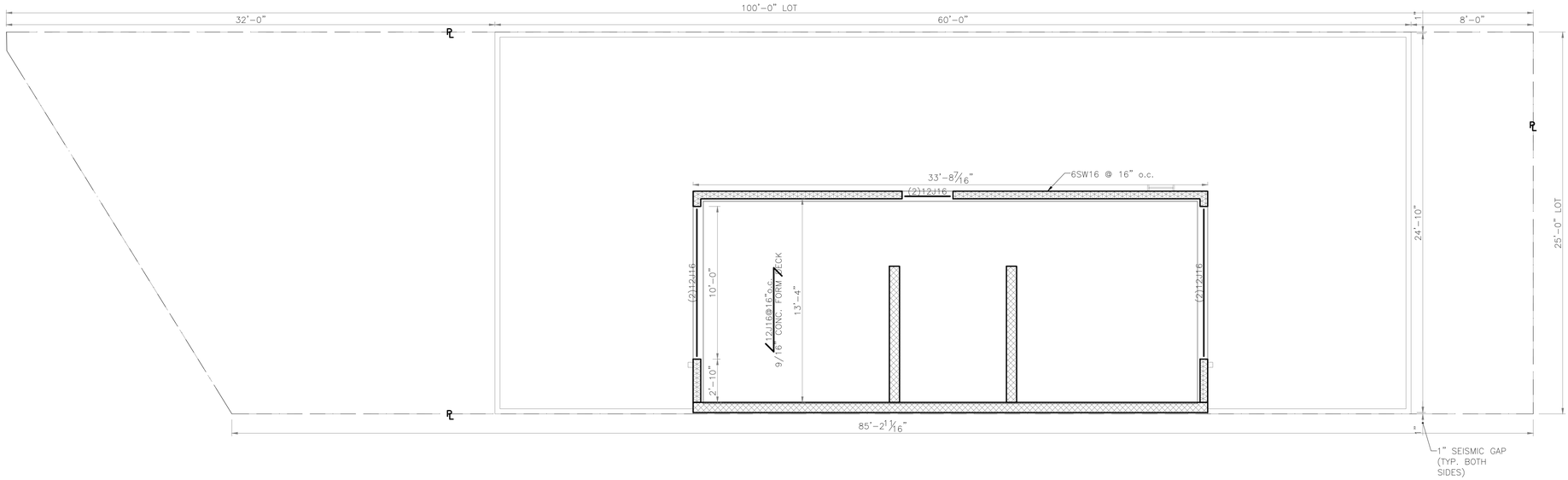
56 FROST STREET
BROOKLYN, NY 11211

Drawing

3RD FL AND 4TH FL FRAMING PLANS

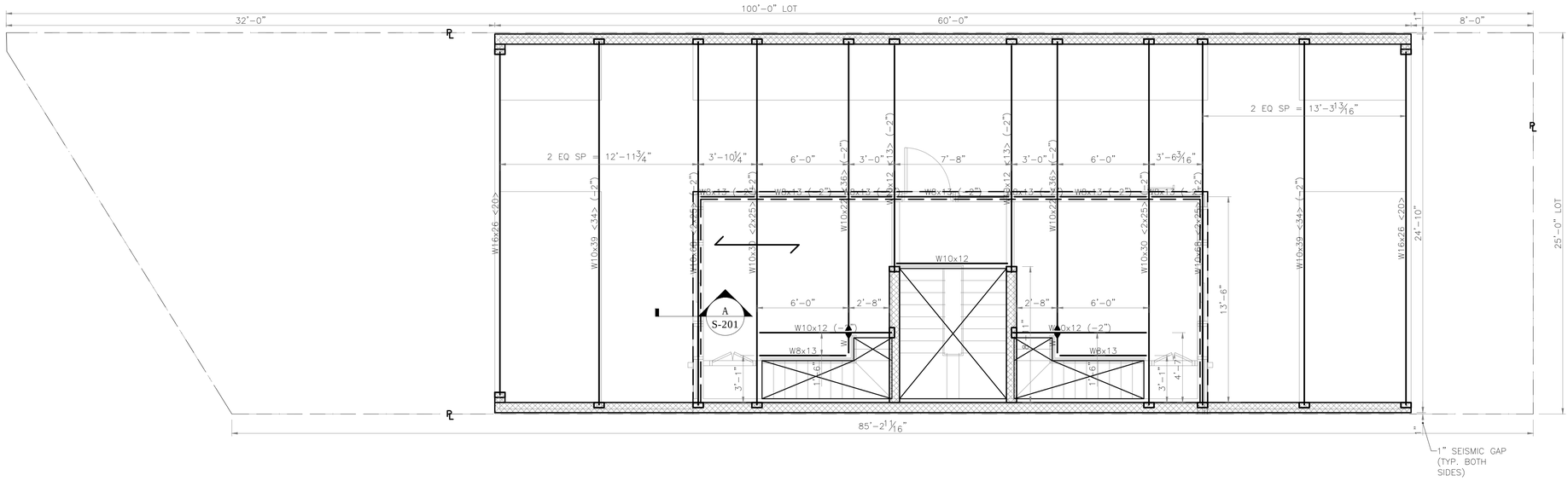
Seal:

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	S-102.00
CAD FILE No:	8 OF 10



BULKHEAD FRAMING PLAN

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



PENTHOUSE FRAMING PLAN

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

LEGEND

- PATTERN — NEW WALL BELOW
- PATTERN — NEW WALL ABOVE
- CONCRETE
- 8" CMU W/ #5@8"O.C. FULLY GROUTED
- NEW FOUNDATION
- SLAB OPENING
- W (STUDS) — NEW STEEL BEAM (IN BRACKETS: QUANTITY OF ¾" DIA., 3" LENGTH, 65KSI SHEAR STUDS)
- ELEV — BOTTOM FOUNDATION ELEVATION
- COLUMN START/END, RESPECTIVELY
- HSS — NEW STEEL POST (SECTION PROVIDED WHERE POST STARTS)
- 1.5" VULCRAFT WITH 2½" LIGHTWEIGHT CONCRETE (4" TOTAL THICKNESS), 16 GAUGE

No.	Date	Revision
2	07/14/15	Structural update
1	06/30/15	Arch. update
.	10/09/13	Preliminary

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Project

56 FROST STREET
BROOKLYN, NY 11211

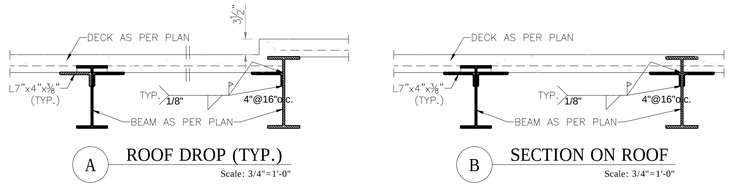
Drawing

PENTHOUSE/ROOF & BULKHEAD FRAMING PLANS

Seal:

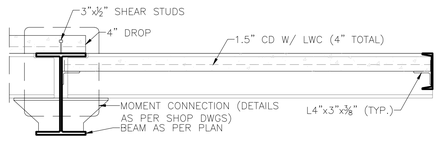
STATE OF NEW YORK — RAJESH SHARON — LICENSED PROFESSIONAL ENGINEER

DATE:	10/14/14
PROJECT No:	1309-1091
DRAWING BY:	A.P.
CHK BY:	R.S.
DWG No:	S-103.00
CAD FILE No:	9 OF 10

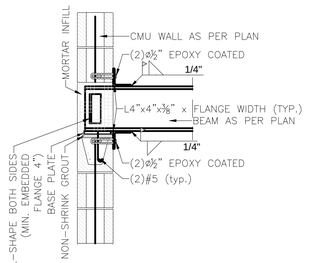


A ROOF DROP (TYP.)
Scale: 3/4"=1'-0"

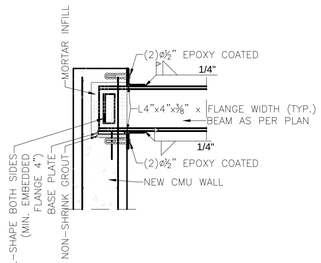
B SECTION ON ROOF
Scale: 3/4"=1'-0"



C BALCONY DROP
Scale: 3/4"=1'-0"



D POCKET IN CMU WALL (TYP.)
Scale: 3/4"=1'-0"



E POCKET IN CONCRETE WALL (TYP.)
Scale: 3/4"=1'-0"

MAXIMUM UNSHORED CLEAR SPAN ([ft-in], LIGHT WEIGHT CONCRETE, MAX 110PCF)

DECK / SLAB	1.5 VL VULCRAFT								
	22 ga.			20 ga.			18 ga.		
	SINGLE SPAN	DOUBLE SPAN	TRIPLE SPAN	SINGLE SPAN	DOUBLE SPAN	TRIPLE SPAN	SINGLE SPAN	DOUBLE SPAN	TRIPLE SPAN
3.5"	6-4	8-5	8-6	7-8	9-7	9-11	9-6	11-4	11-9
4"	6-0	8-1	8-1	7-3	9-7	9-9	8-11	11-4	11-5
4.5"	5-9	7-8	7-8	6-11	9-2	9-4	8-6	10-10	11-0
4.75"	5-7	7-7	7-7	6-9	9-0	9-1	8-3	10-7	10-9
5"	5-6	7-5	7-5	6-7	8-10	8-11	8-1	10-5	10-7
5.75"	5-2	7-0	7-0	6-2	8-4	8-5	7-7	9-10	10-0

MINIMUM ACI CD SLAB REINFORCEMENT

DECK / SLAB	ACI RECOMMENDED WELDED WIRE FABRIC		
	1.5 CD	2.0 CD	3.0 CD
3.5"	WWF 6x6-W1.4xW1.4	N/A	N/A
4"	WWF 6x6-W1.4xW1.4	WWF 6x6-W1.4xW1.4	N/A
4.5"	WWF 6x6-W1.4xW1.4	WWF 6x6-W1.4xW1.4	N/A
5"	WWF 6x6-W2.1xW2.1	WWF 6x6-W1.4xW1.4	WWF 6x6-W1.4xW1.4
5.5"	WWF 6x6-W2.1xW2.1	WWF 6x6-W2.1xW2.1	WWF 6x6-W1.4xW1.4
6"	WWF 6x6-W2.1xW2.1	WWF 6x6-W2.1xW2.1	WWF 6x6-W1.4xW1.4
6.5"	N/A	WWF 6x6-W2.1xW2.1	WWF 6x6-W2.1xW2.1
7"	N/A	N/A	WWF 6x6-W2.1xW2.1
7.5"	N/A	N/A	WWF 6x6-W2.1xW2.1

1. MINIMUM REQUIRED BEARING LENGTH (INTERIOR/EXTERIOR):
   1.a. 1.5 CD: 4"/1½"
   1.b. 2.0 CD: 4"/2"
   1.c. 3.0 CD: 5"/2½"

LOOSE LINTEL SCHEDULE

WALL THICKNESS	UNDER 4'-0" OPNG.	4'-0"+8'-0" OPNG.	8'-0"+12'-0"
8"	2Ls 4"x3"x5/16"	W8x31	W8x35
12"	3Ls 4"x3"x5/16"	W8x31 & W8x15	W8x31 & W8x31

BEAM BEARING PLATE SCHEDULE

BEAM SIZE	PLATE (TYP., U.O.N.)
W8	8"x¾"x8"
W10	8"x¾"x8"
W12	8"x1"x8"
W14	8"x1"x10"
W16	8"x1"x10"
W18	8"x1"x16"
W21	8"x1"x24"
W24	8"x1"x24"

No.	Date	Revision
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.	10/09/13	Preliminary

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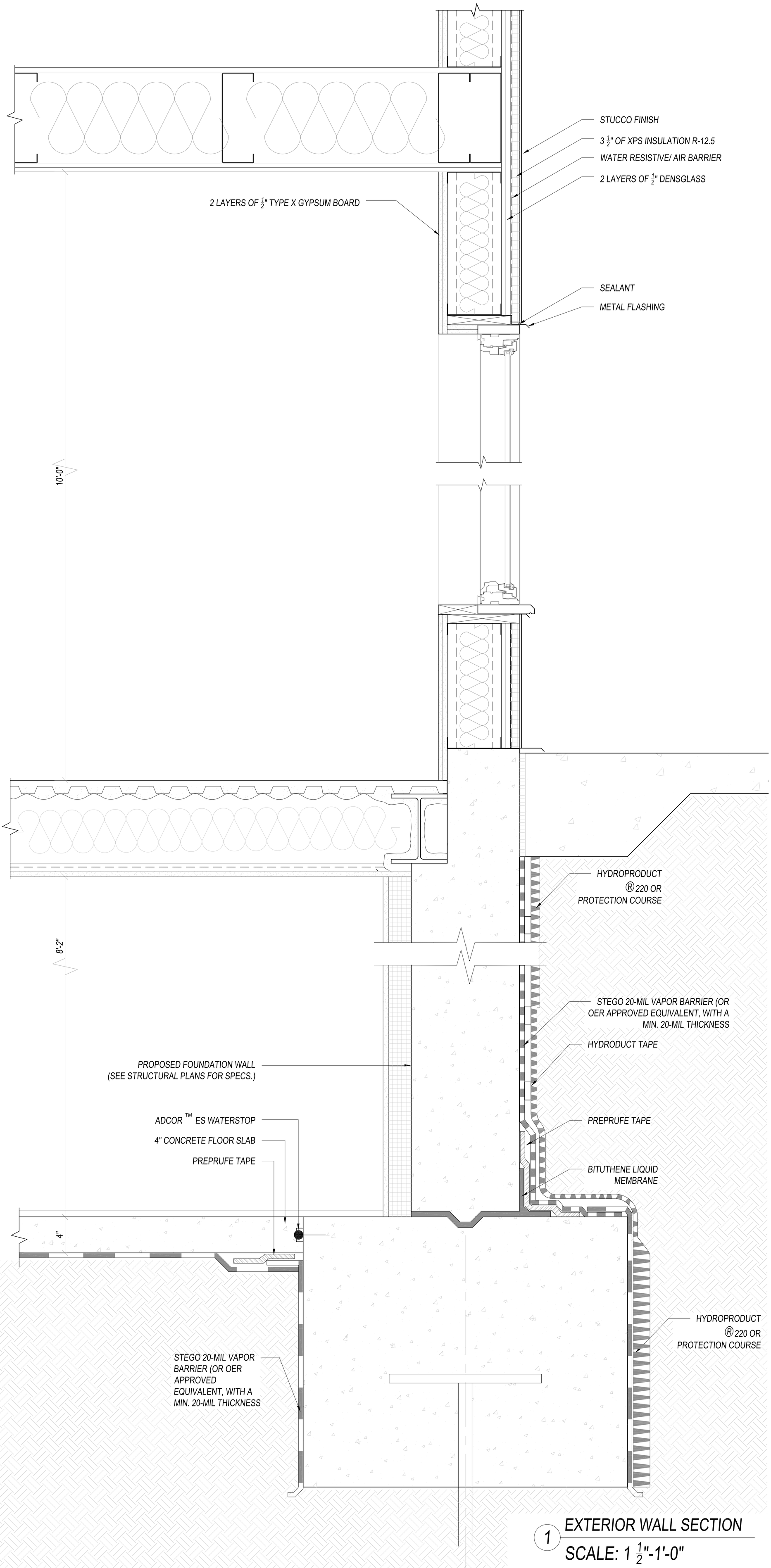
Project
56 FROST STREET
BROOKLYN, NY 11211

Drawing
DETAILS

Seal:

DATE: 10/14/14
PROJECT No: 1309-1091
DRAWING BY: A.P.
CHK BY: R.S.
DWG No:
S-201.00
CAD FILE No:
10 OF 10

Attachment B - Layout of Details of the Cover System



1 EXTERIOR WALL SECTION

SCALE: 1 1/2"-1'-0"

Attachment C – Vapor Barrier Manufacturing Specifications and RA Certified Building Plans

Stego® Wrap 20-Mil Vapor Barrier

STEGO INDUSTRIES, LLC

Vapor Retarders
07 26 00, 03 30 00

1. Product Name

Stego Wrap 20-Mil Vapor Barrier

2. Manufacturer

Stego Industries, LLC
216 Avenida Fabricante, Suite 101
San Clemente, CA 92672
Sales, Technical Assistance
Ph: (877) 464-7834
Fx: (949) 257-4113
www.stegoindustries.com

3. Product Description

USES: Stego Wrap 20-Mil Vapor Barrier is used as a below-slab vapor barrier, and as a protection course for below grade waterproofing applications.
COMPOSITION: Stego Wrap 20-Mil Vapor Barrier is a multi-layer plastic extrusion manufactured with only the highest grade of prime, virgin, polyolefin resins.
ENVIRONMENTAL FACTORS:
Stego Wrap 20-Mil Vapor Barrier can be used in systems for the control of soil gases (radon, methane), soil poisons (oil by-products) and sulfates.

5. Installation

UNDER SLAB: Unroll Stego Wrap 20-Mil Vapor Barrier over an aggregate, sand or tamped earth base. Overlap all seams a minimum of six inches and tape using Stego Tape or Crete Claw® Tape. All penetrations must be sealed using a combination of Stego Wrap and Stego accessories.

For additional information, please refer to Stego's complete installation instructions.

6. Availability & Cost

Stego Wrap 20-Mil Vapor Barrier is available nationally via building supply distributors. For current cost information, contact your local Stego Wrap dis-tributor or Stego Industries' sales department.

7. Warranty

Stego Industries, LLC believes to the best of its knowledge, that specifications and recommendations herein are accurate and reliable. However, since site conditions are not within its control, Stego Industries does not guarantee results from the use of the information provided and disclaims all liability from any loss or damage. No warranty, express or implied, is given as to the merchantability, fitness for a particular purpose, or otherwise with respect to the products referred to.

8. Maintenance

None required.

9. Technical Services

Technical advice, custom CAD drawings, and additional information can be obtained by contacting Stego Industries' technical assistance department or via the website.

4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGO WRAP 20-MIL VAPOR BARRIER

PROPERTY	TEST	RESULTS
Under Slab Vapor Retarders	ASTM E 1745 Class A, B & C – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs	Exceeds Class A, B & C
Water Vapor Permeance	ASTM F 1249 – Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor	0.0071 perms
Puncture Resistance	ASTM D 1709 – Test Methods for Impact Resistance of Plastic Film by Free-Falling Dart Method	3500+ grams*
Tensile Strength	ASTM D 882 – Test Method for Tensile Properties of Thin Plastic Sheeting	97.7 lbf/in.
Permeance After Conditioning (ASTM E 1745 Sections 7.1.2 - 7.1.5)	ASTM E 154 Section 8, F 1249 – Permeance after wetting, drying, and soaking ASTM E 154 Section 11, F 1249 – Permeance after heat conditioning ASTM E 154 Section 12, F 1249 – Permeance after low temperature conditioning ASTM E 154 Section 13, F 1249 – Permeance after soil organism exposure	0.0088 perms 0.0081 perms 0.0084 perms 0.0077 perms
Thickness	ACI 302.1R-04 – Minimum Thickness (10 mils)	20 mils
Roll Dimensions		14 ft. wide x 105 ft. long or 1,470 ft^2
Roll Weight		140 lbs.

Note: perm unit = grains/(ft^2 *hr* in.Hg)

* The material maxed out the testing equipment and did not fail at 3746 grams.

PROPOSED 4 STORY AND PENTHOUSE, 8 FAMILY RESIDENTIAL BUILDING AT 56 FROST ST, BROOKLYN, NY 11211

DRAWING INDEX

ARCHITECTURAL DRAWINGS

1	T-000.00	Cover Sheet, Drawing Index, Project Index
2	Z-000.00	Zoning Analysis, Plot Plan,
3	Z-001.00	Zoning Analysis Cont. Legend, Ht., Stbck Diagrams
4	Z-002.00	Floor Area Diagram
5	G-001.00	General Notes
6	G-002.00	Building Code Notes
7	G-003.00	Building Code Tables 503,601,602
8	A-100.00	Proposed Cellar & First Floor Plans
9	A-101.00	Proposed Second, Third & Fourth Floor Plans
10	A-102.00	Proposed Penthouse / Roof & Bulkhead Floor Plans
11	A-103.00	Proposed Reflected Ceiling Plans
12	A-200.00	Proposed Front & Rear Elevation
13	A-201.00	Proposed Side Elevation
14	A-300.00	Longitudinal Section
15	A-400.00	Wall Details
16	A-500.00	Wall Details, Stair Details, Tree Planting Details
17	A-501.00	ADA Compliance Drawing & Notes
18	A-600.00	Window,Door Schedule & Energy Compliance
19	EN-001.00	Energy Compliance
20	EN-002.00	Energy Compliance

PLUMBING DRAWINGS

21	P-700	Plumbing & Gas Riser Diagrams

PROJECT INDEX

ARCHITECTURAL TEAM

Architect
DE-JAN LU, RA
DJLU Architect
1 Beekman Street, [illegible]
New York, NY 100[illegible]
646.820.3558

REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

Design Consultants
J FRANKL ASSOCIATES
110 Broadway
Brooklyn, NY 11211
718.569.2200

OWNER
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

GENERAL CONTRACTOR

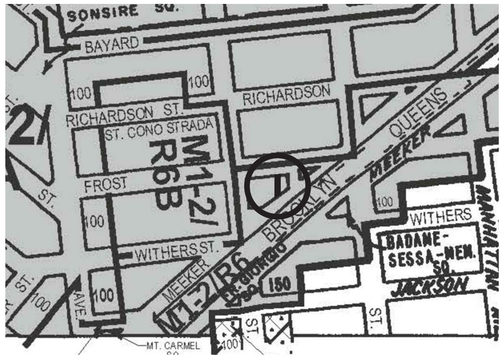
STRUCTURAL ENGINEER

MECHANICAL ENGINEER
JERRY PITERA P.E.JW FIRE SPRINKLER DESIGN
5 Mezbish Place Unit 201
Monroe, NY 10950
845.234.4599

T-000.00

01 OF 21

DOB BSCAN CODE



ZONING ANALYSIS

PROPERTY DATA
ADDRESS: 56 FROST STREET
TAX BLOCK: 2737
TAX LOT: 10
ZONING MAP NO.: 13a
ZONE: M1-2 / R6 / SPECIAL MX-8 MIXED USE DISTRICT
INCLUSIONARY HOUSING DESIGNATED AREA

SCOPE OF WORK
PROPOSED 4 STORY AND PENTHOUSE 8 FAMILY RESIDENTIAL BUILDING.

STRUCTURAL OCCUPANCY CATEGORY: II
SEISMIC DESIGN CATEGORY: B
OCCUPANCY CLASSIFICATION: R-2
CONSTRUCTION CLASSIFICATION: II-A (2008 CODE)
MULTIPLE DWELLING CLASSIFICATION: HAEA

ZR 123-10 GENERAL PROVISIONS
THE PROVISIONS OF THIS CHAPTER SHALL APPLY WITHIN THE SPECIAL MIXED USE DISTRICT. THE REGULATIONS OF ALL OTHER CHAPTERS OF THIS RESOLUTION ARE APPLICABLE, EXCEPT AS SUPERSEDED, SUPPLEMENTED OR MODIFIED BY THE PROVISIONS OF THIS CHAPTER. IN THE EVENT OF A CONFLICT BETWEEN THE PROVISIONS OF THIS CHAPTER AND OTHER REGULATIONS OF THIS RESOLUTION, THE PROVISIONS OF THIS CHAPTER SHALL CONTROL.

ZR 123-20 SPECIAL USE REGULATIONS
IN SPECIAL MIXED USE DISTRICTS, ALL USES PERMITTED IN THE DESIGNATED RESIDENCE DISTRICT AND ALL USES PERMITTED IN THE DESIGNATED M1 DISTRICT, AS SET FORTH IN ANY OTHER PROVISION OF THIS RESOLUTION OTHER THAN SPECIAL PURPOSE DISTRICTS, SHALL BE PERMITTED, EXCEPT AS SUPERSEDED, MODIFIED OR SUPPLEMENTED BY THIS SECTION

ZR 123-32
ENVIRONMENTAL CONDITIONS
IN SPECIAL MIXED USE DISTRICTS, ALL NEW DWELLING UNITS SHALL BE PROVIDED WITH A MINIMUM 35DB(A) OF WINDOW WALL ATTENUATION TO MAINTAIN AN INTERIOR NOISE LEVEL OF 45DB(A) OR LESS, WITH WINDOWS CLOSED, AND SHALL PROVIDE AN ALTERNATE MEANS OF VENTILATION.

USE REGULATION: ZR 123-20 / 22-12
PERMITTED USE GROUP : 2
PROPOSED USE GROUP 2A

LOT AREA: 2,324.55 SF - SEE ARCHITECTURAL SURVEY

SPECIAL BULK REGULATIONS
ZR 123-61 GENERAL PROVISIONS
ALL BUILDINGS ON ZONING LOTS WITHIN THE SPECIAL MIXED USE DISTRICT SHALL COMPLY WITH THE BULK REGULATIONS OF THIS CHAPTER. IN SPECIAL MIXED USE DISTRICTS, THE BULK REGULATIONS SET FORTH IN ARTICLE II, CHAPTER 3, SHALL APPLY TO ALL RESIDENTIAL USES IN A BUILDING OR OTHER STRUCTURE, EXCEPT AS SET FORTH IN SECTIONS 123-60 THROUGH 123-66, INCLUSIVE.

ZR 123-63
MAXIMUM FLOOR AREA RATIO AND LOT COVERAGE REQUIREMENTS FOR ZONING LOTS CONTAINING ONLY RESIDENTIAL BUILDINGS IN R6 DISTRICT
WHERE THE DESIGNATED RESIDENCE DISTRICT IS AN R6 DISTRICT, THE MINIMUM REQUIRED OPEN SPACE RATIO AND MAXIMUM FLOOR AREA RATIO PROVISIONS OF SECTIONS 23-142, 23-143 AND PARAGRAPH (A) OF SECTION 23-147 SHALL NOT APPLY. IN LIEU THEREOF, ALL RESIDENTIAL BUILDINGS, REGARDLESS OF WHETHER THEY ARE REQUIRED TO BE DEVELOPED OR ENLARGED PURSUANT TO THE QUALITY HOUSING PROGRAM, SHALL COMPLY WITH THE MAXIMUM FLOOR AREA RATIO AND LOT COVERAGE REQUIREMENTS SET FORTH FOR THE DESIGNATED DISTRICT IN SECTION 23-145, HOWEVER, IN INCLUSIONARY HOUSING DESIGNATED AREAS, AS LISTED IN THE TABLE IN THIS SECTION, THE MAXIMUM PERMITTED FLOOR AREA RATIO SHALL BE AS SET FORTH IN SECTION 23-952.

ZR 123-63 / ZR 23-952 MAX. RESIDENTIAL F.A.R.: 2.7 (WIDE STREET)
2.7 x 2,324.55 =6,276.29 SF MAX. PERMITTED F.A.

PROPOSED RESIDENTIAL 'GROSS' F.A.:

CELLAR	1,500.00 SF (NOT DEFINED AS F.A. AS PER ZR 12-10)
FIRST FL.	1,500.00 SF
SECOND FL.	1,500.00 SF
THIRD FL.	1,500.00 SF
FOURTH FL.	1,500.00 SF
PENTHOUSE FL.	374.30 SF
TOTAL PRO. 'GROSS' F.A. = 6,374.30 SF	

(SEE DIAGRAMS ON SHEET Z-002)

TOTAL PROPOSED FLOOR AREA = 6,374.30 SF
TOTAL F.A. DEDUCTIONS: 175.07 SF
6,388.89 SF - 175.07 SF = 6,199.23 SF
(SEE DIAGRAMS ON SHEET Z-002)

TOTAL 'NET' F.A. = 6,199.23 SF
6,199.23 SF / 2,324.55 (LOT AREA) =**2.67 F.A.R.** (OK)

LOT COVERAGE
(ZR 23-145) MAX. L.C.: 65%
PROPOSED L.C.
1,500 / 2,324.55 (LOT AREA) = 64.5% (OK)

(ZR 23-132) BALCONIES IN R6 THROUGH R10 DISTRICTS
IN THE DISTRICTS INDICATED, BALCONIES MAY PROJECT INTO OR OVER ANY REQUIRED OPEN AREA WITHIN A PUBLICLY ACCESSIBLE OPEN AREA, A REAR YARD, AN INITIAL SETBACK DISTANCE, ANY OPEN AREAS NOT OCCUPIED BY TOWERS, ANY REQUIRED SIDE OR REAR SETBACKS, OR ANY REQUIRED OPEN SPACE, PROVIDED THAT SUCH BALCONY SHALL:
(A) NOT PROJECT BY A DISTANCE GREATER THAN SEVEN FEET AS MEASURED FROM THE PLANE SURFACE OF THE BUILDING WALL FROM WHICH IT PROJECTS;
(B) NOT PROJECT INTO THE MINIMUM REQUIRED DISTANCE BETWEEN BUILDINGS ON THE SAME ZONING LOT;
(C) NOT COVER MORE THAN TEN PERCENT OF THE AREA DESIGNATED AS OUTDOOR RECREATION SPACE PURSUANT TO SECTION 28-30
(D) BE UNENCLOSED EXCEPT FOR A PARAPET NOT EXCEEDING 3 FEET, 8 INCHES IN HEIGHT OR A RAILING NOT LESS THAN 50 PERCENT OPEN AND NOT EXCEEDING 4 FEET, 6 INCHES IN HEIGHT.
(E) BE LOCATED AT OR HIGHER THAN THE FLOOR LEVEL OF THE THIRD STORY OF A BUILDING OR AT LEAST 20 FEET ABOVE CURB LEVEL
(F) HAVE AN AGGREGATE WIDTH, AT THE LEVEL OF ANY STORY, NOT EXCEEDING 50 PERCENT OF THE WIDTH AT THAT LEVEL OF THE PLANE SURFACE OF THE BUILDING WALL FROM WHICH IT PROJECTS.
PROPOSED BALCONIES AT third & fourth FLOORS ARE IN COMPLIANCE WITH SECTION NOTED ABOVE:
25'-0" X 50% = 12'-6" PERMITTED
TOTAL AGGREGATE WIDTH OF ALL BALCONIES = 12'-6" = 12'-6" (OK)

DENSITY
(ZR 23-22) DENSITY FACTOR: 2,199.23 X 2.7 / 680 = 9 D.U. PERMITTED.
PROPOSED : 8 D.U. (OK).

YARDS : ZR 123-651
SPECIAL YARD REGULATIONS FOR RESIDENTIAL BUILDINGS
NO FRONT YARDS OR SIDE YARDS ARE REQUIRED IN SPECIAL MIXED USE DISTRICTS. HOWEVER, FOR RESIDENTIAL BUILDINGS OTHER THAN SINGLE OR TWO-FAMILY RESIDENCES, IF ANY OPEN AREA EXTENDING ALONG A SIDE LOT LINE IS PROVIDED AT ANY LEVEL, SUCH OPEN AREA SHALL HAVE A MINIMUM WIDTH OF EIGHT FEET.

1 FRONT YARD OF FROST ST 8'-0", 2ND ON MEEKER AVE 24'-8"

NO SIDE YARD PROPOSED

23-531 EXCEPTED THROUGH LOTS R1 - R10
(A) IN ALL DISTRICTS, AS INDICATED, NO REAR YARD REGULATIONS SHALL APPLY TO ANY THROUGH LOTS THAT EXTEND LESS THAN 110 FEET IN MAXIMUM DEPTH FROM STREET TO STREET.

ZR 123-66 HEIGHT AND SETBACK REGULATIONS
THE HEIGHT OF ALL BUILDINGS OR OTHER STRUCTURES IN SPECIAL MIXED USE DISTRICTS SHALL BE MEASURED FROM THE BASE PLANE.

BASE PLANE CALCULATION
BASE PLANE EL.: (12.28' + 12.32') / 2 = 12.30'
ZR 123-662 ALL BUILDINGS IN SPECIAL MIXED USE DISTRICTS WITH R6 DISTRICT DESIGNATIONS
IN SPECIAL MIXED USE DISTRICTS WHERE THE DESIGNATED RESIDENCE DISTRICT IS AN R6 DISTRICT, THE HEIGHT AND SETBACK REGULATIONS OF SECTIONS 23-60 AND 43-40 SHALL NOT APPLY. IN LIEU THEREOF, ALL BUILDINGS SHALL COMPLY WITH THE HEIGHT AND SETBACK REGULATIONS OF THIS SECTION.

(A) MEDIUM AND HIGH DENSITY NON-CONTEXTUAL DISTRICTS
(1)IN SPECIAL MIXED USE DISTRICTS WHERE THE DESIGNATED RESIDENCE DISTRICT IS AN R6, R7, R8, R9 OR R10 DISTRICT, THE HEIGHT OF A BUILDING OR OTHER STRUCTURE,OR PORTION THEREOF, LOCATED WITHIN 10 FEET OF A WIDE STREET OR 15 FEET OF A NARROW STREET,MAY NOT EXCEED THE MAXIMUM BASE HEIGHT SPECIFIED IN TABLE A OF THIS SECTION,BEYOND 10 FEET OF A WIDE STREET AND 15 FEET OF A NARROW STREET, THE HEIGHT OF A BUILDING OR OTHER STRUCTURE SHALL NOT EXCEED THE MAXIMUM BUILDING HEIGHT SPECIFIED IN TABLE A.

MAXIMUM BASE HEIGHT: 60'
MAXIMUM BUILDING HEIGHT: 110'-0"
REQUIRED SETBACK ABOVE MAX BASE HEIGHT: 10' - WIDE STREET
15' - NARROW STREET

PROPOSED BASE HEIGHT = 49'-2" (OK)
PROPOSED BUILDING HEIGHT = 60'-0" (OK)
PROPOSED SETBACK = 8'-0" (OK)

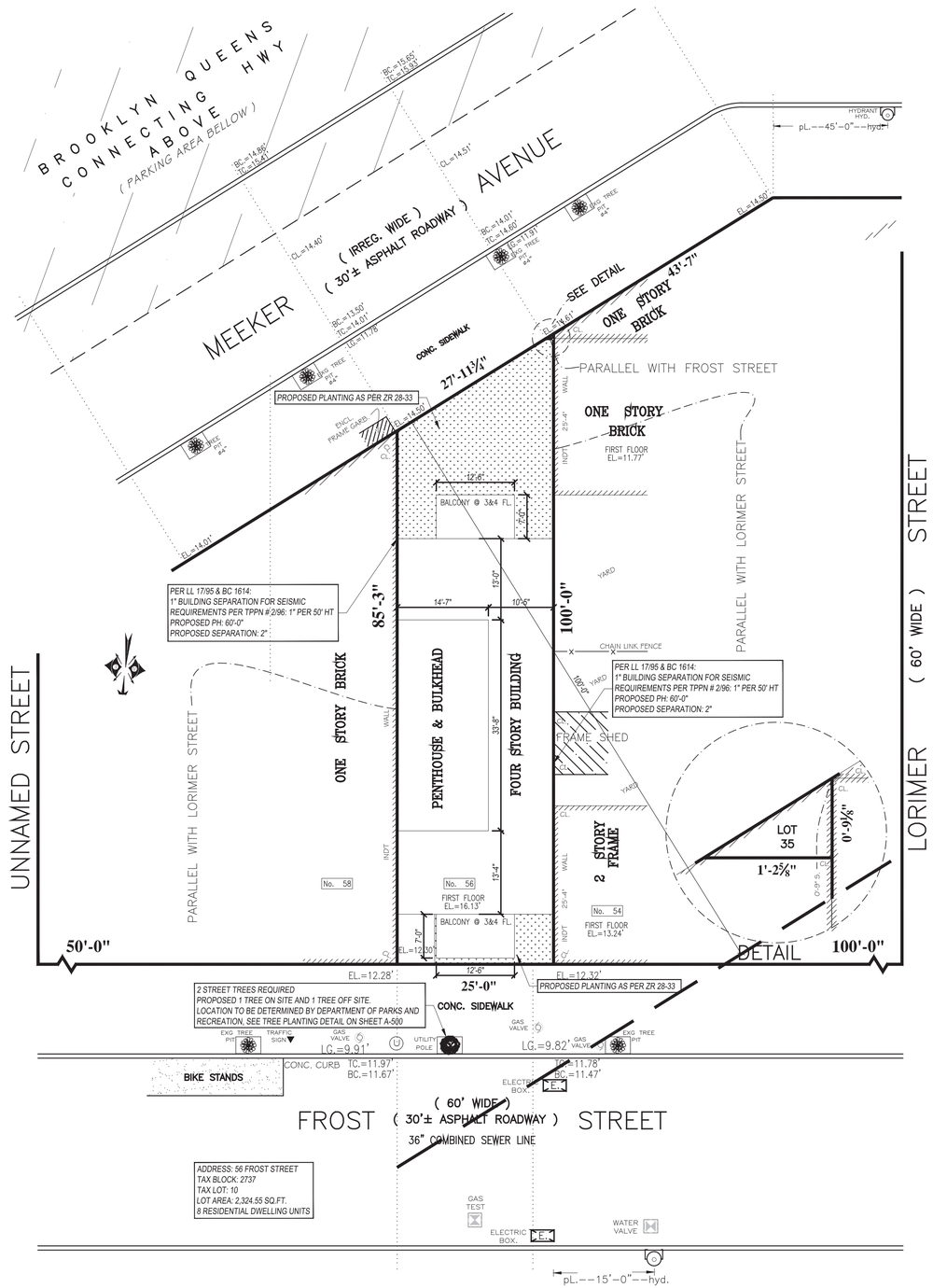
PLANTING
(ZR 23-03) REQ'D ONE TREE FOR EVERY 25'-0" OF STREET FRONTAGE OF THE ZONING LOT.
LOT FRONTAGE: (25'-0" + 27'-11 3/4") = 52'-11 3/4" / 25' = 2 TREE REQUIRED.
PROPOSED 1 TREE ON SITE AND 1 TREE OFF SITE. (OK)

QUALITY HOUSING REGULATIONS
(ZR 28-01, ZR 28-11) PROPOSED BUILDING IS DESIGNED WITH THE BULK REGULATIONS OF QUALITY HOUSING PROGRAM IN ARTICLE 2 CHAPTER 3 AND SHALL COMPLY WITH THE QUALITY HOUSING REGULATIONS OF ARTICLE 2 CHAPTER 8.

(ZR28-21) MIN. UNIT SIZE REQUIRED =400 S.F. PER D.U.
PROPOSED MIN. UNIT SIZE: 429.96 S.F. ON FIRST FLOOR UNIT 1A > 400 S.F. (OK.

(ZR28-22) ALL WINDOWS SHALL BE DOUBLE GLAZED. SEE WINDOW SCHEDULE ON SHEET A-600.

ZONING ANALYSIS CONTINUED ON SHEET Z-001-00



1 PLOT PLAN
SCALE: 3/32"=1'-0"

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ZONING ANALYSIS

DOB JOB #	320878074
BIN #	3338066
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DRAWN BY	ME
SCALE	AS NOTED

Z-000.00
02 OF 21
DOB BSCAN STICKER

PLUMBING | ELECTRICAL | MECHANICAL | STRUCTURAL | ARCHITECTURAL

(ZR28-23) REQUIRED REFUSE STORAGE FOR BLD'G WITH 9 D.U. OR MORE.
PROPOSED 8 D.U. : NOT REQUIRED (OK)

((ZR 28-25) DAYLIGHT IN CORRIDORS
50% OF THE SQUARE FOOTAGE OF A CORRIDOR MAY BE EXCLUDED FROM THE DEFINITION OF FLOOR AREA IF A WINDOW WITH A CLEAR, NON-TINTED, GLAZED AREA OF AT LEAST 20 SQUARE FEET IS PROVIDED IN SUCH CORRIDOR,
(SEE DEDUCTION DIAGRAM ON SHEET Z-002)

(ZR28-31) 3.3% OF THE TOTAL AMOUNT OF RESIDENTIAL F.A. IS REQUIRED FOR RECREATIONAL SPACE FOR BLD'G WITH 9 D.U. OR MORE.
PROPOSED TOTAL 8 D.U. NOT REQUIRED (OK)

(ZR 28-33) THE AREA OF THE ZONING LOT BETWEEN THE STREET LINE AND THE STREET WALL SHALL BE PLANTED AT GROUND LEVEL. (OK)

(ZR 28-41) DENSITY PER CORRIDOR
50% OF CORRIDORS MAY BE DEDUCTED FROM F.A. WHEN CORRIDOR HAS LESS THEN 11 D.U. PER FLOOR IN R-6 ZONES.
(SEE DEDUCTION DIAGRAM ON SHEET Z-002).

(ZR 28-53) LOCATION OF ACCESSORY PARKING
ON-SITE ACCESSORY OFF-STREET PARKING SHALL NOT BE PERMITTED BETWEEN THE STREET LINE AND THE STREET WALL OF A BUILDING OR ITS PROLONGATION.

SPECIAL INSPECTION ITEMS

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

- STRUCTURAL STEEL - WELDING	BC 1704.3.1
- STRUCTURAL STEEL - ERECTION & BOLTING	BC 1704.3.2
	BC 1704.3.3
- CONCRETE CAST IN PLACE	BC 1704.4
- MASONRY	BC 1704.5
- SOILS - SITE PREPARATION	BC 1704.7.1
- SOILS - INVESTIGATIONS (BORINGS/TEST PITS)	BC 1704.7.4
- UNDERPINNING	BC 1704.9.1
- MECHANICAL SYSTEMS	BC 1704.15
- STRUCTURAL SAFETY- STRUCTURAL STABILITY	BC 1704.19
- EXCAVATION- SHEETING, SHORING AND BRACING	BC 1704.19 BC 3304.4.1
- SITE STORM DRAINAGE DISPOSAL AND DETENTION SYSTEM INSTALLATION	BC 1704.20
- SPRINKLER SYSTEMS	BC 1704.21
- HEATING SYSTEMS	BC 1704.23
- FIRESTOP, DRAFTSTOP, AND FIREBLOCK SYSTEMS	BC 1704.25
- CONCRETE TEST CYLINDERS	BC 1905.6
- CONCRETE DESIGN MIX	BC 1905.3
- FOOTING AND FOUNDATION	BC 109.3.1
- FRAME INSPECTION	BC 109.3.3
- ENERGY CODE COMPLIANCE INSPECTION	BC 109.3.5
- FIRE-RESISTANCE RATED CONSTRUCTION	BC 109.3.4

FIRE STOPPING NOTES:

BATHROOM OR KITCHEN PARTITIONS, CHASE SPACES CONTAINING PIPES OR DUCTS TO FILLED WITH MINERAL WOOL OR NON COMBUSTIBLE MATERIAL (ROCKWOOL) FULL HEIGHTS AND ALL VOIDS BETWEEN FLOORS.

DOCUMENTS TO BE FILED SUBSEQUENTLY UNDER THIS APPLICATION

- STRUCTURAL, FOUNDATION / EXCAVATION PLAN
- SPRINKLER PLAN

SEPARATE APPLICATIONS TO BE FILED

- FIRE ALARM
- SD 1 & 2
- BPP (321007744)
- DEMO (320967879)

DRAWING LEGEND AND ABBREVIATIONS

AD	AREA DRAIN
AL	ALUMINUM
EX	EXISTING
FAI	FRESH AIR INTAKE
FD	FLOOR DRAIN
FPSC	FIRE PROOF SELF-CLOSING
GL	GLASS
HM	HOLLOW METAL
MC	MEDICINE CABINET
MIN	MINIMUM
MTL	METAL
MV	MECHANICAL VENTILATION MIN 50 CFM IN TOILETS, BATHS MIN 75 CFM IN LAUNDRY AREA
PK	PASSOVER KITCHEN
PROV	PROVIDED
RD	ROOF DRAIN
TYP	TYPICAL
WD	WOOD
ZD	ZIP DRAIN

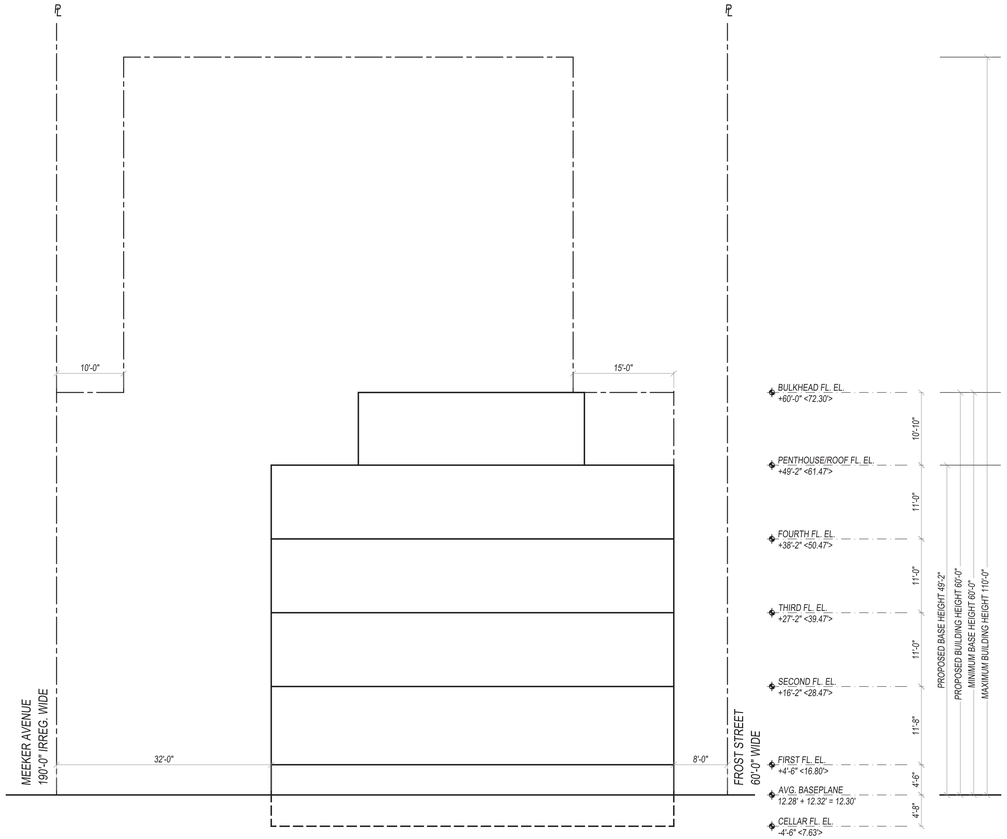
MV (see abbreviations)

SD/CM — HARDWIRED SMOKE DETECTOR/ CARBON MONOXIDE DETECTOR

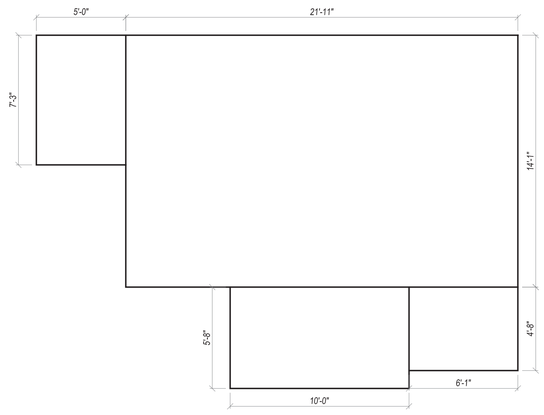
EXIT — EXIT SIGN SHOWING EGRESS DIRECTION

EXIT SIGN (ILLUM.)

X / XX.XX — DETAIL OR REFERENCE SHEET #



1 BUILDING HEIGHT AND SETBACK
SCALE: 3/32"=1'-0"



1 MINIMUM SIZE APT
SCALE: 1/4"=1'-0"

MINIMUM UNIT SIZE
UNIT A ON FIRST FLOOR

A	5'-0" x 7'-3"	36.25 SF
B	21'-11" x 14'-1"	308.66 SF
C	6'-1" x 4'-8"	28.39 SF
D	5'-8" x 10'-0"	56.66 SF
TOTAL		429.96 SF

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ARCHITECTURAL

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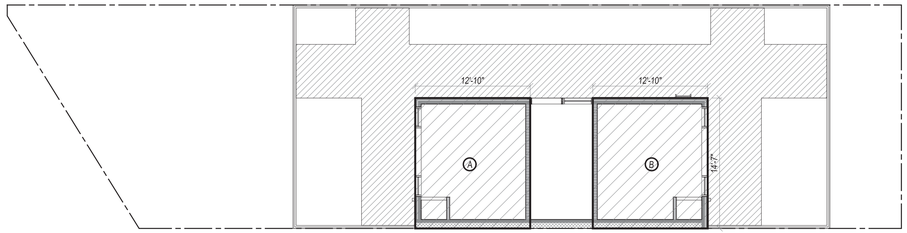
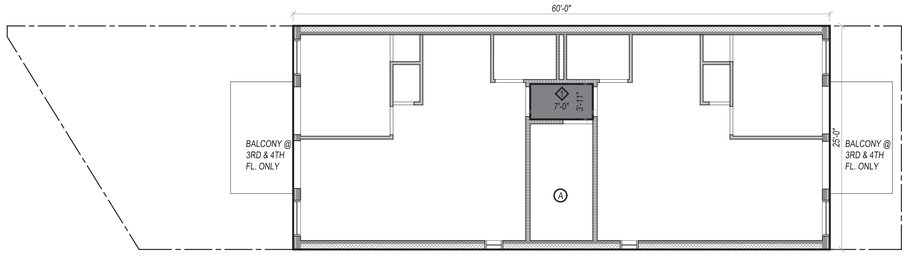
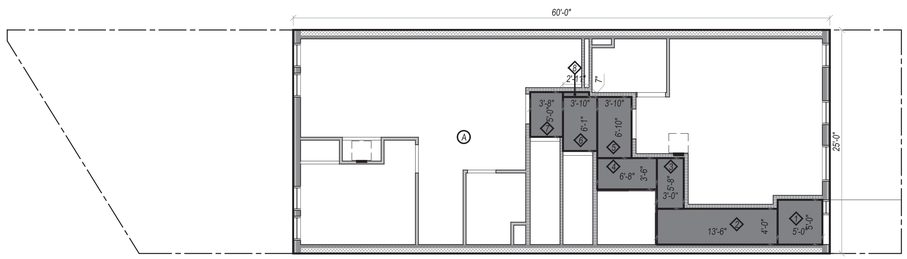


3 PROPOSED PENTHOUSE /ROOF PLAN
SCALE: 1/8"=1'-0"



2 PROPOSED TYP. SECOND - FOURTH FLOOR PLAN
SCALE: 1/8"=1'-0"



1 PROPOSED FIRST FLOOR PLAN
SCALE: 1/8"=1'-0"

FROST STREET
60'-0" WIDE

THE PREMISES IS CURRENTLY LOCATED IN A ZONE X PER EFFECTIVE FIRM. THE APPLICANT HAS BEEN ADVISED BY THE DOB AND ACKNOWLEDGES THAT THE PREMISES IS LOCATED IN A ZONE X PER FEMA ADVISORY FLOOD MAPS RELEASED IN 2013.

GROSS FLOOR AREA
PROPOSED PENTHOUSE FLOOR

A	12'-10" X 14'-7"	187.15 SF
B	12'-10" X 14'-7"	187.15 SF
TOTAL		374.30 SF

GROSS FLOOR AREA
PROPOSED SECOND - FOURTH FLOOR

A	60'-0" X 25'-0"	1,500 SF
TOTAL		1,500 SF

FLOOR AREA DEDUCTIONS
PROPOSED SECOND - FOURTH FLOOR

1	7'-0" x 3'-11" x 50%	13.71 SF	CORRIDOR
TOTAL		13.71 SF	

GROSS FLOOR AREA
PROPOSED FIRST FLOOR

A	60'-0" X 25'-0"	1,500 SF
TOTAL		1,500 SF

FLOOR AREA DEDUCTIONS
PROPOSED FIRST FLOOR

1	5'-0" x 5'-0"	25 SF	CORRIDOR
2	13'-6" x 4'-0"	54 SF	CORRIDOR
3	3'-0" x 5'-8"	17 SF	CORRIDOR
4	6'-8" x 3'-6"	23.33 SF	CORRIDOR
5	3'-10" x 6'-10"	26.19 SF	CORRIDOR
6	3'-10" x 6'-1"	23.32 SF	CORRIDOR
7	3'-8" x 5'-0"	18.33 SF	CORRIDOR
8	2'-11" x 7"	1.70 SF	CORRIDOR
TOTAL		188.87 SF	

AREA CALCULATION FOR CORRIDOR DAYLIGHT DEDUCTION PER 28-25:
79 X 50% = 39.5 SF
AREA CALCULATION FOR CORRIDOR DENSITY DEDUCTION PER ZR 28-41:
188.87 x 50% = 94.44 SF
TOTAL CORRIDOR DEDUCTIONS: 94.44 + 39.5 = 133.94 SF

OVERALL CALCULATIONS

LEVEL	GROSS F.A.		DEDUCTIONS	NET F.A.
	EXISTING	PROPOSED		
1ST FL.		1,500 SF	133.94 SF	1,366.06 SF
2ND FL.		1,500 SF	13.71 SF	1,486.29 SF
3RD FL.		1,500 SF	13.71 SF	1,486.29 SF
4TH FL.		1,500 SF	13.71 SF	1,486.29 SF
PENT FL.		374.30 SF		374.30 SF
TOTAL		6,374.30 SF	175.07 SF	6,199.23 SF

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034322
STATE OF NEW YORK

PLUMBING
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DOB JOB #	
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04 OF 21

DOB BSCAN STICKER

GENERAL NOTES

1. THESE NOTES ARE PART OF THE PLANS AND SPECIFICATIONS AND ARE TO BE COMPLIED WITH IN ALL RESPECTS. MORE RESTRICTIVE NOTES MENTIONED ELSEWHERE ARE TO TAKE PRECEDENCE OVER THE FOLLOWING.

2. THE CONTRACTOR SHALL DIRECT AND SUPERVISE THE WORK. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, PROCEDURES, AND SHALL COORDINATE THE WORK.

3. THE CONTRACTOR SHALL BE HELD TO HAVE VISITED THE SITE SO THAT HE MAY DETERMINE THE DIFFICULTIES HE MAY ENCOUNTER DURING CONSTRUCTION.

4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS IN THE FIELD PRIOR TO COMMENCING WORK, AND SHALL IMMEDIATELY REPORT ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS TO THE ARCHITECT.

5. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FILE ALL REQUIRED CERTIFICATES OF INSURANCE WITH THE DEPARTMENT OF BUILDINGS, OBTAIN ALL REQUIRED PERMITS AND PAY ALL FEES REQUIRED BY GOVERNING NEW YORK CITY AGENCIES.

6. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NEW YORK CITY BUILDING CODE, FIRE DEPARTMENT REGULATIONS, DEPARTMENT OF HIGHWAYS, UTILITY COMPANY AND THE BEST TRADE PRACTICES.

7. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR PROPER CONSTRUCTION OF ANY PART OF THE WORK SHALL BE INCLUDED AS THEY WERE INDICATED IN THE DRAWINGS.

8. THE CONTRACTOR SHALL COORDINATE ALL WORK PROCEDURES WITH REQUIREMENTS OF LOCAL AUTHORITIES AND BUILDING MANAGEMENT.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL CONDITIONS AND MATERIALS WITHIN THE PROPOSED CONSTRUCTION AREA. THE CONTRACTOR SHALL DESIGN AND INSTALL ADEQUATE SHORING AND BRACING FOR ALL STRUCTURAL OR REMOVAL TRADES. THE CONTRACTOR SHALL HAVE SOLE RESPONSIBILITY FOR ANY DAMAGE OR INJURIES CAUSED BY OR DURING THE EXECUTION OF THE WORK.

10. THE CONTRACTOR SHALL LAY OUT HIS OWN WORK, AND SHALL PROVIDE ALL DIMENSIONS REQUIRED FOR OTHER TRADES (PLUMBING, ELECTRICAL, ETC.).

11. PLUMBING AND ELECTRICAL WORK SHALL BE PERFORMED BY PERSONS LICENSED IN THEIR TRADES, HWO SHALL ARRANGE FOR AND OBTAIN INSPECTIONS AND REQUIRED SIGN-OFFS.

12. THE CONTRACTOR SHALL DO ALL CUTTING, PATCHING, REPAIRING AS REQUIRED TO PERFORM ALL OF THE WORK INDICATED ON THE DRAWINGS, AND ALL OTHER WORK THAT MAY BE REQUIRED TO COMPLETE THE JOB.

13. ALL PIPING AND WIRING SHALL BE REMOVED TO A POINT OF CONNECTION AND SHALL BE PROPERLY CAPPED OR PLUGGED.

14. THE CONTRACTOR, UPON COMPLETION OF THE WORK, SHALL ARRANGE FOR DEPARTMENT OF BUILDINGS INSPECTIONS AND SIGN-OFFS REQUIRED TO COMPLETE THE JOB AND PROVIDE ALL CONTROLLED INSPECTIONS AS REQUIRED BY THE BUILDING DEPARTMENT FOR THIS PROJECT.

15. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING LAYOUT, PROFILES, METHODS OF JOINING AND ANCHORAGE DETAILS, INCLUDING MAJOR FINISHING AND TRIM UNITS. PROVIDE LAYOUTS AT 1/4" SCALE AND DETAILS AT 3" SCALE.

16. DIMENSIONS GOVERN - DRAWINGS ARE NOT TO BE SCALED.

GENERAL SAFETY PLAN NOTES

1. CONTRACTOR TO KEEP NOISE FACTOR TO A MINIMUM.

2. CONTRACTOR NOT TO BLOCK OR SEAL ANY MEANS OF EGRESS FROM OR TO BUILDING.

3. CONTRACTOR TO MAINTAIN SAFETY FACTOR FOR FLOOR LOADS & NOT TO OVERLOAD.

4. CONTRACTOR TO MAINTAIN ALL FACILITIES FOR UTILITIES.

5. CONTRACTORS TO MAINTAIN PROPER WORKING HOURS PER OWNER.

6. NO WORK TO BE DONE EXCEPT AS NOTED ON THIS APPLICATION.

N Y STATE ENERGY CODE NOTES

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

ALL PERTINENT DATA & DESIGN CRITERIA REGARDING THE FOLLOWINGSHALL CONFORM WITH THE NYC BUILDING CODE HWICHEVER IS MORE RESTRICTIVE.

1. "U" VALUE OF ENVELOPE SUB-SYSTEM.

2. DESIGN INSIDE AIR TEMPERATURE OF EACH ROOM THAT IS TO BE HEATED / AND OR COOLED.

3. DESIGN OUTDOOR AIR TEMPERATURE

4. DESIGN HEAT / LOSS GAIN THROUGH EACH EXTERIOR FACADE BTU / HR

5. "R" VALUE OF INSULATING MATERIALS.

6. SIZE AND TYPE OF APPARATUS/ EQUIPMENT SYSTEM, CONTROLS, & OTHER PERTINENT DATA TO INDICATE CONFORMANCE TO CODE.

7. ELECTRICAL LIGHTING & POWER DESIGN DATA.

8. FIRE PROTECTION CONSTRUCTION REQUIREMENTS, INCLUDING BUILDING CODE LIMITATIONS REGARDING USE AND INSULATION OF EQUIPMENT, AND WHAT THE CONTRACTOR OR AUTHORIZED REPRESENTATIVE WILL OBTAIN ALL NECESSARY APPROVALS FOR ELECTRICAL WORK FROM BUREAU OF GAS AND ELECTRICITY.

9. DESIGN OF INSIDE AIR TEMPERATURE OF EACH ROOM THJAT IS HEATED OR COOLED:
   HEATED 70 DEGREES F. NYC (70DEG NYS)
   COOLED 78 DEGREES F. NYS

10. DESIGN OF OUTSSIDE AIR TEMPERATURE (BASED ON 5,000 DEGREE DAYS):
   NYC WINTER 0 DEG F.
   NYC SUMMER 89 DEG F.

SECTION NOTES

1. FIRE RETARD ALL WOOD JOIST CEILINGS WITH 5/8" SHEETROCK FIRE-CODE "X" ONE HOUR RATED).

2. ALL FOOTINGS TO BE CARRIED DOWN A MINIMUM OF 4'-0" BELOW ADJACENT GRADE AND BEAR ON UNDISTURBED SOIL HAVING A MINIMUM BEARING CAPACITY OF TWO (2) TONS PER SQUARE FOOT.

3. PROVIDE DOUBLE WOOD JOISTS UNDER PARTITIONS RUNNING PARALLEL TO FLOOR BEAMS.

4. PROVIDE TRIPLE-HEADERS AND TRIMMERS AROUND STAIRWELL OPENING UNLESS OTHERWISE NEEDED.

5. INSTALLATION OF INSULATION AND CONSTRUCTION OF WINDOWS AND EXTERIOR DOORS TO COMPLY WITH NEW YORK STATE ENERGY CODE.
(A) ROOF INSULATION: MINIMUM 6" ROCKWOOL INSULATION.
(B) EXTERIOR WALLS: MINIMUM 4" ROCKWOOL INSULATION.

6. CHIMNEY TO BE ENCLOSED WITH ONE (1) HOUR RATED CONSTRUCTION.

7. ALL WOOD HEADERS AND TRIMMERS TO BE SIZED AS NOTED ON PLANS.

8. WATERPROOF NEW FOUNDATION AND FOOTINGS WITH 1/4" THICK TROWELLED ON MASTIC WATERPROOFING.

9. NEW WOOD STAIRS:
(A) CONTRACTORS SHALL CHECK AND VERIFY STORY HEIGHTS PRIOR TO FABRICATION AND INSTALLATION OF STAIRS.
(B) MAXIMUM RISER 7 3/4" MINIMUM TREAD; 9 1/2" + 1 1/4" NOSING. THE SUM OF TWO RISERS PLUS ONE TREAD SHALL NOT BE LESS THAT 24" NOR MORE THAN 25 1/2".
(C) UPPER SURFACE OF EVERY BALUSTRADE OR RAILING SHALL BE AT LEAST 2'-6"
AND MAXIMUM OF 2'-8" ABOVE THE FRONT EDGE OF THE STAIR TREADS AND 2'-8" MINIMUM, 3'-0" MAXIMUM ABOVE LEVEL OF LANDING.
(D) SOFFIT OF STAIR TO BE COVERED WITH 5/8" SHEETROCK TYPE "X".

10. EXTERIOR METAL RAILINGS:
(A) EXTERIOR METAL RAILINGS SHALL BE A TYPE THAT WILL PREVENT CHILDREN FROM CRAWLING THROUGH OR OVER THEM.
(B) STRUCTURAL DESIGN OF RAILING TO COMPLY WITH SECTION 27-558 (b).

11. ALL CONCRETE FOOTING TO BE CARRIED DOWN BELOW THE LEVEL OF THE HOUSE SEWER WHERE HOUSE SEWER PASSES THROUGH FOUNDATION WALL.

12. ALL CONCRETE TO BE REINFORCED UNLESS OTHERWISE NOTED.

13. REFER TO DETAIL FOR REINFORCING OF CONCRETE FOUNDATION WALLS AND FOOTINGS.

SMOKE DETECTOR/CARBON MONOXIDE NOTES

1. EACH DWELLING UNIT SHALL BE EQUIPPED WITH AN APPROVED TYPE CARBON MONOXIDE & SMOKE DETECTOR DEVICE RECEIVING PRIMARY POWER FROM THE BUILDING WIRING WITH NO SWITCH IN THE CIRCUIT OTHER THAN THE OVER-CURRENT DEVICE PROTECTING THE BRANCH CIRCUIT AS PER SEC. BC 28-908.7.1.1.

2. SUCH SMOKE DETECTORS MUST BE EITHER THE IONIZATION CHAMBER TYPE OR PHOTOELECTRIC DETECTOR TYPE AS PER SEC. BC 28-907.2.10.1.1

3. ALL SMOKE/ CARBON MONIXIDE DETECTORS MUST BE INSTALL WITHIN 15'-0" OF THE ENTRANCE TO ANY SLEEPING ROOMS, WALL OR CEILING MOUNTED, AND INDICATED ON PLAN AS PER NFPA # 78/80.

TENANT SAFETY NOTES

1. CONSTRUCTION WORK SHALL BE DEFINED TO THE APARTMENT INTERIOR, AND WILL NOT CREATE DUST,DIRT, OR OTHER INCONVENIENCES TO OTHER APARTMENT UNITS WITHIN THE BUILDING.

2. CONSTRUCTION OPERATION SHALL NOT BLOCK HALLWAYS OR MEANS OF EGRESS FOR TENANTS OF THE BUILDING.

3. CONSTRUCTION OPERATIONS SHALL NOT INVOLVE INTERRUPTION OF HEATING, WATER OR ELECTRICAL SERVICES TO OTHER TENANTS OF THE BUILDING.

4. CONSTRUCTION OPERATIONS SHALL BE CONFINED TO NORMAL WORKING HOURS: 8 A.M. TO 5 P.M. MONDAYS THROUGH FRIDAYS, EXCEPT ON LEGAL HOLIDAYS.

5. THERE SHALL BE NO ONE OCCUPYING THE APARTMENT TO BE RENOVATED DURING THE COURSE OF CONSTRUCTION WORK.

GENERAL STRUCTURAL NOTES

1. ALL STRUCTURAL WORK, INCLUDING MATERIALS, FIRE RATING AND METHODS OF CONSTRUCTION SHALL CONFORM TO THE BUILDING CODE OF THE CITY OF NEW YORK, LATEST EDITION.

2. THE CONTRACTOR SHALL PROPERLY SHORE, BRACE AND MAKE SAFE ALL FLOORS, RAILS, WALL AND ADJACENT PROPERTY AS JOB CONDITIONS

3. THE CONTRACTOR SHALL COORDINATE ALL STRUCTURAL WORK WITH REQUIRE. THE ARCHITECTURAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS.

4. ALL DIMENSIONS INDICATED ON THE DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO ORDERING OR FABRICATING MATERIAL.

MULTIPLE DWELLING LAW NOTES

M.D.L. CLASSIFICATION HAEA, NYS MDL ARTICLE 3 AND 5

TITLE 1 - FIRE PROTECTION
1. EVERY SUCH DWELLING EXCEEDING SIX STORIES OR SEVENTY-FIVE FEET IN HEIGHT SHALL BE FIREPROOF AS PER SECTION.101.1 M.D.L.

2. EXCEPT AS OTHERWISE SPECIFICALLY PROVIDED IN SUBDIVISIONS THREE AND FOUR AND IN PARAGRAPHS B TO J INCLUSIVE OF SUBDIVISION SIX, EVERY MULTIPLE DWELLING WHICH EXCEEDS TWO STORIES IN HEIGHT FROM THE ENTRANCE STORY TO THE ROOF AND BE EQUIPPED WITH FIREPROOF SELF-CLOSING DOORS GLAZED WITH WIRE GLASS AND WITHOUT TRANSOMS AS PER SECTION 102.1 M.D.L.

3. EXCEPT AS PROVIDED IN PARAGRPH B OF THIS SUBDIVISION, THERE SHALL BE AT LEAST ONE MEANS OF EGRESS FROM EACH APARTMENT ON EACH AND EVERY STORY OF SUCH APARTMENT, AND A SECOND MEANS OF EGRESS IF THE FIRST MEANS IS NOT WITHIN FIFTY FEET OF EVERY LIVING ROOM IN SUCH APARTMENT ON SUCH STORY. WHEN TWO MEANS OF EGRESS ARE REQUIRED, THEY SHALL OPEN FROM DIFFERENT ROOMS AS PER SECTION 103.1.A. M.D.L.

4. EVERY STAIR, FIRE-STAIR AND FIRE-TOWER REQUIRED BY THIS CHAPTER TO EXTEND TO THE LEVEL OF THE ROOF OR TO ANY TERRACE FORMED BY A SETBACK SHALL EXTEND TO THE THROUGH A FIREPROOF BULKHEAD OR OTHER FIREPROOF ENCLOSURE IN SUCH ROOF OR TERRACE APPROVED BY THE DEPARTMENT AS PER SECTION 104.1 M.D.L.

5. IN A DWELLING IN WHICH ONE OR MORE PASSENGER ELEVAORS ARE MAINTAINED AND OPERATED OPENING UPON A PUBLIC HALL AT EVERY STORY, ALL STAIRSM FIRE-STAIRS AND FIRE-TOWERS SHALL BE COMPLETELY SEPERATED FROM ONE ANOTHER AND FROM EVERY ELEVATOR SHAFT BY FIREPROOF WALLS AS PER SECTION 105.1 M.D.L.

6. A CELLAR OR BASEMENT STAIR MAY BE LOCATED INSIDE THE DWELLING, BUT SHALL NOT BE LOCATED UNDERNEATH STAIR LEADING TO THE UPPER STORIES UNLESS IT IS A BASEMENT STAIR LEADING UPWARD FROM A BASEMENT WHICH IS THE MAIN ENTRANCE STORY OF THE DWELLING, OR UNLESS IT IS A STAIR LEADING DOWNWARD FROM THE ENTRANCE STORY WHICH IS SEPERATED BY A FIREPROOF ARCH FROM THE STAIR LEADING UPWARD FROM THE ENTRANCE STORY AS PER SECTION 106 M.D.L.

7. EVERY PUBLIC STAIR ENCLOSURE OR OTHER PUBLIC HALL SHALL COMPLY EITHER WITH THE PROVISIONS OF SECTION ONE HUNDRED FORTY-NINE FOR NON-FIREPROOF MULTIPLE DWELLINGS, SO FAR AS APPLICABLE, OR WITH THE PROVISIONS OF SUBDIVISION TWO OF THIS SECTION, EXCEPT THAT THE PROVISIONS AS TO VEENTILATION SHALL NOT APPLY TO ANY PART OF AN ENTRANCE HALL WITHIN SIXTY FEET IN A STRAIGHT LINE FROM AN ENTRANCE DOOR AS PER SECTION 107.1 MON OF THE FLOOR OR ROOF ABOVE AS PER SECTION 108 M.D.L.

8. ALL PARTITIONS HSALL REST DIRECTLY UPON THE FIREPROOF FLOOR CONSTRUCTION AND NEVER UPON ANY WOOD FLOORING, AND SHALL EXTEND TO THE FIREPROOF CONSTRUCTION M.D.L.

9. PROVIDE EXTERIOR LIGHTS AS PER SEC 26 & 35 M.D.L.

10. ALL BUILDING ENTRANCE DOORS TO BE SELF-CLOSING, SELF LOCKING DEVICES AS PER SEC 50(a) M.D.L.

11. WATER SUPPLY TO BE AS PER SEC 75 M.D.L.

12. CENTRAL HEATING AND HOT WATER SUPPLY TO BE AS PER 79 M.D.L.

13. NIGHT LIGHT IN PUBLIC HALL AND STAIR HALL TO BE AS PER SEC 37, 217 M.D.L.

14. MAILSERVICE TO BE AS PER SEC 57 M.D.L.

15. PROVIDE FLOOR SIGNS AND HOUSE NUMBER.

16. FIRE RATED WITHIN ONE FOOT OF COOKING APPARATUS AND MAINTAIN TWO FOOT CLEARANCE ABOVE WITH 3/16" ASBESTOS AND 26 GA METAL OVER AS PER SEC 33.3(b) M.D.L.

17. REGISTER BUILDING AS PER SEC 325 M.D.L.

18. ALL APARTMENT DOORS TO BE SELF-CLOSING.

19. PROVIDE FOR APARTMENT DOORS HEAVY DUTY LATCHSET AND HEAVY DUTY DEAD BOLT AND DOOR CHAIN GUARD.

AIR RESOURCES NOTES

1. THE APPLICANT IS AWARE OF DISCREPANCIES BETWEEN THE RULES AND REGULATIONS OF THE DEPARTMENT OF AIR RESOURCES AND THE BUILDING CODE AND REFERENCE STANDARDS.

2. INSTALLATIONS APPROVED BY THIS DEPARTMENT OR EQUIPMENT APPROVAL BY THE BOARD OF STANDARDS AND APPEALS OR ACCEPTED BY THE M.E.A. DIVISION MAY NOT BE IN CONFORMANCE WITH SAID RULES OR REGULATIONS.

3. APPROVAL BY THE DEPT. OF BLDGS. SHALL NOT BE PRESUMED TO BE AND INDICATION OF COMPLIANCE WITH THE ABOVE MENTIONED RULES AND REGULATIONS.

4. THE OWNER HAS BEEN MADE AWARE OF THESE DIFFERING REQUIREMENTS AND OF THE NEED TO OBTAIN NECESSARY APPROVALS AND PERMITS FROM THE DEPT. OF AIR RESOURCES.

5. IT IS UNDERSTOOD THAT ISSUANCE OF PERMITS BY THIS DEPARTMENT IS NOT TO BE CONSTRUED AS EVIDENCE OF COMPLIANCE WITH DEPARTMENT OF AIR RESOUCES RULES AND REGULATIONS AND WILL NOT PREVENT THE DEPT. OF AIR RESOURCES FROM ISSUING VIOLATIONS OR FROM PREVENTING THE USE OF NON-COMPIYING, FUEL BURNING EQUIPMENT - SEE B.D. MEMO DATED

HOUSING MAINTENANCE CODE

1. D26-11 MAINTAIN IN CLEAN CONDITION ROOF, YARDS, COURTS, OPEN SPACES AND INTERIOR PUBLIC SPACES.

2. D26-12 REPAINT OR RECOVER WALLS AND CEILINGS WITH WALLPAPER EVERY THREE YEARS (FOR MDs) AND KEEP RECORDS OF SUCH. ALSO REPAINT WINDOW FRAMES AND SASHES EVERY FIVE YEARS.

3. D26-13 KEEP PREMISES FREE FROM RODENTS AND INSECT INFESTATION.

4. D26-14 MAINTAIN METAL CANS (2 MINIMUM) SUFFICIENT TO CONTAIN WASTE FOR 72 HOURS AND PLACE NOTICE OF HOURS AND METHODS OF COLLECTION.

5. D26-15 PROVIDE AND MAINTAIN SUPPLY OF WATER TO KEEP PLUMBING FIXTURES ADEQUATELY SUPPLIED.

6. D26-16 PROPERLY MAINTAIN AND KEEP IN GOOD REPAIR PLUMBING AND DRAINAGE SYSTEM. ALSO MAINTAIN UNOBSTRUCTED DRAINAGE OF OPEN SPACES, ROOFS, TERRACES, ETC.

7. D26-17 MAINTAIN CENTRAL HEATING BETWEEN 10/1 TO 5/31 AT 68aF BETWEEN 6 a.m. AND 10 p.m. WHEN OUTSIDE TEMPERATURE FALLS BELOW 55aF; AT 55aF BETWEEN 10 p.m. AND 6 a.m. HWEN OUTSIDE TEMPERATURE FALLS BELOW 40aF.

8. D26-19 EQUIP EACH DWELLING FOR ELECTRIC LIGHTING IN PUBLIC SPACES (10 WATTS PER 25 S.F. AT 60 WATTS PER FIXTURE), AT ENTRANCES (100 WATTS), IN COURTS AND YARDS (40 WATTS). LIGHTS SHALL BE TURNED ON IN PUBLIC HALLS AND STAIRS FROM SUNSET AND CONTINUOUSLY IN FIRESTAIRS OR IN WINDOWLESS HALLS AND STAIRS.

9. D26-20 PROVIDE PEEPHOLES IN DOORS; MIRRORS IN ELEVATORS (TO ENABLE VIEWING OF INTERIOR PRIOR TO ENTERING) AND A KEY LOCK IN EACH DOOR. FOR OLTs UP TO BASEMENT AND THREE STORIES IN HEIGHT, DOORS TO PUBLIC AREAS ARE TO BE SELF CLOSING AND CEILING OF LOWEST STORY IS TO BE FIRE-RETARDED.

10. D26-21 MAINTAIN MAIL RECEPTACLES AND DIRECTORIES, FLOOR SIGNS AND HOUSE NUMBERS VISIBLE FROM THE SIDEWALK.

11. D26-22 PROVIDE JANITORIAL SERVICES.

12. D26-32 PROVIDE EVERY KITCHEN OR KITCHENETTE WITH GAS OR ELECTRICITY FOR COOKINGAND A SINK WITH RUNNING WATER, EQUIPPED WITH A WASTE AND TRAP AT LEAST TWO INCHES IN DIAMETER.

13. D26-40 FOR MULTIPLE DWELLING, FILE REGISTRATION STATEMENT.

56 FROST STREET

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REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT
DE-JAN LU
STATE OF NEW YORK
034327

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

ZONING ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

G-001.00

05 OF 21

DOB BSCAN STICKER

The following are primary sections that subject application is subject to but not limited to the following under the provisions of the 2008 New York City Building Code

CHAPTER 3 USE AND OCCUPANCY CLASSIFICATION
BC 302 CLASSIFICATION
302.1 R-2
BC 310 RESIDENTIAL GROUP R
310.1.2 Group R-2. This occupancy shall include buildings or portions thereof containing sleeping units or more than two dwelling units that are occupied, as a rule, for shelter and sleeping accommodation on a long-term basis for a month or more at a time.

CHAPTER 5 GENERAL BUILDING HEIGHTS AND AREAS; SEPARATION OF OCCUPANCIES
501.2 Premises identification should be provided in accordance with BC 501.2
501.3 Fire Department access.
501.3.1 Frontage Total Frontage proposed adjoining the street: 25'
501.3.2 Building access.
501.3.2.1 Above grade. Above grade access is provided via windows at front faced
501.3.2.2 Below grade. Below grade access provided via stairs
BC 503 GENERAL HEIGHT AND AREA LIMITATIONS

TABLE 503 ALLOWABLE HEIGHT AND BUILDING AREAS CONSTRUCTION TYPE IB
Hgt (feet) 65
GROUP R-2 Hgt(S) 65

BC 508 INCIDENTAL USE AREAS AND MIXED OCCUPANCIES
508.2 Incidental use areas. The following spaces are to be identified as incidental use areas and are to be provided with the required separation per Table 508.2
508.2.1 Occupancy classification. All incidental use areas are to be classified under the occupancy which they are incidental to R-2
508.2.1.1 Fire protection requirements. fire protection requirements in Chapter 9 for an incidental use area shall be based upon the occupancy classification of the area's main occupancy
508.2.1.2 Allowable area and height. The actual floor area of an incidental use area shall be treated as being in the same occupancy group as its main occupancy for the purposes of calculating allowable height and area in accordance with Section 503.1.
508.2.2 Separation. Incidental use areas shall be separated or protected, or both, from all other occupancies in accordance with Table 508.2.
TABLE 508.2 INCIDENTAL USE AREAS ROOM OR AREA SEPARATION
Furnace room where any piece of equipment is 400,000 1 hour or provide automatic sprinkler system b
Btu per hour input or less, except in R-3 occupancy
Rooms with any boiler 15 psi or less and 10 horsepower or less, except in R-3 occupancy 1 hour or provide automatic sprinkler system
Mechanical and/or electrical equipment room, except in R-3 occupancy 1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet, except within dwelling units 1 hour or provide automatic sprinkler system
Storage rooms over 100 square feet, except in R-3 occupancy 1 hour or provide automatic sprinkler system
509.9 Separation of different tenancies. Spaces or dwelling units occupied by different tenants shall be separated by fire barriers having at least 1-hour fire-resistance ratings.
CHAPTER 6 TYPES OF CONSTRUCTION
602.2 Types I and II. Type I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials. Table 601 BUILDING ELEMENT TYPE I-B
Structural frame including columns, girders, trusses 2hr.
Bearing walls Exterior, 2hr.
Bearing walls Interior 2 hr.
Nonbearing walls and partitions Exterior See Table 602
Nonbearing walls and partitions Interior 0 hr.
Floor construction Including supporting beams and joists 2 hr.
Roof construction Including supporting beams and joists 1 hr.
Table 602. fire-resistance rating requirements for exterior walls based on fire separation distance FIRE SEPARATION OCCUPANCY

GROUP R-2
5' 1 hr.
5' to 10' 1 hr.
10' to 30' 1 hr.
30 0 hr.

SECTION BC 603 COMBUSTIBLE MATERIAL IN TYPE I AND II CONSTRUCTION
603.1 Allowable materials. Combustible materials shall only be used in accordance with BC 603.1

CHAPTER 7 FIRE-RESISTANCE-RATED CONSTRUCTION
BC 703 FIRE-RESISTANCE RATINGS AND FIRE TESTS
703.2 Fire-resistance ratings. all fire-resistance rating of building elements are determined in accordance with the test procedures set forth in ASTM E 119 or in accordance with Section 703.3.
BC 704 EXTERIOR WALLS
704.1 General . all required rated Exterior walls under table 601 & 602 are to be fire-resistance rated and have opening protection as required by this section. Exterior wall construction shall comply with the provisions of Chapter 14 and Appendix D of the 2008 BC where applicable.
704.11 Parapets. Parapets shall be provided on exterior walls of buildings.
704.11.1 Parapet construction . Parapets shall have the same fire-resistance rating as that required for the supporting wall, and on any side adjacent to a roof surface, shall have noncombustible faces for the uppermost 18 inches (457 mm), including counter flashing and coping materials. The height of the parapet shall not be less than 30 inche
BC 706 FIRE BARRIERS
706.3 Fire-resistance rating. The fire-resistance rating and assembly required of the walls and floor assemblies required for fire barriers shall fully comply with required ratings and assembly as described in BC 706 and all applicable provisions.
BC 707 SHAFT ENCLOSURES.
707.1 General. The provisions of section BC 707 in its entirety shall apply to all vertical shafts where such shafts are required to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies
707.2 Shaft enclosure required. Openings through a floor/ceiling assembly shall be protected by a shaft enclosure complying with this section.
707.4 Fire-resistance rating. Shaft enclosures shall have a fire-resistance rating of not less than 2 hours where penetrating three stories or more and not less than 1 hour where penetrating fewer than three stories.
BC 708 FIRE PARTITIONS
708.1 General. The fire-resistance rating and assembly required of the walls and floor assemblies required for fire partition shall fully comply with required ratings and assembly as described in BC 708 and all applicable provisions.
708.3 Fire-resistance rating. The fire-resistance rating of the walls shall be 1 hour.
SECTION BC 709 SMOKE BARRIERS
709.1 General. The fire-resistance rating and assembly required of the walls and floor assemblies required for Smoke Barriers shall fully comply with required ratings and assembly as described in BC 709 and all applicable provisions.
709.3 Fire-resistance rating. A1-hour fire-resistance rating is required for smoke barriers.
BC 710 SMOKE PARTITIONS
710.1 General. The fire-resistance rating and assembly required of the walls and floor assemblies required for Smoke Partitions shall fully comply with required ratings and assembly as described in BC 710 and all applicable provisions.
710.3 Fire-resistance rating. Unless required elsewhere in the code, smoke partitions are not required to have a fire-resistance rating.
BC 711 HORIZONTAL ASSEMBLIES
711.1 General. Floor and roof assemblies required to have a fire-resistance rating shall comply with this BC 711 and all applicable provisions.
711.2 Materials. The floor and roof assemblies shall be of materials permitted by the building type of construction and Horizontal floor or roof assemblies shall be of noncombustible materials when such assemblies serve as a horizontal offset to a fire wall or fire barrier that is required to be noncombustible.
711.3 Fire-resistance rating. The fire-resistance rating of floor and roof assemblies shall not be less than that required by the building type of construction and any other applicable provision.

CHAPTER 9 FIRE PROTECTION SYSTEMS
BC 903 AUTOMATIC SPRINKLER SYSTEMS
903.2.7 Group R. An automatic sprinkler system shall be installed in Group R fire areas. An automatic sprinkler system shall be installed throughout buildings with a main use or dominant occupancy of Group R-2

SECTION BC 907 FIRE ALARM AND DETECTION SYSTEMS
907.2.6.2.3 Smoke detectors. An approved automatic smoke detection system shall be installed throughout resident housing areas, including sleeping areas and contiguous day rooms, group activity spaces and other common spaces normally accessible to residents. Exceptions: 1. Other approved smoke detection arrangements providing equivalent protection including, but not limited to, placing detectors in exhaust ducts from cells or behind protective guards listed for the purpose are allowed when necessary to prevent damage or tampering. 2. Sleeping units in Use Conditions 2 and 3. 3. Smoke detectors are not required in sleeping units with four or fewer occupants in smoke compartments that are equipped throughout with an approved automatic sprinkler system.
907.2.9 Group R-2. An automatic fire alarm system without alarm notification appliances shall be provided in accordance with this section in Group R-2 occupancies, other than student apartments,

where such occupancy satisfies any one of the following conditions: *1. Any dwelling unit is located three or more stories above the lowest level of exit discharge, including dwelling units in penthouses of any area; 2. Any dwelling unit is located more than one story below the highest level of exit discharge of exits serving the dwelling unit; or 3.* The building contains more than 16 dwelling units. *Actuation of smoke detectors shall not initiate a signal to alarm notification appliances. The activation of any detector required by this section shall initiate a signal at a central station or a constantly attended location. Smoke detectors shall be located as follows: 1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room, greater than 75 square feet (6.96 m2) in area. 2. In air distribution systems in accordance with Section 606 of the New York City Mechanical Code. 3. In elevator machine rooms and in elevator lobbies.*

SECTION BC 908 EMERGENCY ALARM SYSTEMS
908.7 Carbon monoxide alarms and detectors. Carbon monoxide alarms and detectors shall be provided and installed in accordance with Sections 908.7.1 through 908.7.3.
908.7 Carbon monoxide alarms and detectors. Carbon monoxide alarms and detectors shall be provided and installed in accordance with Sections 908.7.1 through 908.7.3.‡
908.7.1 Group R occupancies. Listed carbon monoxide alarms or detectors shall be installed as follows: 2. Groups R-2. Carbon monoxide alarms shall be installed in affected dwelling units as per Section 908.7.1.1. of the 2008 NYC BC

908.7.1.1 Affected dwelling units. Carbon monoxide alarms or detectors shall be required within the following dwelling units: 1. Units on the same story where carbon monoxideproducing equipment or enclosed parking is located. 2. Units on the stories above and below the floor where carbon monoxide-producing equipment or enclosed parking is located. 3. Units in a building containing a carbon monoxideproducing furnace, boiler, or water heater as part of a central system. 4. Units in a building served by a carbon monoxideproducing furnace, boiler, or water heater as part of a central system that is located in an adjoining or attached building.
908.7.1.1.1 Required locations within dwelling units. Carbon monoxide alarms or detectors shall be located within dwelling units as follows: 1. Outside of any room used for sleeping purposes, within 15 feet (4572 mm) of the entrance to such room. 2. In any room used for sleeping purposes. 3. On any story within a dwelling unit, including below-grade stories and penthouses of any area, but not including crawl spaces and uninhabitable attics.
908.7.1.1.2 Installation requirements. Carbon monoxide alarms or detectors shall comply with the power source, interconnection, and acceptance testing requirements as required for smoke alarms in accordance with Sections 907.2.10.2 through 907.2.10.4. of the 2008 NYC BC
CHAPTER 10 MEANS OF EGRESS

SECTION BC 1004 OCCUPANT LOAD
1004.1 Design occupant load. In determining means of egress requirements, the number of occupants for whom means of egress facilities shall be provided shall be established by the largest number computed in accordance with Sections 1004.1.1 through 1004.1.3.
1004.1.2 Number by Table 1004.1.2. The number of occupants computed at the rate of one occupant per unit of area as prescribed in Table 1004.1.2. TABLE 1004.1.2 - MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

Residential 200 gross within dwelling units

SECTION BC 1005 EGRESS WIDTH
1005.1 Minimum required egress width. The means of egress width shall not be less than that required by this section. The total width of means of egress in inches (mm) shall not be less than the total occupant load served by the means of egress multiplied by the factors in Table 1005.1 and not less than specified elsewhere in this code. Multiple means of egress shall be sized such that the loss of any one means of egress shall not reduce the available capacity to less than 50 percent of the required capacity. The maximum capacity required from any story of a building shall be maintained to the termination of the means of egress.
TABLE 1005.1 - EGRESS WIDTH PER OCCUPANT SERVED
OCCUPANCY STAIRWAYS (inches per occupant) OTHER COMPONENTS (inches per occupant) R 0.3 0.2
SECTION BC 1008 DOORS, GATES AND TURNSTILES
1008.1.1.1 Door width. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 32 inches (813 mm).

SECTION BC 1009 STAIRWAYS AND HANDRAILS
1009.1 Stairway width. The width of stairways shall be determined as specified in Section 1005.1, but such width shall not be less than 44 inches (1118 mm). See Section 1007.3 for accessible means of egress stairways. Exceptions: 1. A width of not less than 36 inches (914 mm) shall be permitted in: 1.1. A stairway that serves an occupant load of 50 or less cumulative for all stories; or 1.2. A stairway that provides egress to the exit discharge solely for the use of Group R-2 occupancies, provided the building it serves is 125 feet (38 100 mm) or less in height, and provided such a stairway serves not more than 30 occupants per floor.
1013.2 Egress through intervening spaces Egress from a room or space shall not pass through adjoining or intervening rooms or areas, except where such adjoining rooms or areas are accessory to the area served; are not a high-hazard occupancy and provide a discernible path of egress travel to an exit. Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes. An exit access shall not pass through a room that can be locked to prevent egress. Means of egress from dwelling units or sleeping areas shall not lead through other sleeping areas, toilet rooms or bathrooms.

1013.3 Common path of egress travel. In occupancies other than Groups H-1, H-2 and H-3, the common path of egress travel shall not exceed 75 feet (22 860mm). In occupancies in Groups H-1, H-2, and H-3, the common path of egress travel shall not exceed 25 feet (7620mm).
1013.6 Exit access in R-2 occupancies. In buildings in occupancy Group R-2 exceeding three stories or more in height or occupied by more than two dwelling units on any story, a door from a dwelling unit shall open into an intervening public hall. Such public hall shall be constructed as a public corridor in accordance with Section 1016. Where two or more exits are required, such public hall shall provide access to at least two exits.

SECTION BC 1014 EXIT AND EXIT ACCESS DOORWAYS
1014.1 Exit or exit access doorways required. Two exits or exit access doorways from any space shall be provided where one of the following conditions exists: 1. The occupant load of the space exceeds the values in Table 1014.1.
TABLE 1014.1 SPACES WITH ONE MEANS OF EGRESS
OCCUPANCY MAXIMUM OCCUPANT LOAD
R2 20

SECTION BC 1015 EXIT ACCESS TRAVEL DISTANCE
1015.1 Travel distance limitations. Exits shall be so located on each story such that the maximum length of exit access travel, measured from the most remote point within a story to the entrance to an exit along the natural and unobstructed path of egress travel, shall not exceed the distances given in Table 1015.1.
TABLE 1015.1 EXIT ACCESS TRAVEL DISTANCE
OCCUPANCY WITH SPRINKLER SYSTEM (feet)
R2 200b

1016.1.2 Public corridors. Public corridors shall be fire-resistance rated in accordance with Table 1016.1.2.
TABLE 1016.1.2 PUBLIC CORRIDOR FIRE-RESISTANCE RATING
OCCUPANCY REQUIRED FIRE-RESISTANCE RATING (hours)
R2 (Nonaccessible) 1
1016.2 Corridor width. The minimum corridor width shall be as determined in Section 1005.1, but not less than 44 inches (1118 mm). Exceptions: 1. Twenty-four inches (610 mm)—For access to and utilization of electrical, mechanical or plumbing systems or equipment. 2. Thirty-six inches (914 mm)—With a required occupant capacity of 50 or less, except as otherwise required by Chapter 11. 4. Thirty inches (762 mm) —Within a dwelling unit in Occupancy Groups R-2 and R-3, except as otherwise required by Section 1107.
1016.3 Dead ends. Where more than one exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors more than 20 feet (6096 mm) in length. 4. In occupancies in Group R-2, the dead end in a corridor shall not exceed 40 feet (12 192 mm). However, where the corridors are completely enclosed in construction having a 2-hour fire-resistance rating with all doors opening into thecorridor being self-closing and having a fire-resistance rating of 1 1/2 hours, the length of dead-end corridor shall not exceed 60 feet (24 384 mm).

SECTION BC 1018 NUMBER OF EXITS AND CONTINUITY
1018.1 Minimum number of exits All rooms and spaces within each story shall be provided with and have access to the minimum number of approved independent exits as required by Table 1018.1 based on the occupant load of such story, except as modified in Section1018.2. For the purposes of this chapter, occupied roofs shall be provided with exits as required for stories. The required number of exits from any story, basement or individual space shall be maintained until arrival at grade or the public way.
1018.2 Buildings with one exit. Only one exit shall be required in buildings as described below: 5. Buildings of Group R-2 occupancy of construction Type I or II not exceeding six stories and not exceeding 2,000 square feet (186 m2) per story.

SECTION BC 1019 VERTICAL EXIT ENCLOSURES
1019.1 Enclosures required. Interior exit stairways and interior exit ramps shall be enclosed with fire barriers. Exit enclosures shall have a fire-resistance rating of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the shaft enclosure shall include any basements but not any mezzanines. An exit enclosure shall not be used for any purpose other than means of egress. Enclosures shall be constructed as fire barriers in accordance with Section 706. Exceptions: 10. In Group R-1 and R-2 occupancies, where exit enclosures are required to have a fire-resistance rating of 2 hours, such enclosures shall be constructed of masonry or masonry equivalent. Wall assemblies constituting masonry equivalent shall be constructed in accordance with department rules.

SECTION BC 1023 EXIT DISCHARGE
1023.1 General. Exits shall discharge directly to the exterior of the building. The exit discharge shall be at grade or shall provide direct access to grade. The exit discharge shall not reenter a building.

CHAPTER 11 ACCESSIBILITY
BC 1105 ACCESSIBLE ENTRANCES
1105.1 Public entrances. In addition to accessible entrances required by Sections 1105.1.1 through 1105.1.6, all public entrances shall be accessible.
1105.1.6 Tenant spaces. All entrances to tenant spaces that are required to be accessible shall be accessible entrances.
1105.1.6.1 Dwelling units and sleeping units. Doors and doorways at entrance(s) to Accessible units, including hardware, shall comply with Section 404 (Doors and doorways) of ICC A117.1. Doors and doorways, including hardware, at entrance(s) to Type B units shall comply with Section 1003.5 (Doors and doorways) of ICC A117.1. Exceptions: 1. An accessible entrance is not required to dwelling units and sleeping units that are not required to be Accessible units or Type B units. 2. Entrances to multistory dwelling or sleeping units in R-2 occupancy as provided in Section 1107.2.5

that are not on the primary entry story to the unit and are not part of the accessible route required in Exception 1 of Section 1107.2.5 shall not be required to be accessible.

SECTION BC 1107 DWELLING UNITS AND SLEEPING UNITS
1107.1 General. In addition to the other requirements of this chapter, occupancies having dwelling units or sleeping units shall be provided with accessible features in accordance with this section.
1107.2 Design. Dwelling units and sleeping units which are required to be Accessible units or Type B units shall comply with this code including Appendix P where applicable, and the applicable provisions of Chapter 10 of ICC A117.1. In addition, Type B units in R-2 occupancies shall comply with Sections 1107.2.1 through 1107.2.8. Units required to be Type B units are permitted to be designed and constructed as Accessible units.
1107.2.5 Type B multistory units in R-2 occupancy. Multistory dwelling or sleeping units shall comply with the following: 1. One of the stories with an accessible entrance shall be designated as the primary entry story to the unit. 2. All rooms, spaces and doors on the primary entry story shall comply with Section 1107.2; and 3. Rooms, spaces or doors located on other than the primary entry story, and interior routes thereto, need not comply with Section 1107.2 where the primary entry story contains equivalent functional facilities.

CHAPTER 12 INTERIOR ENVIRONMENT

BC 1203 VENTILATION
1203.4 Natural ventilation. Natural ventilation of occupy-able and habitable space shall be through openings to the outdoors. The openings shall be of a type permitted under Sections 1203.4.1.1, 1203.4.1.2, 1203.4.1.3 and 1203.4.1.4. The operating mechanism for such openings shall be provided with ready access so that the openings are readily controllable by the building occupants.
1203.4.1 Ventilation area required. Ventilation areas shall be as set forth in Sections 1203.4.1.1 through 1203.4.1.4.
1203.4.1.1 Occupy-able spaces. Where occupy-able spaces are not required to be provided with mechanical ventilation in accordance with the New York City Mechanical Code, natural ventilation shall be provided in accordance with Section 1203.4.1.1. Openings providing required natural ventilation to occupy-able spaces shall be windows, doors, louvers, skylights or other similar ventilating openings. Exceptions: 1. Bathrooms and toilet rooms in R or I-1 occupancies shall comply with Section 1203.4.1.3. 2. Kitchenettes in R or I-1 occupancies shall comply with Section 1203.4.1.4.
1203.4.1.2 Habitable spaces. All habitable spaces shall be provided with natural ventilation in accordance with Section 1203.4.1.2. Openings providing required natural ventilation to habitable spaces shall be windows and/or glazed doors.

1203.4.1.2.1 Minimum opening. The minimum open-able area to the outdoors shall be 5 percent of the floor area of the habitable space being ventilated. Every opening providing required natural ventilation shall be at least 12 square feet (1.1 m2) of glazed area, providing a minimum of 6 square feet (0.56 m2) of open-able area.
1203.4.1.2.4 Maximum depth of room. No part of any room shall be more than 30 feet (9144 mm) from a window opening onto a street or yard unless such room also opens onto a court complying with Section 1206. Exception: In dwelling units containing more than three habitable rooms in Group R-1 or R-2 occupancies in buildings of Type I or II construction, rooms may be greater than 30 feet (9144 mm) in depth provided that all other requirements of Section 1203.4.1.2 are met and that the required windows are so located as to properly light all portions of the room in accordance with Section 1205. 1203.4.1.3 Bathrooms and toilet rooms in R and I-1 occupancies. Bathrooms or toilet rooms in R or I-1 occupancies shall be provided with natural ventilation in accordance with Section 1203.4.1.3, unless provided with exhaust ventilation in accordance with the New York City Mechanical Code. Openings providing required natural ventilation shall be windows.
1203.4.1.4. Kitchenettes in R and I-1 occupancies. Kitchenettes in R or I-1 occupancies shall be provided with natural ventilation in accordance with Section 1203.4.1.4, unless provided with exhaust ventilation in accordance with the New York City Mechanical Code. Openings providing required natural ventilation shall be windows.

SECTION BC 1205 LIGHTING
1205.1 General. Every room and space in every building shall be provided with artificial light in accordance with Section 1205.3. Every habitable room and space shall also be provided with natural light by means of exterior glazed openings in accordance with Section 1205.2 Natural light. Every opening providing required natural light shall be so located so as to properly light all portions of the room. Openings providing required natural light shall be windows and/or glazed doors.
1205.2.1 Minimum opening. The minimum net glazed area shall not be less than 10 percent of the floor area of the room served. Every opening providing required natural light shall be at least 12 square feet (1.1 m2) of glazed area.
1205.2.4 Maximum depth of room. No part of any room shall be more than 30 feet (9144 mm) from a window opening on a street or yard unless such room also opens onto a legal court. Exception: In dwelling units containing more than three habitable rooms in R-1 or R-2 occupancies in buildings of Type I or II construction, rooms may be greater than 30 feet (9144 mm) in depth provided that all other requirements of Section 1205.2 are met and that the required windows are located so as to properly light all portions of the room.

SECTION BC 1207 SOUND TRANSMISSION
1207.1 Scope. This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units, between dwelling units and adjacent mechanical equipment spaces, or between dwelling units and adjacent public areas such as halls, corridors, stairs or service areas
1207.2 Air-borne sound. Walls, partitions and floor/ceiling assemblies separating dwelling units from each other, from public or service areas, from stairs or from mechanical equipment spaces, including boiler rooms, or elevator or other shafts shall have a sound transmission class (STC) for air-borne noise of not less than 50 based upon laboratory measurements made in accordance with ASTM E 90, or not less than 45 if field tested in accordance with ASTME 336. Dwelling unit entrancedoors shall be installed of assemblies having an STC of not less than 35 based upon laboratory measurements made in accordance with ASTM E 1408. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings.
1207.2.1 Machine and equipment rooms. Elevator machine rooms and machinery spaces containing equipment totaling more than 75 rated h.p. shall not be located vertically or horizontally adjacent to dwelling units unless the total sound power level output of all the equipment in the machine room or space is certified not to exceed the maximum sound power levels of Table 1207.2.1 in any octave band.
1207.3 Structure-borne sound. Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area stair, exterior mechanical equipment, or other mechanical equipment space, including boiler rooms, shall be constructed of assemblies having an impact insulation class (IIC) rating of not less than 50 based upon laboratory measurements made in accordance with ASTM E 492, or not less than 45 if field tested in accordance with ASTM E 1007 in completed construction. See Chapter 30 for additional sound control requirements for elevator machinery.
1207.3.1 Refuse chutes. Metal refuse chutes, metal chute supports, and/or metal chute bracing shall be free of direct contact with the shaft enclosure and the openings provided in the floor construction. Metal chutes shall be resiliently supported at each structural support location. Isolators shall provide a minimum static deflection of 0.3 inches (7.62 mm). All chutes shall be plumb.

BC 1208 INTERIOR SPACE DIMENSIONS
1208.1 Minimum room widths. Habitable spaces, other than a kitchen, shall not be less than 8 feet (2438 mm) in any plan dimension. Kitchens and kitchenettes shall have a clear passageway of not less than 3 feet (914 mm) between counter fronts and appliances or counter fronts and walls. Exceptions: 1. A room that complies with the requirements for natural light and natural ventilation and in addition has an unobstructed opening of not less than 60 square feet (5.6m2) into an immediately adjoining room shall not be less than 7 feet (2134 mm)in any plan dimension. 2. A habitable dining space that complies with the requirements for natural light and natural ventilation may be less than 8 feet (2438 mm) in any plan dimension. 3. One-half the number of bedrooms in a dwelling unit containing three or more bedrooms shall not be less than 7 feet (2134 mm) in any plan dimension. 4. Aroom in a Group R-1 dwelling or sleeping unit shall not be less than 6 feet (1829 mm) in any plan dimension.
1208.2 Minimum ceiling heights. Habitable rooms and spaces shall have a ceiling height of not less than 8 feet (2438 mm). Occupy-able spaces and corridors shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). Bathrooms, toilet rooms, kitchens in other than I-1 and R occupancies, kitchenettes in I-1 or R occupancies, storage rooms and laundry rooms shall be permitted to have a ceiling height of not less than 7 feet (2134 mm). All measurements shall be taken from the finished floor to the finished underside of the ceiling or ceiling beams.
1208.3 Room area. Minimum net floor areas of rooms shall be in accordance with Sections 1208.3.1 and 1208.3.2.
1208.3.1 Habitable rooms and spaces. Every habitable room or space shall have not less than 80 square feet (7.4m2) in net floor area.
1208.3.2 Dwelling units. In a dwelling unit, at least one habitable room shall have not less than 150 square feet (13.9 m2) of net floor area.

SECTION BC 1210 SURROUNDING MATERIALS
1210.1 Floors. Toilet and bathing room floors shall have a smooth, hard, nonabsorbent surface that extends upward onto the walls at least 6 inches (152 mm).
1210.2 Walls. Walls within 2 feet (610 mm) of urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of 4 feet (1219 mm) above the floor, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture. Exceptions: 1. Dwelling units. 2. Toilet rooms that are not accessible to the public and which have not more than one water closet. Accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture.
1210.3 Showers. Shower compartments and walls above bathtubs with installed shower heads shall be finished with a smooth, nonabsorbent surface to a height not less than 70 inches (1778 mm) above the drain inlet.
1210.4 Waterproof joints. Builtin tubs with showers shall have waterproof joints between the tub and adjacent wall.
1210.5 Toilet rooms. Toilet rooms shall not open directly into a room used for the preparation of food for service to the public. In multiple dwellings no toilet room or bathroom shall open onto any kitchen or kitchenette

SECTION BC 1211 KITCHENS AND KITCHENETTES
1211.1 Sleeping. No kitchen or kitchenette shall be occupied for sleeping purposes.
1211.2 Kitchenettes in multiple dwellings. Except at entrances thereto, every kitchenette in a multiple dwelling shall be surrounded by partitions extending from floor to ceiling, and/or by a soffit dropped 1 foot (305 mm) from the ceiling

SECTION BC 1213 REFUSE AND RECYCLABLE STORAGE
1213.1 General. Multiple dwellings shall comply with Section 81 of the New York State Multiple Dwelling Law and Section 27-2021 of the New York City Housing Maintenance Code. Where a room is provided for the storage of refuse and recyclables in a building, such room shall be completely enclosed by construction that has a fire-resistance rating of not less than 2 hours, with self-closing opening protective having a fire protection rating of not less than 1 1/2 hours. The location of such refuse storage room shall be identified on the construction documents.

CHAPTER 13 ENERGY EFFICIENCY
1301.1.1 Criteria. Buildings shall be designed and constructed in accordance with the Energy Conservation Construction Code of New York State.

SECTION BC 1614 EARTHQUAKE LOADS—GENERAL
1614.1 Scope. Every structure, and portion thereof, shall at a minimum, be designed and constructed to resist the effects of earthquake motions and assigned a seismic design category as set forth in Section 1616.3.
Exceptions: 1. Structures designed in accordance with the provisions of Sections 9.1 through 9.6, 9.13 and 9.14 of ASCE 7 shall be permitted.
2. One- and two-family dwellings not more than three stories in height are exempt from the requirements of Sections 1613 through 1622.
3. The seismic-force-resisting system of wood frame buildings that conform to the provisions of Section
2308 are not required to be analyzed as specified in Section 1616.1.
4. Agricultural storage structures intended only for incidental human occupancy are exempt from the requirements of Sections 1613 through 1623
1614.4 Quality assurance. A quality assurance plan shall be provided where required by Chapter 17.
1614.5 Seismic and wind. When the code-prescribed wind design produces greater effects, the wind design shall govern, but detailing requirements and limitations prescribed in this and referenced sections shall be followed

CHAPTER 17 STRUCTURAL TESTS AND SPECIAL INSPECTIONS
SECTION BC 1704 SPECIAL INSPECTIONS
1704.1 General. Where application is made for construction as described in this section, one or more special inspectors shall be employed by the owner to provide inspections during construction on the types of work listed under Section 1704 and elsewhere in this code. The special inspector shall be acceptable to the registered design professional of record The following special inspections should be required under subject application

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General Contractor

REVISION TABLE

No.	Date	Description

REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

ZONING ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

G-002.00

06 OF 21

DOB BSCAN STICKER

TABLE 503—continued
ALLOWABLE HEIGHT AND BUILDINGAREAS [a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area,building,"per floor.

GROUP	Hgt (feet) Hgt(S)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
		UL	160e	65	55	65	55	65	50	40
R–1	S	UL	UL	6	NP	6	NP	6	NP	NP
	A	UL	UL	UL	NP	24,000	NP	20,500	NP	NP
R–2	S	UL	UL	6	NP	6	3	6	NP	NP
	A	UL	UL	UL	NP	24,000	5,600	20,500	NP	NP
R–3	S	UL	UL	6	3	6	3	6	3	3
	A	UL	UL	17,500	10,500	14,700	5,600	30,000	8,400	5,500
S–1	S	UL	6	5	3	4	3	4	3	2
	A	UL	48,000	12,000	7,500	7,500	7,500	7,500	5,000	1,000
S–2[b,c]	S	UL	UL	6	3	6	4	6	3	2
	A	UL	UL	15,000	10,000	10,000	8,500	10,000	8,400	5,500
U[c]	S	UL	5	4	2	3	2	4	2	1
	A	UL	35,000	19,000	8,500	14,000	8,500	18,000	9,000	5,500

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A[D]	B	A[D]	B	HT	A[D]	B
STRUCTURAL FRAME INCLUDING COLUMNS, GIRDERS, TRUSSES	3[D]	2[D]	1	0	1	0	HT	1	0
BEARING WALLS EXTERIOR	3	2	1	0	2	2	HT	1	0
BEARING WALLS INTERIOR	3[D]	2[D]	1	0	1	0	1/HT	1	0
NONBEARING WALLS AND PARTITIONS EXTERIOR	SEE TABLE 602								
NONBEARING WALLS AND PARTITIONS INTERIOR	0	0	0	0	0	0	SEE SECTION 602.4.6	0	0
FLOOR CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	2	2	1	0	1	0	HT	1	0
ROOF CONSTRUCTION INCLUDING SUPPORTING BEAMS AND JOISTS	1 1/2[C]	1[C]	1[C]	0[C]	1[C]	0	HT	1[C]	0

TABLE 602
FIRE - RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE

FIRE SEPARATION DISTANCE (FEET)	TYPE OF CONSTRUCTION	GROUP H	GROUP F-1, M, S-1	GROUP A,B,E,F-2,I,R,S-2,U[A,B]
< 5[C]	All	3	2	1
≥ 5	IA	3	2	1
< 10	OTHERS	2	1	1
≥ 10	IA, IB	2	1	1
< 30	IIB, VB	1	0	0
	OTHERS	1	1	1
≥ 30	All	0	0	0

* SEE WALL DETAILS ON SHEETS A-400, A-500 FOR FIRE RATING COMPLIANCE

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SCALE	AS NOTED

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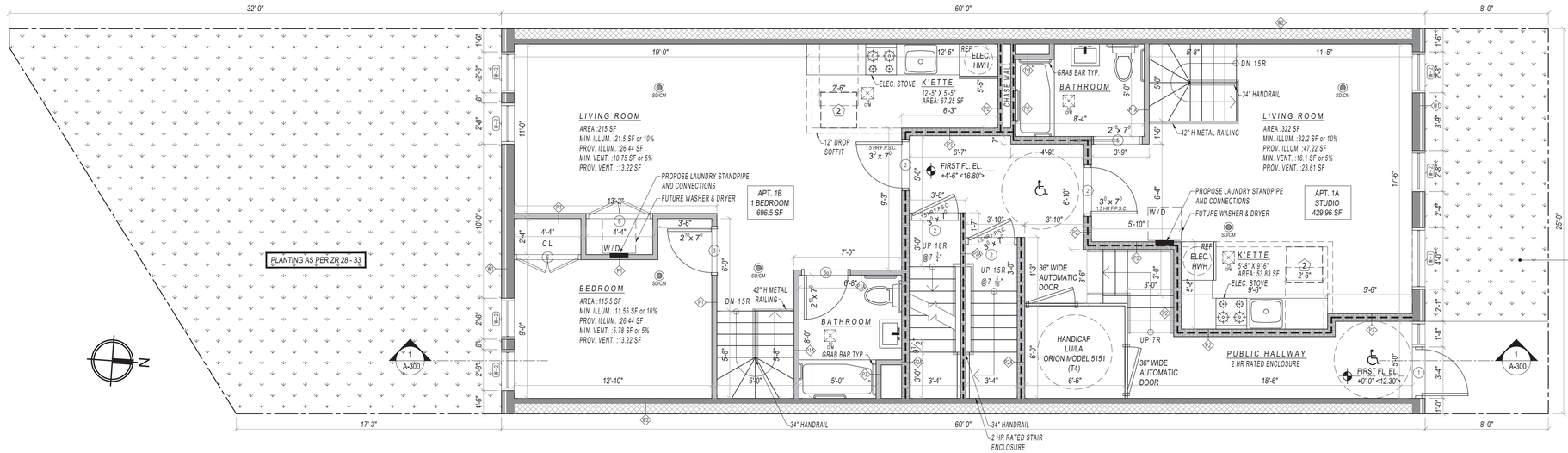
DOB BSCAN STICKER



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

ENTIRE BLDG TO BE FIRE PROTECTED WITH SPRINKLERS PER ALL REGULATIONS SEE FIRE PROTECTION DWGS FILED SEPARATELY

PER BC 908.7, 907.2.9, 907.2.10.1.1
HARDWIRED CARBON MONOXIDE AND SMOKE DETECTORS SHALL COMPLY WITH LL 7/04 27-981.21
RCNY 28-02, BC28-903.2.7

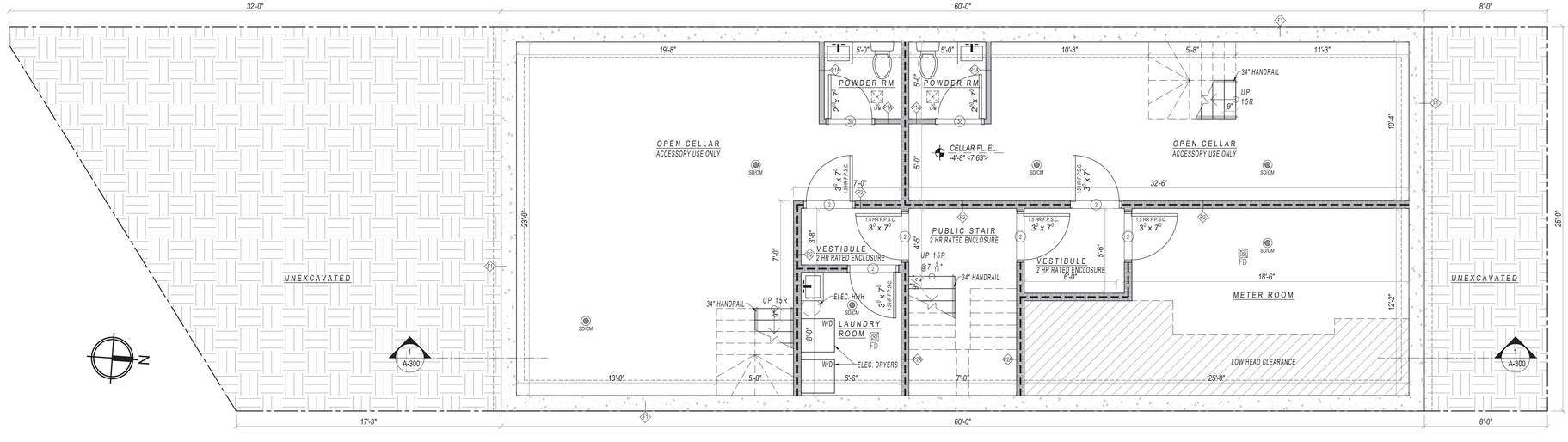
STRUCTURAL DRAWINGS FILED SEPARATELY

HEAT FOR ENTIRE BUILDING TO BE PROVIDED BY SPLIT-SYSTEM UNITS
NO BOILER ROOM PROPOSED

ENTRY DOOR
- TO PROVIDE MIN. 20 SF OF NON-TINTED GLAZED SURFACE
- TEMPERED CUSTOM GLASS DOOR & SIDELIGHT
- ALUMINUM HARDWARE

PLANTING AS PER ZR 28 - 33

2 TREES REQUIRED
1 OFF SITE AND 1 ON SITE.
LOCATION TO BE DETERMINED BY DEPARTMENT OF PARKS AND RECREATION, SEE TREE PLANTING DETAIL ON SHEET A-500



1 PROPOSED CELLAR FLOOR PLAN
SCALE: 1/4"=1'-0"

DRAWING LEGEND

	STEEL STUD WALL
	CONCRETE MASONRY
	CAST IN PLACE CONCRETE
	2HR FIRE SEPARATION
SP	SPRINKLER HEAD
SD/CM	SMOKE/CARBON MONOXIDE DETECTOR*
X	WALL TAG
6	DOOR TAG
W-1	WINDOW TAG
4	EQUIPMENT TAG

*HARDWIRED CARBON MONOXIDE AND SMOKE DETECTOR SHALL COMPLY WITH LL 7/04 27-981.21 RCNY 28-02, BC 907.2.10.1.1

EQUIPMENT LEGEND

1 — HWH : A.O.SMITH
MODEL # ECL-30 30 GALLON

2 — MITSUBISHI ELECTRIC AIR HANDLING INDOOR UNITS : PEFY-P12NMAU
HWH — NOTE: ALL HWH CLOSETS TO BE P1 WALLS & DOOR WITH 1 1/2" FIRE RATED
NOTE: SEPARATION ON ALL HWH CLOSETS IN ACCORDANCE WITH BC TABLE 508.2

3 — MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS : PUZ-A24NHA4

3 — MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS FOR DUPLEX UNITS: PUMU-P36NHMU

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PROPOSED FLOOR PLANS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

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DOB BSCAN STICKER

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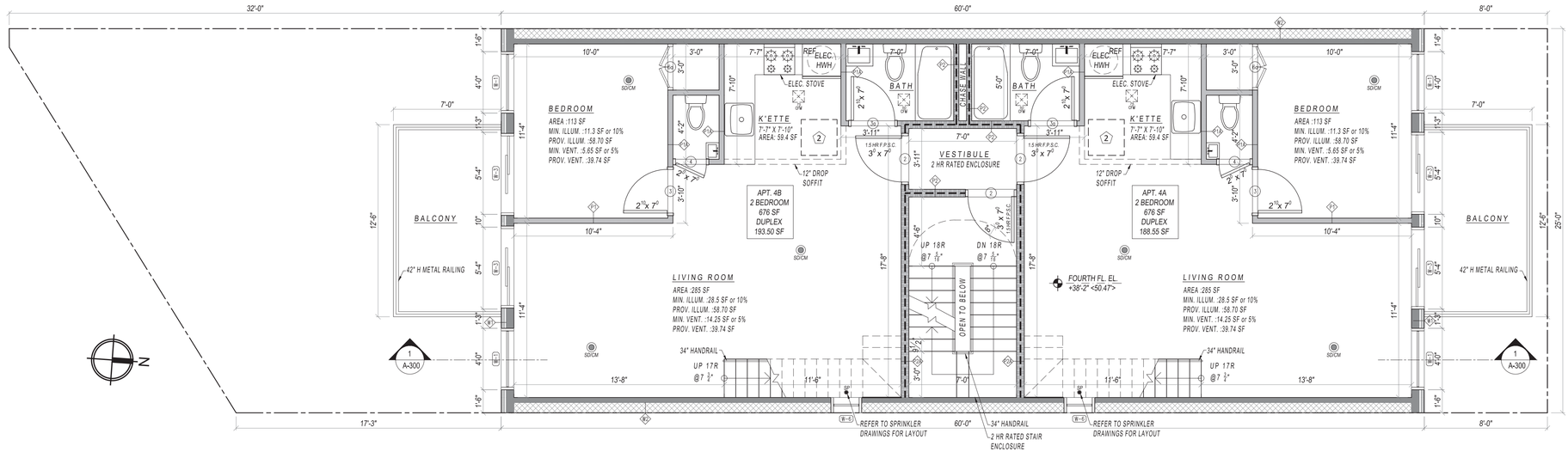
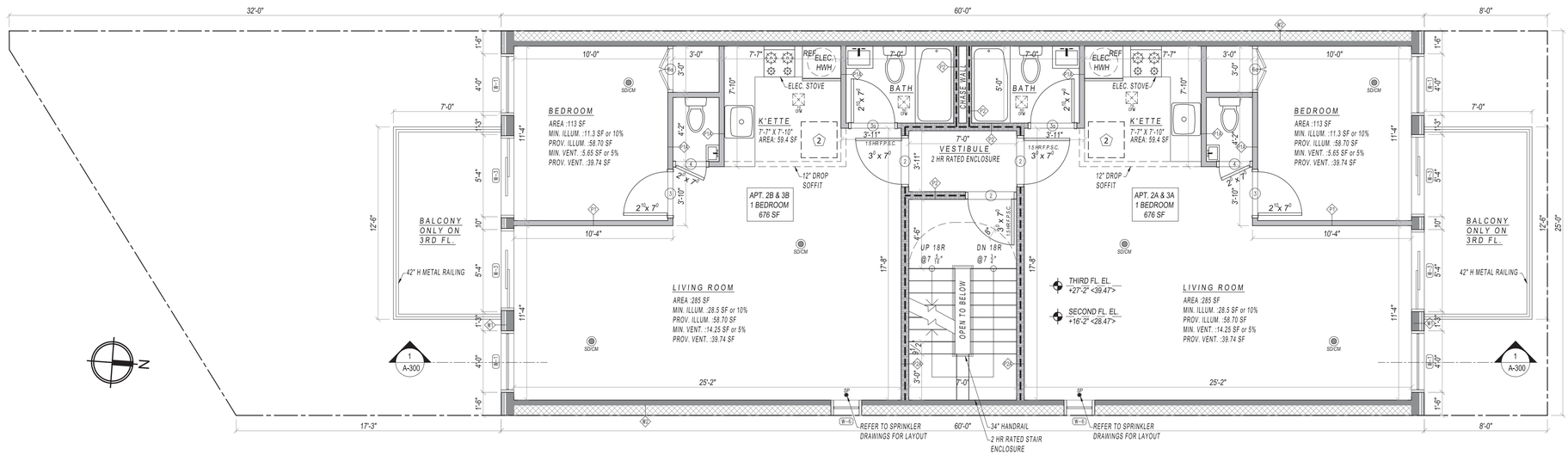
ARCHITECTURAL



2 *PROPOSED FOURTH FLOOR PLAN*
SCALE: 1/4"=1'-0"



1 *PROPOSED TYPICAL SECOND AND THIRD FLOOR PLAN*
SCALE: 1/4"=1'-0"

DRAWING LEGEND

	STEEL STUD WALL
	CONCRETE MASONRY
	CAST IN PLACE CONCRETE
	2HR FIRE SEPARATION
SP	SPRINKLER HEAD
SD/CM	SMOKE/CARBON MONOXIDE DETECTOR*
X	WALL TAG
6	DOOR TAG
W-1	WINDOW TAG
4	EQUIPMENT TAG

*HARDWIRED CARBON MONOXIDE AND SMOKE DETECTOR SHALL COMPLY WITH LL 7/04 27-981.21 RCNY 28-02, BC 907.2.10.1.1

EQUIPMENT LEGEND

1	HWH : A.O.SMITH MODEL # ECL-30 30 GALLON
2	MITSUBISHI ELECTRIC AIR HANDLING INDOOR UNITS : PEFY-P12NMAU NOTE: ALL HWH CLOSETS TO BE P1 WALLS & DOOR WITH 1 1/2" FIRE RATED NOTE: SEPARATION ON ALL HWH CLOSETS IN ACCORDANCE WITH BC TABLE 508.2
HWH	
3	MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS : PUZ-A24NHA4
3	MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS FOR DUPLEX UNITS: PUMU-P36NHMU

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PROPOSED FLOOR PLANS

DOB JOB #	320878074
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SCALE	AS NOTED

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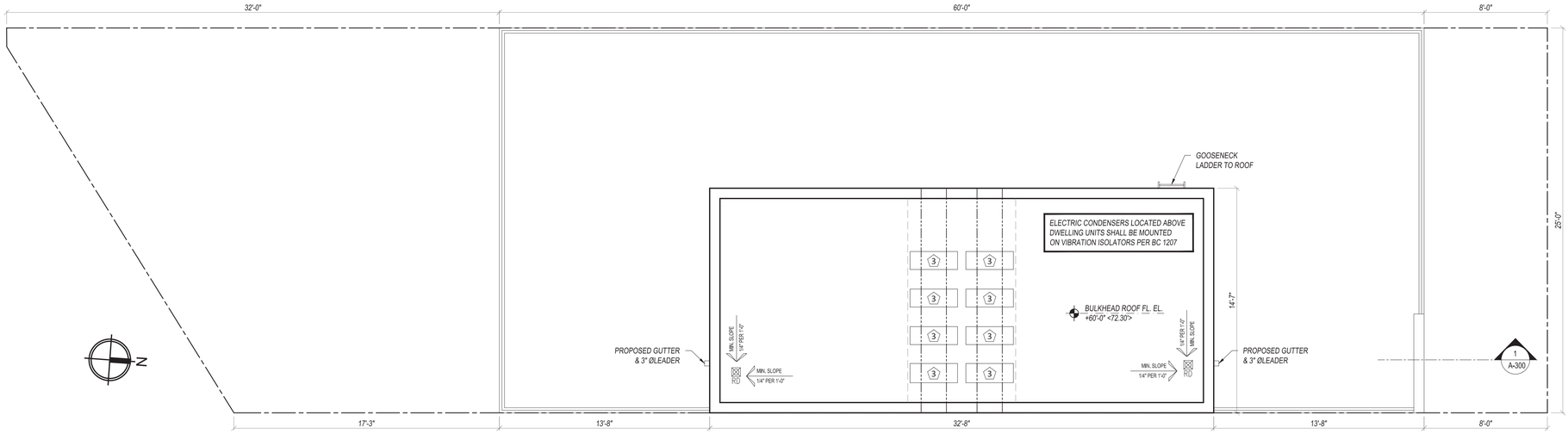
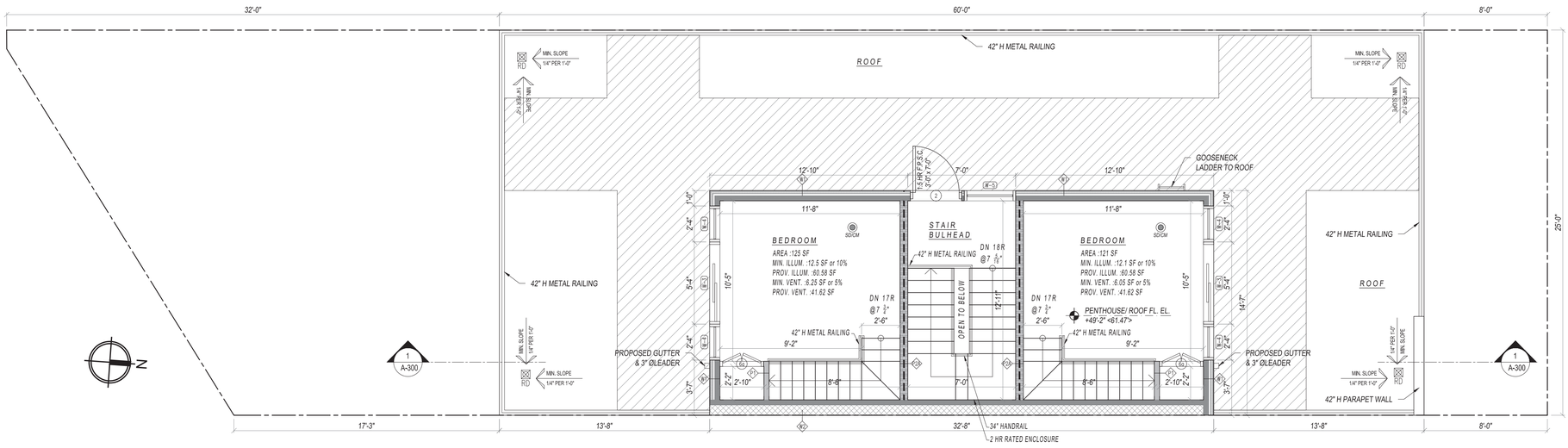
DOB BSCAN STICKER



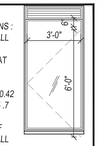
2 *PROPOSED BULKHEAD FLOOR PLAN*
SCALE: 1/4"=1'-0"



1 *PROPOSED PENTHOUSE/ROOF FLOOR PLAN*
SCALE: 1/4"=1'-0"

BC 504.3 ROOFTOP STRUCTURES. ROOFTOP STRUCTURES SHALL NOT BE INCLUDED IN THE HEIGHT OF THE BUILDING OR CONSIDERED AN ADDITIONAL STORY UNLESS THE AGGREGATE AREA OF ALL SUCH STRUCTURES EXCEEDS 33 1/3 PERCENT OF THE AREA OF THE ROOF OF THE BUILDING UPON WHICH THEY ARE ERECTED.
PROPOSED ROOF 1,500 SF X 33.33% = 499.95 SF
PROPOSED BULKHEAD = 102.08 SF
PROPOSED PENTHOUSE = 374.30 SF
PROPOSED RAILING = 22.55 SF
TOTAL ROOF STRUCTURES: 498.93 < 499.95 SF

BC 910.5.2:
SMOKE VENT DIMENSIONS : THE VENTING AREA SHALL BE MIN. 3.5% OF THE MAXIMUM SHAFT AREA AT ANY LEVEL.
MAX SHAFT AREA :
STAIR = 7'-0" x 12'-11" = 90.42 SF x 3.5% = 3.16 SF = 455 .7 SI REQ.
AT LEAST ONE-THIRD OF THE VENTING AREA SHALL BE CLEAR OPENING TO THE EXTERIOR IN THE FORM OF FIXED LOUVERS, RIDGE VENTS, OR HOODED OR GOOSENECKED OPENINGS. THE REMAINING PORTION OF THE REQUIRED VENT AREA MAY BE A WINDOW OR SKYLIGHT GLAZED WITH PLAIN GLASS NOT MORE THAN 0.125-INCH (3.2 MM) THICK OR WITH PLASTIC GLAZING.
STAIR:
PROPOSED LOUVER SIZE:
455.7 SI / 3 = 151.9 SI
3'-0" X 6" = 1.5 SF = 216 SI > 151.9 SI
PROPOSED WINDOW PORTION:
72" X 36" = 2592 SI



DRAWING LEGEND

	STEEL STUD WALL
	CONCRETE MASONRY
	CAST IN PLACE CONCRETE
	2HR FIRE SEPARATION
SP	SPRINKLER HEAD
SD/CM	SMOKE/CARBON MONOXIDE DETECTOR*
X	WALL TAG
6	DOOR TAG
W-1	WINDOW TAG
4	EQUIPMENT TAG

**HARDWIRED CARBON MONOXIDE AND SMOKE DETECTOR SHALL COMPLY WITH LL 7/04 27-981.21 RCNY 28-02, BC 907.2.10.1.1*

EQUIPMENT LEGEND

1	*HWH : A.O.SMITH MODEL # ECL-30 30 GALLON*
2 HWH	*MITSUBISHI ELECTRIC AIR HANDLING INDOOR UNITS : PEFY-P12NMAU* *NOTE: ALL HWH CLOSETS TO BE P1 WALLS & DOOR WITH 1 1/2" FIRE RATED* *NOTE: SEPARATION ON ALL HWH CLOSETS IN ACCORDANCE WITH BC TABLE 508.2*
3	*MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS : PUZ-A24NHA4*
3	*MITSUBISHI ELECTRIC CONDENSING OUTDOOR UNITS FOR DUPLEX UNITS: PUMU-P36NHMU*

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REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

PROPOSED FLOOR PLANS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-102.00
10 OF 21
DOB BSCAN STICKER

PLUMBING
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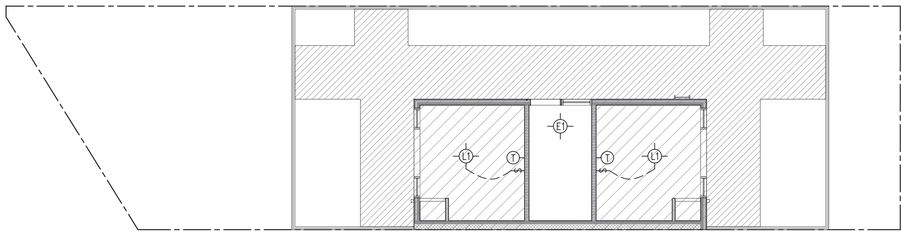
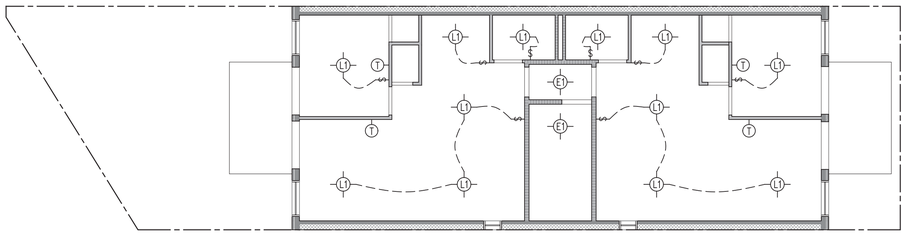
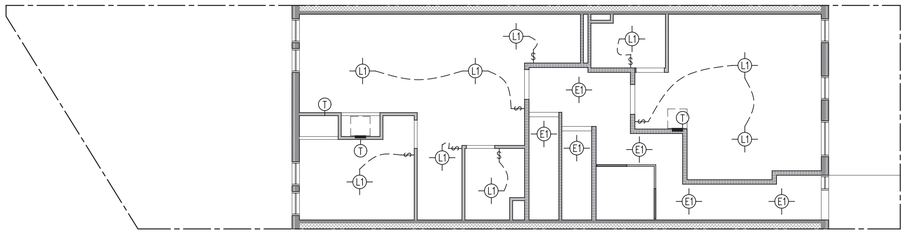
MECHANICAL
STRUCTURAL
ARCHITECTURAL



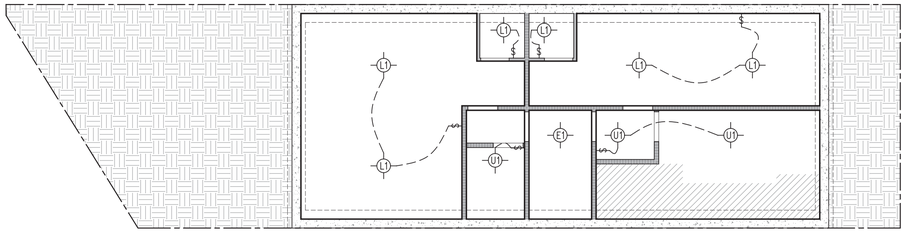
4 PROPOSED PENTHOUSE/ ROOF REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"



3 PROPOSED TYPICAL FLOOR REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"



2 PROPOSED FIRST FLOOR REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"



1 PROPOSED CELLAR REFLECTED CEILING PLAN
SCALE: 1/8"=1'-0"

LIGHTING POWER DENSITY CALCULATION
PROPOSED SECOND AND THIRD FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
CORRIDOR	27.42 SF	E1 X 1	13 W	13 / 27.42 = .47
STAIR	91.6 SF	E1 X 1	13 W	13 / 91.6 = .14
TOTAL WATTS/ SF = 26 W / 119.02 SF = 0.22 W/SF < .07 W/SF				

LIGHTING POWER DENSITY CALCULATION
PROPOSED SECOND AND THIRD FLOOR RESIDENTIAL AREA

APT	SPACE	AREA	LIGHTING POWER		WATT/SF
A	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 182 W / 571.9 SF = 0.32 W/SF < .07 W/SF					
B	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 182 W / 571.9 SF = 0.32 W/SF < .07 W/SF					

LIGHTING POWER DENSITY CALCULATION
PROPOSED FIRST FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
CORRIDOR	134 SF	E1 X 4	52 W	52 / 134 = .39
STAIR	75.5 SF	E1 X 2	26 W	26 / 75.5 = .34
TOTAL WATTS/ SF = 78 W / 209.5 SF = 0.37 W/SF < .07 W/SF				

LIGHTING POWER DENSITY CALCULATION
PROPOSED FIRST FLOOR- RESIDENTIAL AREA

APT	SPACE	AREA	LIGHTING POWER		WATT/SF
A	STUDIO	322 SF	L1 X 2	52 W	52 / 322 = .16
	BATHROOM	47.5 SF	L1 X 1	26 W	26 / 47.5 = .55
	ACCESSORY	307 SF	L1 X 2	52 W	52 / 307 = .17
	BATHROOM	25 SF	L1 X 1	26 W	26 / 25 = 1.04
TOTAL WATTS/ SF = 156 W / 701.5 SF = 0.22 W/SF < .07 W/SF					
B	LIVING ROOM	333 SF	L1 X 3	78 W	78 / 333 = .23
	BATHROOM	49 SF	L1 X 1	26 W	26 / 49 = .53
	BEDROOM	123.6 SF	L1 X 1	26 W	26 / 123.6 = .21
	KITCHENETTE	67.25 SF	L1 X 1	26 W	26 / 67.25 = .39
	ACCESSORY	457.7 SF	L1 X 2	52 W	52 / 457.7 = .11
	BATHROOM	25 SF	L1 X 1	26 W	26 / 25 = 1.04
TOTAL WATTS/ SF = 234 W / 1,055.55 SF = 0.22 W/SF < .07 W/SF					

LIGHTING POWER DENSITY CALCULATION
PROPOSED CELLAR FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
STAIR	85 SF	E1 X 1	13 W	13 / 85 = .15
MECHANICAL ROOM	304 SF	U1 X 2	46 W	46 / 304 = .15
LAUNDRY ROOM	79 SF	E1 X 1	13 W	13 / 79 = .16
TOTAL WATTS/ SF = 72 W / 468 SF = 0.15 W/SF < .07 W/SF				

LIGHTING SCHEDULE

SYMBOL	MANUFACTURER	MODEL #	TYPE	WATTAGE
L1	SEA GULL LIGHTING	79364BLE15	COMPACT FLUORESCENT 2- SELF- BALLASTED	26 WATTS (120 W EQUIV.)
E1	SEA GULL LIGHTING	5901BLE15	COMPACT FLUORESCENT 1- SELF- BALLASTED	13 WATTS (60 W EQUIV.)
U1	APPLETON LIGHTING	NT800B	COMPACT FLUORESCENT 1- SELF- BALLASTED	23 WATTS (100 W EQUIV.)
S1	PHILIPS STONCO LIGHTING	VWXL26HFL1	COMPACT FLUORESCENT 1- SELF- BALLASTED	26 WATTS (100 W EQUIV.)

LIGHTING CONTROL NOTE

1. Recessed luminaires installed in the building thermal envelope shall be sealed to maximum air leakage 2cfm.
2. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identified the lights served and indicated their status.
3. Each area that is required to have a manual control shall also allow the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern by at least 50 percent. Lighting reduction shall be achieved by one of the following or other approved method:
   - Controlling all lamps or luminaires;
   - Dual switching of alternate rows of luminaires, alternate luminaires or alternate lamps;
   - Switching the middle luminaire lamps independently of the outer lamps; or
   - Switching each luminaire or each lamp.
4. Buildings larger than 5,000 square feet (465 m2) shall be equipped with an automatic control device to shut off lighting in those areas. This automatic control device shall function on either:
   - A scheduled basis, using time-of-day, with an independent program schedule that controls the interior lighting in areas that do not exceed 25,000 square feet (2323 m2) and are not more than one floor; or
   - An occupant sensor that shall turn lighting off within 30 minutes of an occupant leaving a space; or
   - A signal from another control or alarm system that indicates the area is unoccupied.
5. In addition, for classrooms, conference rooms, employee lunch rooms and offices smaller than 200 sf, sensor and controls, including an occupant sensor, shall be installed that only enable lighting to be turned on by manual control, that automatically turn lighting off within a maximum of 30 minutes If all occupants leaving a space, and that enable lighting to be turned off by manual control. Such sensors and controls shall not have an override switch that converts from manual-on to automatic-on functionality. The occupant sensor may have a grace period of up to 30 seconds to turn on the lighting automatically after the sensor has turned off the lighting if occupancy is detected.
6. Automatic time switch control device shall incorporate an over-ride switching device that is readily accessible, is located so that a person using the device can see the lights or the area controlled by that switch, or so that the area being lit is annunciated, is manually operated, allows the lighting to remain on for no more than 2 hours when an override is initiated, and controls area not exceeding 5000 sf.
7. Automatic time switch control device shall incorporate an automatic holiday scheduling feature that turns off all loads for at least 24 hours, then resume the normally scheduled operation.
8. Daylight zones, shall be provided with individual controls that control the lights independent of general area lighting. Daylight zone near vertical fenestration is 15 feet deep from window. Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration.
9. Sleeping units in hotels, motels, boarding houses or similar buildings shall have at least one master switch at the main entry door that controls all permanently wired luminaries and switched receptacles, except those in the bathrooms. Suites shall have a control meeting these requirements at the entry to each room or at the primary entry to the suite.
10. Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photo sensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photo sensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hrs.
11. The following luminaires located within the same area shall be tandem wired:
    - Fluorescent luminaires equipped with one, three or odd-numbered lamp configurations, that are recess-mounted within 10 ft center-to- center of each other.
    - Fluorescent luminaires equipped with one, three or any other odd numbered lamp configuration, that are pendant- or surface-mounted within 1 ft edge-to-edge of each other.
12. Internally illuminated exit signs shall not exceed 5 watts per side.
13. Install separate electrical meters required for separate dwelling units.
14. In cases of substitution, lighting within dwelling units shall have a minimum of 50 percent of the permanently installed interior light fixtures fitted with high-efficacy lamps. For lamps with less than 15 watts, minimum efficacy is 40 lumen / watt, for lamps with 15-40 watts, minimum efficacy is 50 lumen / watt, for lamps with more than 40 watts, minimum efficacy is 60 lumen / watt.

LIGHTING POWER DENSITY CALCULATION
PROPOSED FOURTH & PENTHOUSE FLOOR- PUBLIC AREA

SPACE	AREA	LIGHTING POWER		WATT/SF
CORRIDOR	27.42 SF	E1 X 1	13 W	13 / 27.42 = .47
STAIR	90.4 SF	E1 X 1	13 W	13 / 90.4 = .14
STAIR	91.6 SF	E1 X 1	13 W	13 / 91.6 = .14
TOTAL WATTS/ SF = 39 W / 209.42 SF = 0.19 W/SF < .07 W/SF				

LIGHTING POWER DENSITY CALCULATION
PROPOSED FOURTH & PENTHOUSE FLOOR RESIDENTIAL AREA

APT	SPACE	AREA	LIGHTING POWER		WATT/SF
A	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	PENTHOUSE	146 SF	L1 X 1	26 W	26 / 146 = .18
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 208 W / 717.9 SF = 0.29 W/SF < .07 W/SF					
B	BEDROOM	113 SF	L1 X 1	26 W	26 / 113 = .23
	BATHROOM	35 SF	L1 X 1	26 W	26 / 35 = .74
	KITCHENETTE	59.4 SF	L1 X 1	26 W	26 / 59.4 = .44
	LIVING ROOM	352 SF	L1 X 3	78 W	78 / 352 = .22
	PENTHOUSE	150 SF	L1 X 1	26 W	26 / 150 = 17
	POWDER ROOM	12.5 SF	L1 X 1	26 W	26 / 12.5 = 2.08
TOTAL WATTS/ SF = 208 W / 721.9 SF = 0.29 W/SF < .07 W/SF					

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Mechanical Engineer
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REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

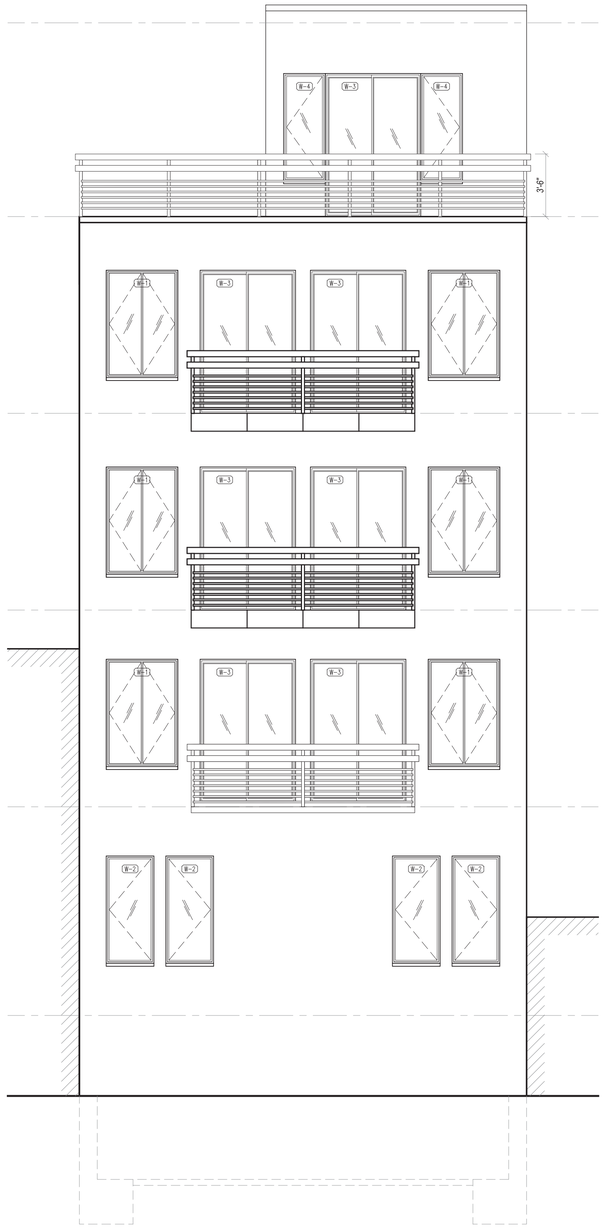
REGISTERED ARCHITECT DE-JAN LU STATE OF NEW YORK 034322

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

REFLECTED CEILING PLANS

DOB JOB #	
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-103.00
11 OF 21
DOB BSCAN STICKER



1 PROPOSED REAR ELEVATION
SCALE: 1/4"=1'-0"

2 PROPOSED FRONT ELEVATION
SCALE: 1/4"=1'-0"

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PROPOSED ELEVATIONS

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SCALE	AS NOTED

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12 OF 21

DOB BSCAN STICKER

PLUMBING
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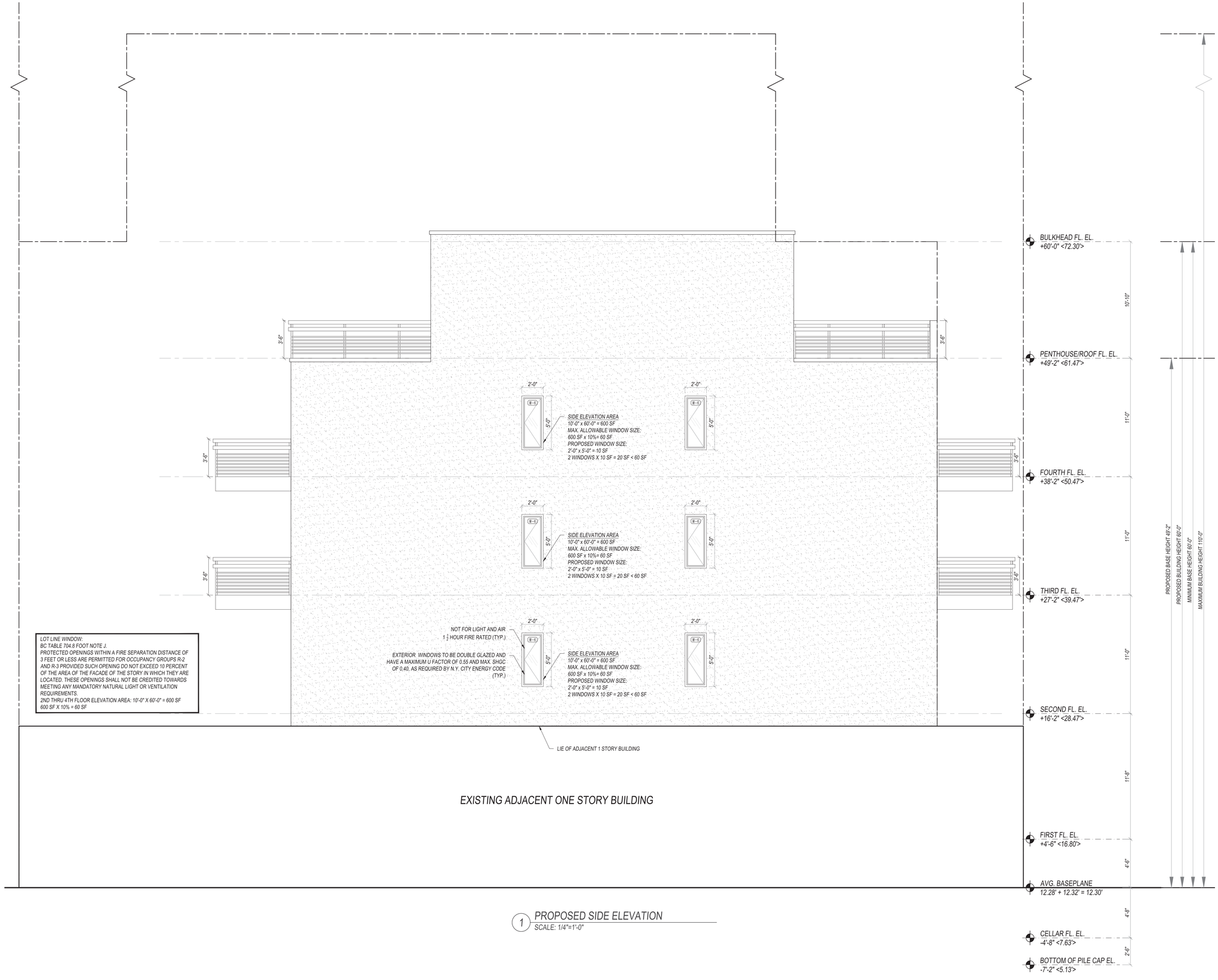

1 PROPOSED SIDE ELEVATION
SCALE: 1/4"=1'-0"

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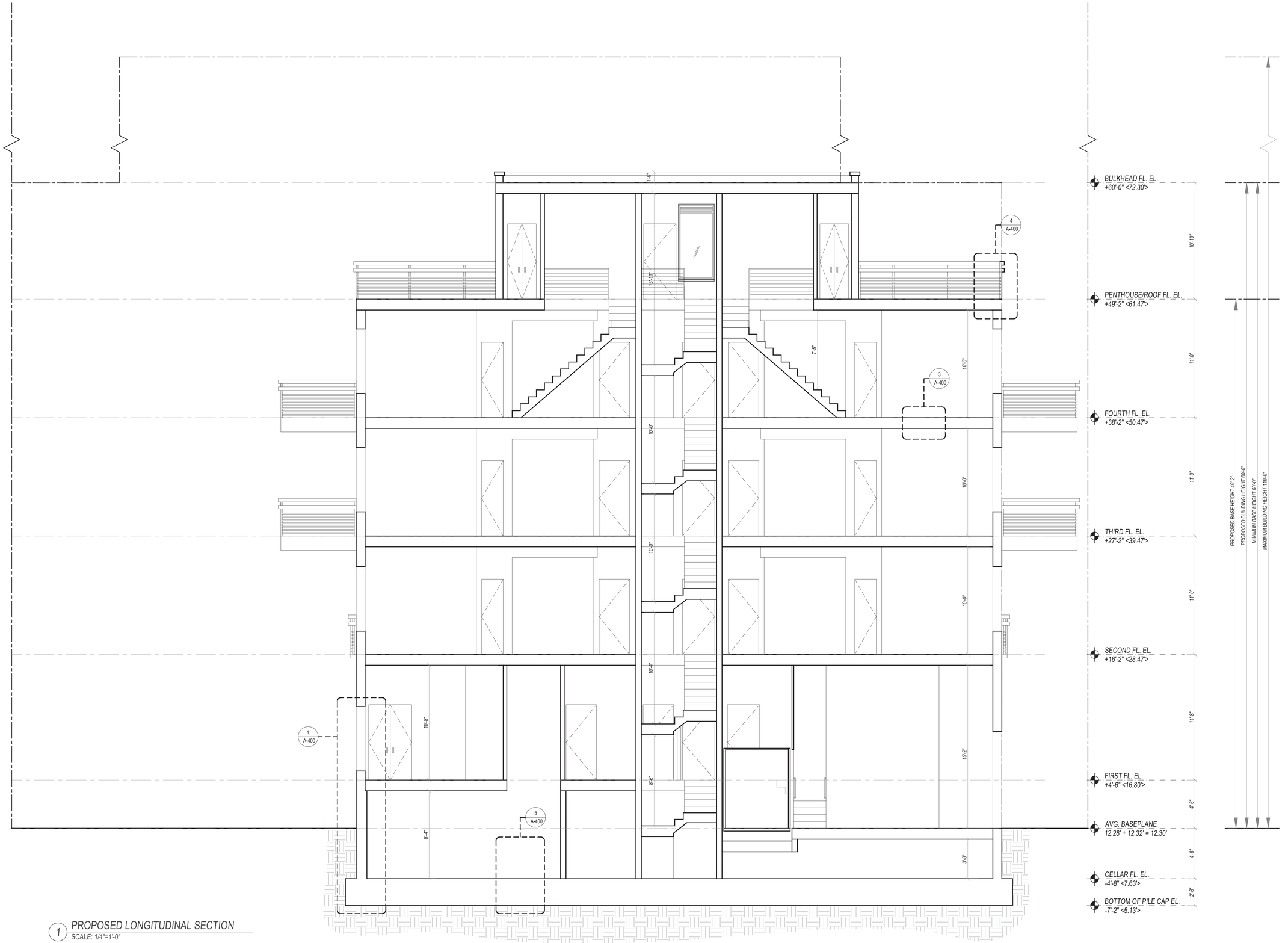

1 PROPOSED LONGITUDINAL SECTION
SCALE: 1/4"=1'-0"

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034322
STATE OF NEW YORK

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SCALE	AS NOTED

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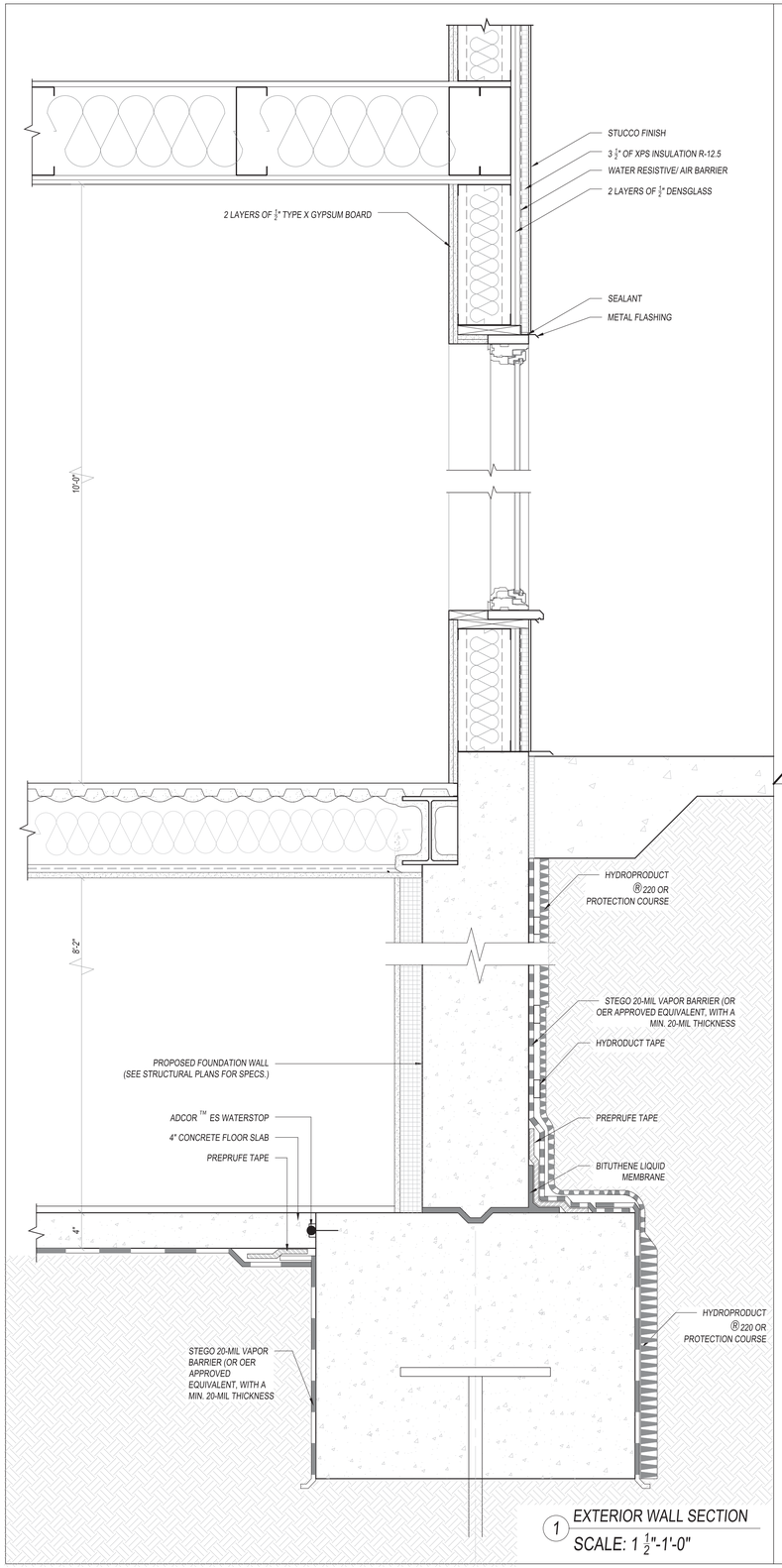
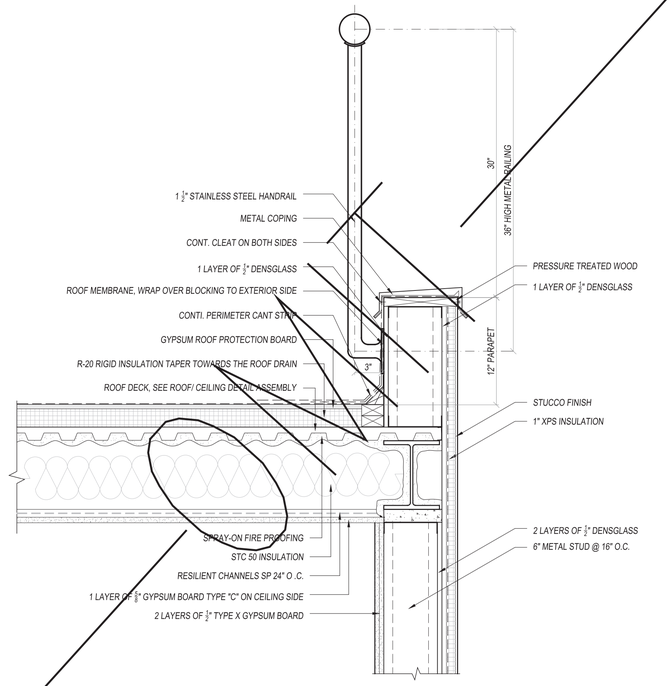
14 OF 21

DOB BSCAN STICKER

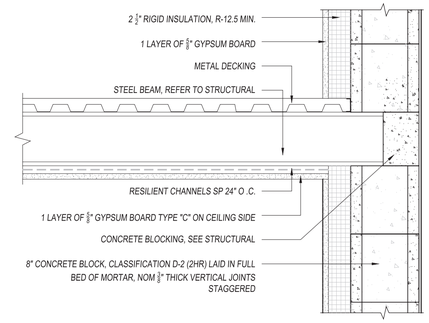
PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL



1 EXTERIOR WALL SECTION
SCALE: 1 ½"-1'-0"



2 ROOF/ BULKHEAD PARAPET DETAIL
SCALE: 1 ½"-1'-0"



3 FLOOR ASSEMBLY DETAIL
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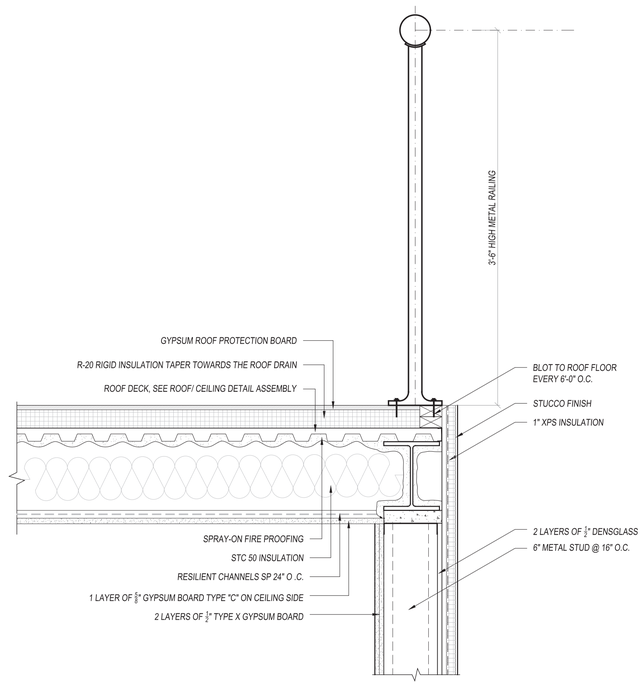
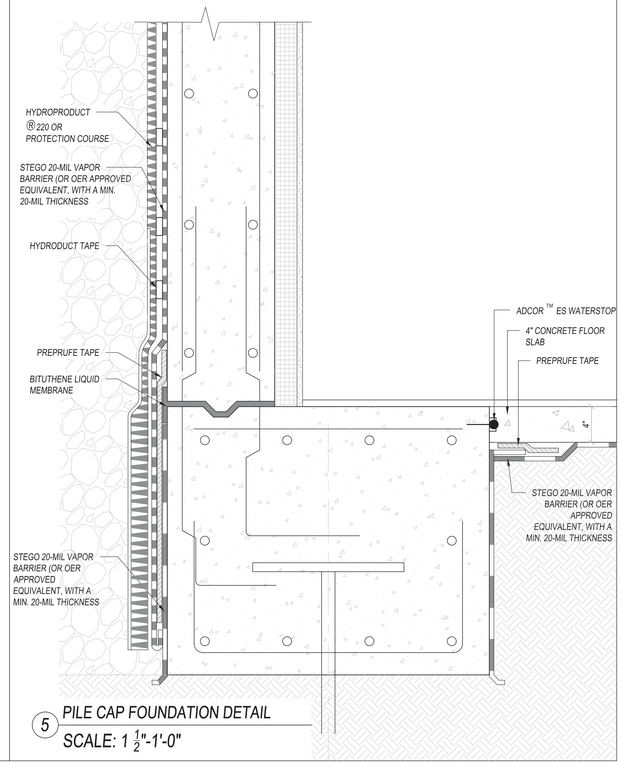


4 ROOF/ BULKHEAD PARAPET DETAIL
SCALE: 1 ½"-1'-0"



5 PILE CAP FOUNDATION DETAIL
SCALE: 1 ½"-1'-0"

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WALL DETAILS

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15 OF 21

DOB BSCAN STICKER

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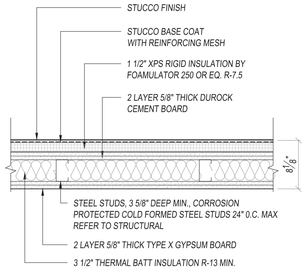
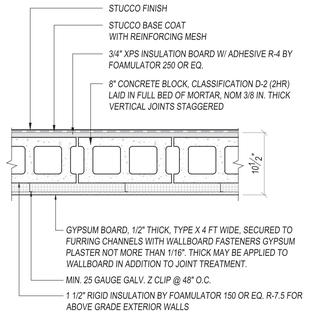


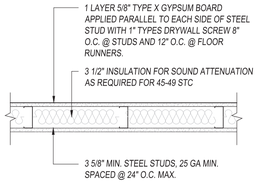
UL DESIGN NO. U404 GA FILE WP 1417

W1 — EXTERIOR STUD WALL WITH EIFS
2 HR FIRE RATED
R-13 + R-7.5 CI FOR COMMERCIAL & GROUP R



UL DESIGN NO. U912

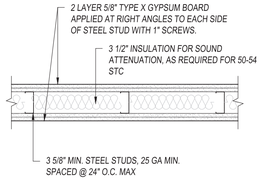
W2 — FURRED CMU WALL W/ EIFS
3 HR FIRE RATED
R-11.5 CI FOR COMMERCIAL & GROUP R



UL DESIGN NO. U465
GA FILE NO. WP 1081, 45-49 STC

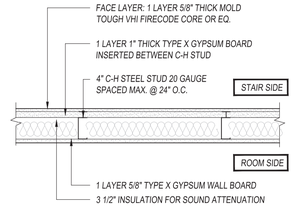
P1 — INTERIOR WALL ASSEMBLIES
1 HR FIRE RATED

P1A — 4" NON-RATED INTERIOR PARTITION FOR WET AREAS
USE 5/8 " WATER RESISTANT GYPSUM PANEL ON WET AREA SIDE



UL DESIGN NO. U419
GA FILE NO. WP 1561, 50-54 STC

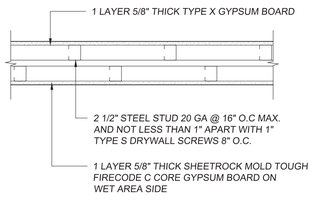
P2 — INTERIOR WALL ASSEMBLIES - NON BEARING
2 HR FIRE RATED



NOTE: USE "J" SHAPED, 4" WIDE, 20 GA GALV.
STEEL RUNNERS @ FLOOR AND CEILING

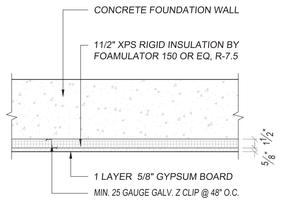
UL DESIGN NO. U467
GA WP 7068, 45-49 STC

P2A — STAIR SHAFT ENCLOSURE (MASONRY EQUIV.)
2 HR FIRE RATED

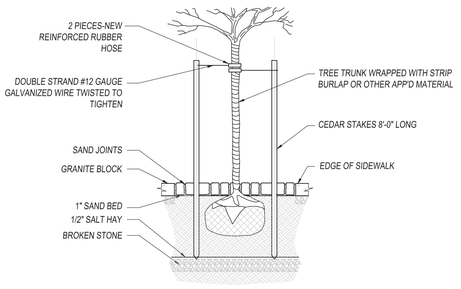


UL DESIGN NO. U493 GA FILE WP 5006

P3 — 1 HR CHASE WALL
1 HR FIRE RATED



F1 — CONCRETE FOUNDATION WALL
R-7.5 CI FOR GROUP R APPLICATION



TREE SECTION DETAIL
N.T.S.

TREE PLANTING NOTES

1. ALL MATERIALS AND CONSTRUCTION METHODS USED ARE TO CONFORM TO SECTION # 4.16 OF THE BUREAU OF HIGHWAY OPERATIONS SPECIFICATIONS, LATEST EDITION.

2. PRIOR TO THE START OF WORK, THE CONTRACTOR SHALL OBTAIN THE NECESSARY PERMIT FROM THE DEPT. OF PARKS AND RECREATION FOR THE REMOVAL AND PLANTING OF TREES.

3. TREE PITS SHOULD BE LOCATED TWO (2) FEET MINIMUM FROM OIL OR WATER BOXES.

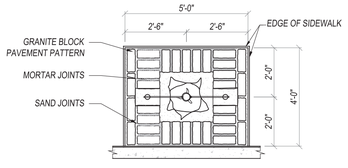
4. TREE STAKES ARE TO BE REMOVED BY THE TREE SUBCONTRACTOR NOT LESS THAN ONE YEAR AFTER PLANTING OF SAID TREES AND PRIOR TO THE FINAL ACCEPTANCE OF THE WORK.

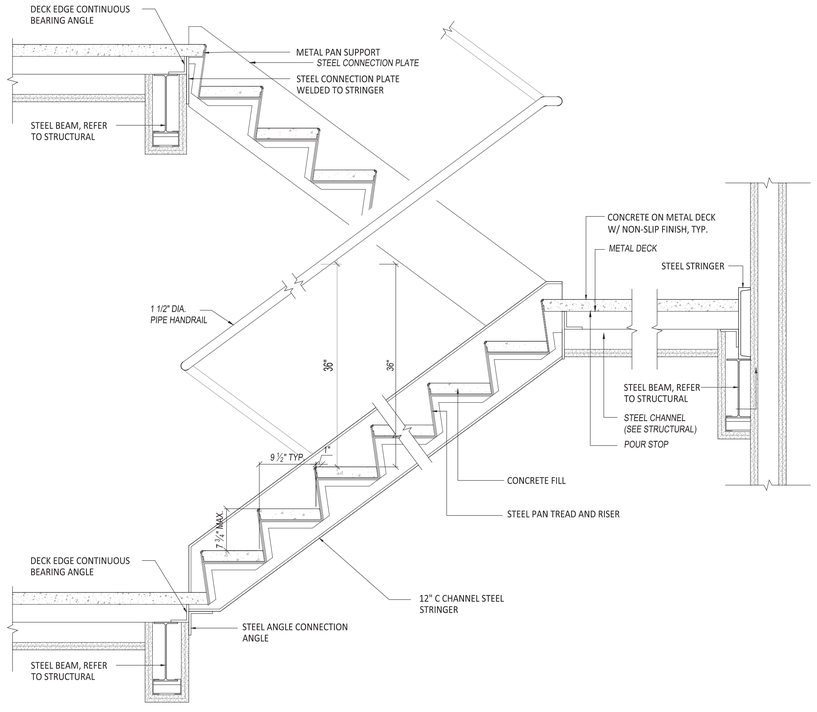
5. USE OF SIDEWALK PAVEMENT MATERIALS OTHER THAN GRANITE BLOCK MUST BE SPECIFICALLY APPROVED, IN WRITING, BY THE BUREAU OF HIGHWAY OPERATIONS.

6. GRANITE BLOCK IN TREE PIT SHALL BE PAID FOR UNDER ITEM NO. 6.06.

7. WRITTEN NOTIFICATION WILL BE MADE TO THE DEPARTMENT OF PARKS AND RECREATION PRIOR TO COMMENCEMENT OF SUCH WORK.

8. NO DELETERIOUS, CAUSTIC OR ACID MATERIALS SHALL BE DUMPED OR MIXED WITHIN 10 FEET OF SUCH TREE.





STAIR DETAIL
N.T.S.

STAIR NOTES

1. PRIOR TO THE ERECTION OF STAIR, STAIR FABRICATOR SHALL CHECK AND VERIFY STORY HEIGHT, DISTANCE FROM LANDING TO FINISH FLOOR AND MINIMUM REQUIRED HEAD CLEARANCES.

2. STAIRWAYS SHALL HAVE A MINIMUM HEADROOM CLEARANCE OF 80 INCHES.

3. THE SUM OF TWO RISERS PLUS ONE TREAD EXCLUSIVE OF NOSING SHALL BE NOT LESS THAN 24 INCHES NOR MORE THAN 25-1/2 INCHES.
MAX. RISER = 7-3/4"
MIN. TREAD DEPTH = 9-1/2" + NOSING
NOSING NOT LESS THAN 3/4 INCH (19 MM) NOT MORE THAN 11/4 INCHES.

4. STAIRWAYS SHALL HAVE HANDRAILS ON EACH SIDE. HANDRAIL HEIGHT, MEASURED ABOVE STAIR TREAD NOSINGS, OR FINISH SURFACE OF RAMP SLOPE, SHALL BE UNIFORM, NOT LESS THAN 34 INCHES AND NOT MORE THAN 38 INCHES.

5. STAIR CONSTRUCTION SHALL HAVE A STRENGTH TO SUSTAIN A MINIMUM LIVE LOAD OF 100 LBS. PER SF.

SUB-ARTICLE 4
REQUIRED STAIRWAYS C26-292.0

(6.4.1.7.1) G. CONSTRUCTION OF REQUIRED STAIRWAYS.
1. MATERIALS FOR REQUIRED STAIRWAYS. STAIRS AND STAIRWAYS SERVING AN EXIST SHALL BE CONSTRUCTED OF INCOMBUSTIBLE MATERIAL OR ASSEMBLIES THROUGHOUT. EXCEPT IN FRAME AND NON-FIREPROOF STRUCTURES FORTY FEET OR LESS IN HEIGHT AND OCCUPIED BY FIFTY OR LESS PERSONS ABOVE THE FIRST STORY. THE TREADS AND LANDINGS SHALL BE CONSTRUCTED AND MAINTAINED IN SUCH MANNER AS TO PREVENT PERSONS FROM SLIPPING THEREON.

6.4.1.7.2) 2. STRENGTH OF REQUIRED STAIRWAYS. STAIRS, PLATFORMS, LANDINGS AND STAIR HALLS SHALL BE OF SUFFICIENT STRENGTH TO SUSTAIN A SAFELY LIVE LOAD OF AT LEAST ONE HUNDRED POUNDS PER SQUARE FOOT.

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REVISION TABLE

No.	Date	Description

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56 Frost Realty LLC
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General Contractor

REGISTERED ARCHITECT
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STATE OF NEW YORK
034322

PLUMBING
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MECHANICAL
STRUCTURAL
ARCHITECTURAL

WALL DETAILS CONTINUE

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-500.00

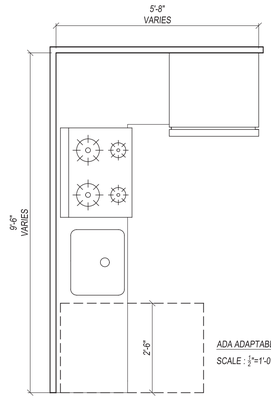
16 OF 21

DOB BSCAN STICKER

ADAPTABLE KITCHENETTE (CAPABLE OF POSSIBLE FUTURE CONVERSION TO ACCESSIBLE KITCHEN)

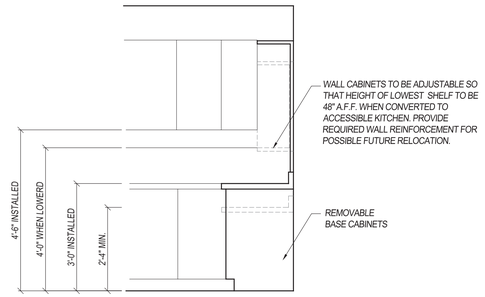
GENERAL NOTES

1. *ONE LOWERABLE WORK SURFACE,30" WIDE IS REQUIRED, WITH REMOVAEIBLE BASE CABINETS. HEIGHT TO BE ADJUSTABLE BETWEEN 28" AND 36" AFF TO COUNTERTOP.*
2. *ONE LOWERABLE SINK SURFACE,30" WIDE IS REQUIRED, WITH REMOVAEIBLE BASE CABINETS. HEIGHT TO BE ADJUSTABLE BETWEEN 28" AND 36" AFF TO COUNTERTOP.*
3. *OVENS ARE ASSUMED TO BE SELF-CLEANING TYPE. IF OTHERWISE , PROVIDE A MINIMUM 30" ADJUSTABLE COUNTER SPACE WITH REMOVABLE BASE CABINETS NEXT TO OVEN.*
4. *A MINIMUM 36" TURNAROUND SPACE UNDER THE COUNTER WITH REMOVABLE BASE CABINETS SHALL BE PROVIDED IN DEEP CLOSED ENDED GALLERY KITCHENS AND OTHER U-SHAPED KITCHENS WHERE THE CLEARANCE BETWEEN CABINETS IS LESS THAN 5'-0" THE MINIMUM CLEARANCE BETWEEN CABINETS SHALL BE 40"*
5. *48" A.F.F. WHEN CONVERTED TO ACCESSIBLE KITCHEN. PROVIDE REQUIRED WALL REINFORCEMENT FOR POSSIBLE FUTURE RELOCATION.*



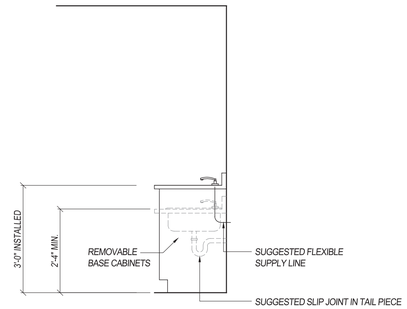
ADA ADAPTABLE KITCHEN CABINETS

SCALE : $\frac{1}{4}$"=1'-0"



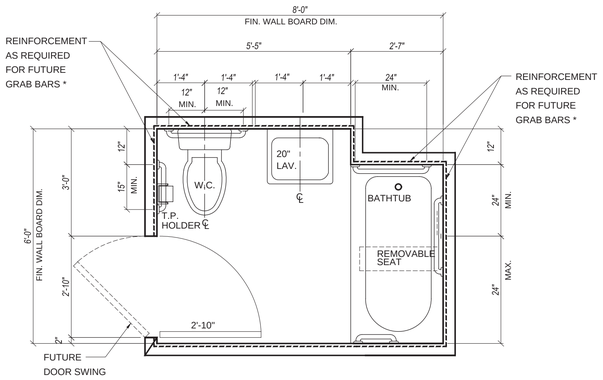
ADAPTABLE KITCHEN LOWERABLE WORK

SCALE : $\frac{1}{4}$"=1'-0"



ADAPTABLE KITCHEN LOWERABLE SINK COUNTER

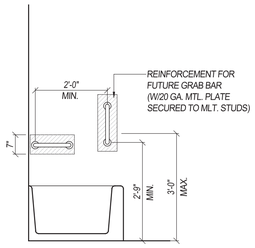
SCALE : $\frac{1}{4}$"=1'-0"



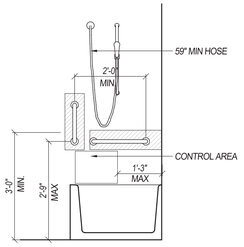
TOILET,BATHTUB,LAVATORY AND TO BE REPLACEABLE WITH ACCESSIBLE TYPE FIXTURES AND FITTINGS WHEN BATHROOM MAY BE CONVERTED TO ACCESSIBLE TYPE. SEE DETAILS OF EACH FIXTURE FOR REQUIRED WALL REINFORCEMENT FOR POSSIBLE FUTURE ATTACHMENT OF GRAB BARS.

ADAPTABLE BATHROOM TYPE A MINIMUM SIZE

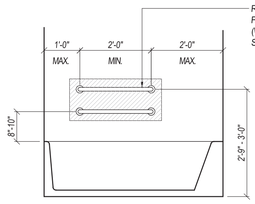
SCALE : $\frac{1}{4}$"=1'-0"



HEAD END WALL



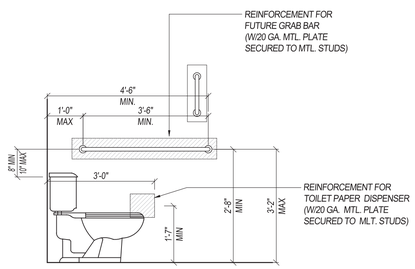
CONTROL END WALL



BACK WALL

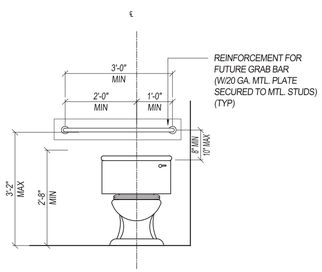
ADAPTABLE BATHTUB

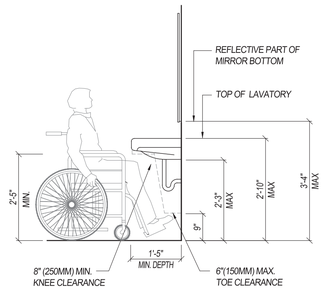
SCALE : $\frac{1}{4}$"=1'-0"



ADAPTABLE TOILET

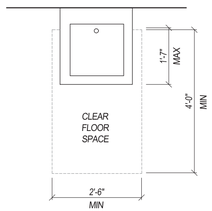
SCALE : $\frac{1}{4}$"=1'-0"





HEIGHT OF LAVATORIES AND SINKS

SCALE : $\frac{1}{4}$"=1'-0"



OPTIONAL ACCESSIBLE LAVATORY

SCALE : $\frac{1}{4}$"=1'-0"

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ADA COMPLIANCE DWG & NOTES

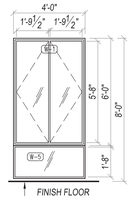
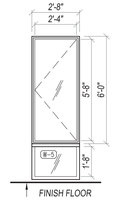
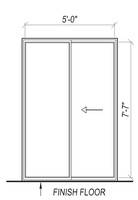
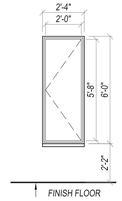
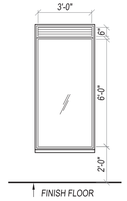
DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-501.00

17 OF 21

DOB BSCAN STICKER

WINDOW SCHEDULE (ALL WINDOWS SHALL BE DOUBLE GLAZED)

TAG	W-1	W-2	W-3	W-4	W-5
ELEVATION					
TYPE	CASEMENT WINDOW	CASEMENT WINDOW	SLIDING DOOR	CASEMENT WINDOW	WINDOW / VENT
U-FACTOR	0.28	0.28	0.28	0.28	0.28
SHGC	0.29	0.29	0.29	0.29	0.29
GLAZED AREA	20.77 SF	13.22 SF	37.92 SF	11.33 SF	18 SF
OPENABLE AREA	20.77 SF	13.22 SF	18.96 SF	11.33 SF	216 SI
CONDITION:	PROPOSED	PROPOSED	PROPOSED	PROPOSED	PROPOSED

WINDOW NOTE

1. In case of substitution, general contractor to provide all double-glazed windows and doors to comply with the following requirements:
- Metal framed window assembly: maximum U-factor of 0.55, SHGC of 0.40, maximum air leakage of 0.3 cfm/SF.
- Curtain wall and storefront assembly: maximum U-factor of 0.50, SHGC of 0.40, maximum air leakage of 0.3 cfm/SF.
- Metal framed glazed entrance door: maximum U-factor of 0.85, SHGC of 0.40, maximum air leakage of 1.0 cfm/SF.
- Skylight: maximum U-factor of 0.60, maximum skylight to roof ratio of 3%, maximum air leakage of 0.3 cfm/SF.
- Non-metal framed window assembly: 0.40, SHGC of 0.40, maximum air leakage of 0.3 cfm/SF.
2. General contractor to provide expandable spray-applied polyurethane foam sealant continuously installed at all window rough openings.

ZR123-32 ENVIRONMENTAL CONDITIONS
IN SPECIAL MIXED USE DISTRICTS, ALL NEW DWELLING UNITS SHALL BE PROVIDED WITH A MINIMUM 35DB(A) OF WINDOW WALL ATTENUATION TO MAINTAIN AN INTERIOR NOISE LEVEL OF 45DB(A) OR LESS, WITH WINDOWS CLOSED, AND SHALL PROVIDE AN ALTERNATE MEANS OF VENTILATION.

EQUIPMENT SCHEDULE

TAG	EQUIPMENT	MANUFACTURER	MODEL	DIMENSION	QUANTITY	CAPACITY (BTU/H)	ENERGY EFFICIENCY	MEA / UL NUMBER
1	ELECTRIC HWH	A.O.SMITH	ECL-30	30"h x 22"dia.	9	30 GALLONS	EF=0.93	MEA 25-05-E

EQUIPMENT SCHEDULE

GENERAL					FAN DATA						COOLING DATA					HEATING DATA			FILTER		ELECTRICAL		VIBRATION ISOLATION		DIMENSION (IN)	WEIGHT (LBS)	REMARKS
TAG	EQUIPMENT	MARK	MANUFACTURER	MODEL	CFM	MIN. O.A.	RPM	TOTAL S.P. IN H2O	BHP	DRIVE	TOTAL MBH	SENS. MBH	EAT (DB/WB)(°F)	LAT (DB/WB)(°F)	OUTDOOR TEMP. (°F)	MBH @ 5°F	EAT /LAT (°F)	OUTDOOR TEMP. (°F)	TYPE	EFF. %	PHASE	VOLT	TYPE	DEFL			
2	AIR HANDLING UNIT	AH-1	MITSUBISHI	PEFY-P12NMAU	265/371			0.60		DIRECT DRIVE	12		80/67	55/54	95.0	9	65/85	5	WASH	90%	1	208	NEO PRENE		28 x 28 x 10	51	

EQUIPMENT SCHEDULE

GENERAL						BLOWER DATA						COOLING DATA		HEATING DATA				COMPRESSOR				FILTER	ELECTRICAL				WEIGHT (LBS)	DIMENSION (IN)
TAG	EQUIPMENT	MARK	SERVICE	MANUFACTURER	MODEL	CFM	MIN. O.A.	FLA	ESP (in WG)	BHP	DRIVE	TOTAL MBH	EAT/LAT (°F)	MBH @ 5°F	EAT /LAT (°F)	EWT/ LWT (°F)	GPM	QNTY	TYPE	STEPS	RLA (EACH)		VOLT	PHASE	MCA	MOP		
3	CONDENSING UNIT	ACCU-1	DUPLEX APTS.	MITSUBISHI	PUMU-P36NHMU	3530	100%		0.2-1.0		DIRECT	36	N/A	27	N/A	N/A	N/A	1	ROTARY			NONE	208	1	26	30	287	37 x 14 x 53
3	CONDENSING UNIT	ACCU-2	1ST, 2ND & 3RD FL.	MITSUBISHI	PUZ-A24NHA4	1940	100%		0.2-1.0		DIRECT	24	N/A	18	N/A	N/A	N/A	1	ROTARY			NONE	208	1	18	25	165	37 x 15 x 37

HVAC NOTES

1. Provide one thermostat / humidistat for each zone for hvac system.
2. Electric heat shall be enable only when the heat pump cannot meet load.
3. Zone thermostat operation shall have minimum 5 degree dead band between heating and cooling.
4. All zone thermostat shall be operated via thermostatic setback controls operated via an automatic time clock or a programmable control system.
5. HVAC controls shall have ability to setback temperatures down to 55 degrees F, or up to 85 degrees F.
6. HVAC controls shall be capable of automatically starting and stopping the systems for seven different daily schedules per week, capable of having settings saved in memory for 10 hours during a loss of power, and a manual system "on" override for up to two hours, or an occupancy sensor.
7. When applicable, each outdoor supply air and exhaust air ducts shall be provided with motorized dampers to shut off when not in use. Motorized dampers shall have ability to operate at minimum positions.
8. Operating and Maintenance manual shall be provided by mechanical contractor and specified in the construction documents.
9. If air system is provided, each supply air outlet, and zone terminal device shall be provided with means of balancing. Discharge dampers prohibited on constant volume and VAV fans with motors greater than 10 HP.
10. If hydronic system is provided, all heating and cooling coils to be provided with a means of balancing and pressure test.

HOT WATER TANK NOTES

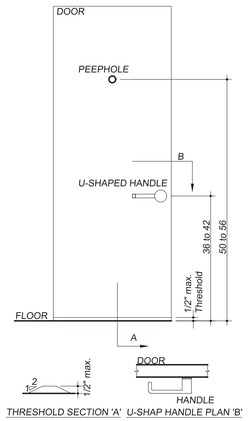
1. Controls shall allow 110 degree F set point for dwellings, and 90 degrees F for other occupancies. Lavatories in public restrooms shall be limited to 110 degrees F
2. Water heating equipment shall be provided with heat traps on the supply and discharge piping if not integrated with equipment
3. Automatic circulating hot water systems-1" insulation. First 8' pipe in non-circulating systems without integral heat traps-0.5" insulation. Conductivity for insulation shall not exceed 0.27 Btu/inch/hxft^2xF
4. Automatic circulating hot water system pumps and heat trace to be turned off manually or automatically when hot water system is not in operation
5. In case of substitution, the installed electric hot water heater shall have a minimum of 0.97 - 0.00132V, EF, or the installed gas hot water heater shall have a minimum of 0.67 - 0.0019V, EF, or the installed gas instantaneous hot water heater shall have a minimum of 0.62-0.0019V, EF.

DOOR SCHEDULE

TAG	LOCATION	DOOR SIZE	DOOR TYPE	SWING	FRAME	FIRE RATING	SADDLE	COMMENTS	GLAZING
1	MAIN ENTRANCE	3'-0" X 8'-0"	GLAZED	DOUBLE	ALUMINUM	1-1/2 HR	ALUM.		35 SF
2	APT ENTRANCE*	3'-0" X 7'-0"	H.M.	SINGLE	H.M.	1-1/2 HR	ALUM.		
3	BEDROOM	2'-10" X 6'-8"	WOOD	SINGLE	WOOD	N/A	NONE		
3a	BATHROOM	2'-10" X 7'-0"	WOOD	SINGLE	WOOD	N/A	MARBLE		
4	BATHROOM	2'-0" X 7'-0"	WOOD	SINGLE	WOOD	N/A	MARBLE		
5	BATHROOM	2'-10" X 7'-0"	WOOD	SLIDING	WOOD	N/A	MARBLE		
6	CLOSET	4'-0" X 6'-8"	WOOD	DOUBLE	WOOD	N/A	NONE		
6a	CLOSET	2'-8" X 6'-8"	WOOD	DOUBLE	WOOD	N/A	NONE		

DOOR NOTE

1. In case of substitution, general contractor to provide all opaque exterior swing doors with insulated metal door at maximum U-factor of 0.70, and maximum air leakage of 0.3 cfm/SF.
2. In case of substitution, general contractor to provide all opaque exterior roll-up or sliding doors with insulated metal door at maximum U-factor of 0.50.
3. Cargo doors and loading dock doors shall be equipped with weather seals to restrict infiltration when vehicles are parked in doorway.



THRESHOLD SECTION 'A' U-SHAP HANDLE PLAN 'B'

Sec. 4.13, ANSI A117.1, 4.13.9 thru 4.13.11

HANDICAP DOOR HARDWARE
NOT TO SCALE

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REVISION TABLE

No.	Date	Description

Owner
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Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

WINDOW & DOOR SCHEDULES

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

A-600.00

18 OF 21

DOB BSCAN STICKER

NYC ENERGY CODE TABULAR ANALYSIS (NYCECC 2011)

ADDRESS	55 Frost St
BLOCK	2737
LOT	10
CLIMATE ZONE	4A
BUILDING TYPE	residential only (group R)
SCOPE OF WORK	Four story and penthouse resicential building

NYECC citation	Provision	Item Description	Proposed Design value	Code Prescriptive Value	Supporting Documentation
Climate Zones, Design Conditions, Materials, Equipment and Systems					
302	**Design Conditions**				
302.1	**Interior Design Conditions**	Minimum and maximum temperatures for interior design load calculations	Load calculations performed at a maximum of 72 degrees F for heating and a minimum of 75 degrees F for cooling.	Load calculations performed at a maximum of 72 degrees F for heating and a minimum of 75 degrees F for cooling.	General note on EN-001
Commercial Building Thermal Envelope					
502.2	**Opaque Assemblies**				
502.2 (1)	**Roof Assembly -Insulation Entirely Above Deck**	new roof membrane and thermal insulation	Roof Type 1: 3 1/2" XPS (R-20.5) continuous insulation above deck	Minimum R-20 continuous insulation	Roof ceiling assembly detail on page A-402
502.2 (1)	**Walls, Above-grade: Mass.**	CMU wall with continuous rigid insulation either on interior side or on exterior side as EIFS	2 1/2" XPS continuous insulation (R-12.5)	Minimum R-11.4 continuous insulation at residential floor	Wall tag on all floor plans Wall Type 2.6 & 2.7 detail on page A-401
502.2 (1)	**Walls, Above-grade: Metal framed**	steel stud walls with EIFS exterior.	R-13 fiberglass batt insulation at cavity, 1 1/2" XPS board (R-7.5ci) at EIFS system	Minimum R13 + R7.5ci	Wall tag on all floor plans Wall Type detail 3.3, 3.5, 3.6, 3.7 on page A-401
502.2 (1)	**Below-Grade Walls**	continuous rigid insulation at cellar / basement concrete wall	1 1/2" XPS continuous insulation (R-7.5)	Minimum R-7.5 continuous insulation at residential floor	Wall tag on all floor plans Wall Type detail 1.6 on page A-400
502.2 (1)	**Slab-on-Grade Floors: Unheated Slabs**	slab on grade	2" XPS continuous insulation (R-10) for 24 in.	R-10 for 24 in. below at residential floor	Foundation detail on page A-403
502.2 (1)	**Opaque Doors, Swinging**	Insulated Metal egress door	U-0.70	U-0.70	Insulated metal door specification on A-600
502.2 (1)	**Opaque Doors, Roll-up or Sliding**	Insulated metal roll-up garage door	U-0.50	U-0.50	Insulated metal door specification on A-600
502.3	**Fenestration**				
502.3	**Window to wall ratio**	Unmodified WWR	less than 40%	40% Maximum	Building Elevations
502.3	**Vertical Fenestration,framing materials other than metal with or without metal reinforcement or cladding, U Value, SHGC, PF <0.25**	New vinyl framed windows at residential floors	U-0.31 SHGC-0.30	U-0.40 SHGC- 0.40	Window schedule and note on A-600
502.3	**Vertical Fenestration, Metal Framing with or without thermal break U Value, SHGC, PF >0.25**	New vinyl framed windows at residential floors, located below overhang	U-0.31 SHGC-0.30	U-0.40 SHGC- NR	Window schedule and note on A-600
502.3	**Glazed Doors, Metal Framing with or without thermal break U Value & SHGC, PF <0.25**	New aluminum framed glazed door at building entry	U-0.69 SHGC-0.26	U-0.85 SHGC- 0.40	Door schedule and note on A-600
502.4	**Air leakage (Mandatory)**				
502.4.1	**Window and door assemblies**	New windows	Air leakage less than 0.3 cfm/sf	Maximum Air Leakage = 0.3 cfm/SF	Window schedule and note on A-600
502.4.3	**Continuous Air Barrier**	Expandable spray-applied polyurethane foam sealant, continuous @ window rough openings	Expandable spray-applied polyurethane foam sealant, continuous @ window rough openings	A continuous air barrier shall be installed: sealing all seams, openings and penetrations of the building and shall be sealed with caulking materials or closed with gasketing systems compatable with the construction materials and location.	Window schedule and note on A-600
502.4.4	**Outdoor intakes and exhaust openings**	New vents and air intakes.	All new vents and air intakes to be provided with Class I motorized, leakage-rated damper with a max leakage rate of 4 cfm/sf at 1.0 in. wg.	Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the bldg envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a max leakage rate of 4 cfm/sf at 1.0 in. wg.	General note on EN-001
502.4.6	**Vestibules**	Vestibule provided @ building entrance. Two sets of swinging doors with selfclosers.	Vestibule not required, entrance doors open directly from a space less than 3000 s.f.	Vestibule provided at door separating conditioned space from the exterior, if doors are open directly from a space no less than 3000 sf	First floor plan
502.5	**Vapor retarders (Mandatory)**				
502.5.3	**Minimum clear air spaces and vented openings for vented cladding.**	Stucco with a 3/8" inch clear airspace with 3/8" inch continuous slot vent openings at the top and bottom of each wall.	Stucco with a 3/8" inch clear airspace with 3/8" inch continuous slot vent openings at the top and bottom of each wall.	Stucco with a 3/8" inch clear airspace with 3/8" inch continuous slot vent openings at the top and bottom of each wall.	Exterior Wall detail on A-401 General note on EN-001
Commercial Building Mechanical Systems					
503	**Building Mechanical Systems**				
503.2	**Mandatory Provisions**				
503.2.1	**Calculation of heating and cooling loads**	Minimum and maximum temperatures for interior design load calculations	Design loads shall be determined in accordance with the procedures described in the ASHRAE/ACCA 183.	ASHRAE/ACCA 183 ASHRAE HVAC Systems and Equipment Handbook, chapter 3 Energy Code	General note on EN-001 Mechanical Plan
503.2.2	**Equipment and system sizing**	Heating and cooling equipment shall not exceed calculated loads	Specified equipment sized within load calculation limits	Heating and cooling equipment shall not exceed calculated loads	General note on EN-001 Mechanical Plan
503.2.3	**HVAC Equipment Performance Requirements**				
503.2.3(2)	**Unitary and applied heat pumps, electrically operated, minimum efficiency requirements**	split system air cooled heat pump	cooling 36,000Btu/h, heating 40,000 Btu/h 13.0 EER, 7.7 HSPF	For unit with cooling capactiy < 65,000 Btu/hr, min. 13.0 SEER at cooling mode and min. 7.7 HSPF at heating mode	Split or Single Package System, air cooled heat pump units schedule on A-600
503.2.4	**HVAC System Controls**				
503.2.4.1	**Thermostatic Controls**	Thermostats/humidistats for mechanical zones	One thermostat is provided for each zone	Minimum one thermostat/humidistat required per zone	Equipment schedule note on A-600
503.2.4.1.1	**Heat Pump Supplementary Electric Resistance Heat**	Heat Pump Supplementary Electric Resistance Heat	Electric heat shall be enable only when the heat pump cannot meet load	Except during defrost, supplementary electric heat to be prevented from coming on when heat pump can meet load	Equipment schedule note on A-600
503.2.4.2	**Set Point Overlap Restriction**	thermostats	Each thermostat will be programmed as required	Zone thermostat operation shall have minimum 5 degree dead band between heating and cooling	Equipment schedule note on A-600
503.2.4.3	**Off-hour Controls, setbacks**	All zones	Each thermostat will be programmable to meet requirements	All zone thermostat shall be operated via thermostatic setback controls operated via an automatic time clock or a programmable control system	Equipment schedule note on A-600
503.2.4.3.1	**Thermostatic Setback capabilities**	All zones	Each thermostat will be programmable to meet requirements	Controls shall have ability to setback temperatures down to 55 degrees F, or up to 85 degrees F.	Equipment schedule note on A-600
503.2.4.3.2	**Automatic Setback and shutdown Capabilities**	All zones	Each thermostat will be programmable to meet requirements	Controls shall be capable of automatically starting and stopping the systems for seven different daily schedules per week, capable of having settings saved in memory for 10 hours during a loss of power, and a manual system "on" override for up to two hours, or an occupancy sensor	Equipment schedule note on A-600
503.2.4.4	**Shutoff damper controls**	Outside air intakes and exhaust	Each outdoor supply air and exhaust air ducts are provided with motorized dampers to shut off when not in use	Each outdoor supply air and exhaust air ducts shall be provided with motorized dampers to shut off when not in use	Equipment schedule note on A-600
503.2.5	**Ventilation**				
503.2.5	**Minimum Mechanical Ventilation**	Outside air control	Motorized dampers shall have ability to operate at minimum positions	Where mechanical ventilation is provided system shall be capable of reducing outside air to the minimum requirements	Equipment schedule note on A-600
503.2.8	**Piping Insulation**				
Table 503.2.8	**Hot Water Piping Insulation**	Hot Water Piping Insulation	2" insulation provided for piping greater than 1.5" in diameter	1.5" for pipe less than 1.5" diameter. 2" for piping greater than 1.5" in diameter. Where k for insulation is 0.27 or less.	Pipe insulation detail on A-404 General note on EN-001
503.2.9	**HVAC System Completion**				
503.2.9.3	**Manuals**	Operating and Maintenance Manual Requirements	Contractor shall provide manual as specified in mechanical specifications	Operating and Maintenance manual shall be provided by mechanical contractor and specified in the construction documents	Equipment schedule note on A-600 General note on EN-001
Commercial Building Service Water Heating					
504.2	**Service Water Heating (Mandatory)**				
504.2	**Equipment Performance Efficiency**	Electric water heater, resistance type	50 Gallon, 4.5 kw, EF=0.91 40 Gallon Lowboy, 4.5 kw, EF=0.92	if <= 12 kw, 0.97-0.00132V, EF min. if > 12kw, 1.73V + 155 SL, Btu/h min.	Equipment schedule note on A-600
504.3	**Temperature Controls**	Temperature Controls	Provided as required	Controls shall allow 110 degree F set point for dwellings, and 90 degrees F for other occupancies. Lavatories in public restrooms shall be limited to 110 degrees F	Equipment schedule note on A-600
504.4	**Heat Traps**	Heat Traps	how water heater supplied with integral heat traps	Water heating equipment shall be provided with heat traps on the supply and discharge piping if not integrated with equipment	Equipment schedule note on A-600
504.5	**Pipe Insulation**	Pipe Insulation	1" insulation to be used on all hot water service piping	Autcmatic circulating hot water systems-1" insulation. First 8' pipe in non-circulating systems without integral heat traps-0.5" insulation Conductivity for insulation shall not exceed 0.27 Btu/inch/hxft^2xF	pipe insulation detail on A-404 Equipment schedule note on A-600
504.6	**Hot water system controls**	Circulating Pumps & Heat Trace	Controls shall shut of heat trace and pumps when heating system is not in operation	Automatic circulating hot water system pumps and heat trace to be turned off manually or automatically when hot water system is not in operation	Equipment schedule note on A-600
Commercial Building Electrical and Power Lighting Systems					
502.2	**Lighting Controls (Mandatory)**				
505.2.1 - as well as 505.2.2, 505.2.3 and 505.2.4.	**Interior lighting controls**	Interior lighting controls include manual, automatic, and occupant sensor controls.	Interior lighting controls have been provided.	Lighting systems shall be provided with controls as required in Sections 505.2.1, 505.2.2, 505.2.3 and 505.2.4.	Lighting notes on reflected ceiling and lighting plan
505.2.4	**Exterior lighting controls.**	Daylight sensor controls provided for exterior lighting. Manual overrides to be provided.	photosensors provided and programmed as per requirements	Lighting not designated for dusk-todawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusktodawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hrs.	Lighting notes on reflected ceiling and lighting plan
505.4	**Exit Signs (Mandatory)**	LED exit signs to be provided.	5W per side	Internally illuminated exit signs shall not exceed 5 watts per side.	Lighting notes on reflected ceiling and lighting plan
505.5	**Interior lighting power requirements (Prescriptive)**				
505.5.1	**Total connected interior lighting power**	Total connected load of proposed interior lighting. Describe building area type, area and associated watts per square foot (w/sq.ft).	Provided as required	The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections 505.5.1.1 through 505.5.1.4.	Reflected ceiling and lighting plan Lighting schedules
505.5.4	**Interior lighting power**	Interior lighting power for multi-family dwelling	Provided as required	The total interior lighting power (watts) is the sum of all interior lighting powers for all areas in the building covered in this permit. 0.7 watt / sf max for multi-family dwelling	Reflected ceiling and lighting plan Lighting schedules
505.5.3	**Lighting within dwelling units**	Lighting within dwelling units	100% of permanently installed fixtures provided are high efficacly lamp	Lighting within dwelling units may have a minimum of 50 percent of the permanently installed interior light fixtures fitted with high-efficacy lamps as an alternative to Section 505.5.2.	Lighting notes on reflected ceiling and lighting plan
505.6, 505.6.2(1) and 505.6.2(2)	**Exterior lighting (Mandatory).**	Total connected load of proposed exterior lighting for lighting zone 2	Provided as required	total allowance calculated per Table 505.6.2(2)	Reflected ceiling and lighting plan Lighting schedules
505.7	**Electrical energy consumption (Mandatory).**	Separate electrical meters have been provided for each unit.	Separate electrical meters have been provided for each unit.	separate electrical meters required for separate dwelling units	Lighting notes on reflected ceiling and lighting plan

PROFESSIONAL STATEMENT: TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE NEW YORK CITY 2011 ENERGY CONSERVATION CODE.

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Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU STATE OF NEW YORK 034322

ENERGY ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

EN-001.00

19 OF 21

DOB BSCAN STICKER

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

PROGRESS INSPECTIONS FOR ENERGY CODE COMPLIANCE – COMMERCIAL BUILDINGS GROUP R

	INSPECTION / TEST	Periodic (minimum)	Reference Standard (See ECC Chapter 6) or Other Criteria	ECC or Other Citation	THIS INSPECTION REQUIRED YES	NO
IIA	**Envelope Inspections**					
IIA1	Protection of exposed foundation insulation: Insulation shall be visually inspected to verify proper protection where applied to the exterior of basement or cellar walls, crawl space walls and/or the perimeter of slab-on-grade floors.	As required during foundation work and prior to backfill	Approved construction documents	303.2.1; ASHRAE 90.1 – 5.8.1.7	X	
IIA2	Insulation placement and R-values: Installed insulation for each component of the conditioned space envelope and at junctions between components shall be visually inspected to ensure that the R-values are marked, that such R-values conform to the R-values identified in the construction documents and that the insulation is properly installed. Certifications for unmarked insulation shall be similarly visually inspected.	As required to verify continuous enclosure while walls, ceilings and floors are open	Approved construction documents	303.1, 303.1.1, 303.1.2, 502.1, 502.2; ASHRAE 90.1 –5.5, 5.6 or 11; 5.8.1	X	
IIA3	Fenestration thermal values and product ratings: U-factors and SHGC values of installed fenestration shall be visually inspected for conformance with the U-factors and SHGC values identified in the construction drawings by verifying the manufacturer's NFRC labels or, where not labeled, using the ratings in ECC Tables 303.1.3(1), (2) and (3). Where ASHRAE 90.1 is used, visible light transmittance values shall also be verified.	As required during installation	Approved construction documents; NFRC 100, NFRC 200	303.1, 303.1.3, 502.3; ASHRAE 90.1 –5.5; 5.6 or 11; 5.8.2	X	
IIA4	Fenestration and door assembly product ratings for air leakage: Windows and sliding or swinging door assemblies, except site-built windows and/or doors, shall be visually inspected to verify that installed assemblies are listed and labeled by the manufacturer to the referenced standard. For curtain wall, storefront glazing, commercial entrance doors and revolving doors, the testing reports shall be reviewed to verify that the installed assembly complies with the standard cited in the approved plans.	As required during installation; prior to final construction inspection	NFRC 400, AAMA/WDMA/CSA 101/I.S.2/A440 ASTM E283; ANSI/DASMA 105	502.4; ASHRAE 90.1 –5.4.3.2	X	
IIA5	Fenestration areas: Dimensions of windows, doors and skylights shall be verified by visual inspection.	Prior to final construction inspection	Approved construction documents	502.3; ASHRAE 90.1 – 5.5.4, 5.6 or 11	X	
IIA6	Sealing: Openings and penetrations in the building envelope, including site-built fenestration and doors, shall be visually inspected to verify that a continuous air barrier around the envelope forms an air-tight enclosure. The progress inspector shall visually inspect to verify that materials and/or assemblies have been tested and meet the requirements of the respective standards, or that the building is tested and meets the requirements of the standard, in accordance with the standard(s) cited in the approved plans.	As required during construction	Approved construction documents; ASTM E2178, ASTM E2357, ASTM E1677, ASTM E779, ASTM E283.	502.4.3, 502.4.7; ASHRAE 90.1 – 5.4.3.1	X	
IIA7	Projection factors: Where the energy analysis utilized a projection factor > 0, the projection dimensions of overhangs, eaves or permanently attached shading devices shall be verified for conformance with aporoved plans by visual inspection.	Prior to final construction inspection	Approved construction documents, including energy analysis	502.3; ASHRAE 90.1 – 5.5.4, 5.6 or 11	X	
IIA8	Loading dock weatherseals: Weatherseals at loading docks shall be visually verified.	Prior to final construction inspection	Approved construction documents	502.4.5; ASHRAE 90.1 – 5.4.3.3		X
IIA9	Building entrance vestibules: Required entrance vestibules shall be visually inspected for proper operation.	Prior to final construction inspection	Approved construction documents	502.4.6; ASHRAE 90.1 – 5.4.3.4		X
IIB	**Mechanical and Service Water Heating Inspections**					
IIB1	Fireplaces: Provision of combustion air and tight-fitting fireplace doors shall be verified by visual inspection.	Prior to final construction inspection	Approved construction documents; ANSI Z21.60 (see also MC 904), ANSI Z21.50	303.1.5; BC 2111; MC Chapters 7, 9; FGC Chapter 6		X
IIB2	Outdoor air intakes and exhaust openings: Dampers for stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be visually inspected to verify that such dampers, except where permitted to be gravity dampers, comply with approved construction drawings. Manufacturer's literature shall be reviewed to verify that the product has been tested and found to meet the standard.	As required during installation	Approved construction documents; AMCA 500D	502.4.4; ASHRAE 90.1 – 6.4.3.4	X	
IIB3	HVAC, service water heating and pool equipment sizing and performance: Equipment sizing, efficiencies and other performance factors of all major equipment units, as determined by the applicant of record, and no less than 15% of minor equipment units, shall be verified by visual inspection and, where necessary, review of manufacturer's data. Pool heaters and covers shall be verified by visual inspection.	Prior to final plumbing and construction inspection	Approved construction documents	503.2, 504.2, 504.7; ASHRAE 90.1 – 6.3, 6.4.1, 6.4.2, 6.8; 7.4, 7.8	X	
IIB4	HVAC system controls and economizers and service hot water system controls: No less than 20% of each type of required controls and economizers shall be verified by visual inspection and tested for functionality and proper operation. Such controls shall include, but are not limited to: - Thermostatic - Set point overlap restriction - Off-hour - Shutoff damper - Snow-melt system - Demand control systems - Outdoor heating systems - Zones - Economizers - Air systems - Variable air volume fan - Hydronic systems - Heat rejection equipment fan speed - Complex mechanical systems serving multiple zones - Ventilation - Energy recovery systems - Hot gas bypass limitation - Temperature - Service water heating - Hot water system - Pool heater and time switches - Exhaust hoods - Radiant heating systems.	After installation and prior to final electrical and construction inspection, except that for controls with seasonally dependent functionality, such testing shall be performed before sign-off for issuance of a Final Certificate of Occupancy	Approved construction documents, including control system narratives; ASHRAE Guideline 1: The HVAC Commissioning Process where applicable	503.2.4, 503.2.5.1, 503.2.11, 503.3, 503.4, 504.3. 504.6, 504.7; ASHRAE 90.1 – 6.3, 6.4, 6.5, 6.7.2.4, 7.4.4, 7.4.5	X	
IIB4	Controls with seasonally dependent functionality: Controls whose complete operation cannot be demonstrated due to prevailing weather conditions typical of the season during which progress inspections will be performed shall be permitted to be signed off for the purpose of a Temporary Certificate of Occupancy with only a visual inspection, provided, however, that the progress inspector shall perform a supplemental inspection where the controls are visually inspected and tested for functionality and proper operation during the next immediate season thereafter. The owner shall provide full access to the progress inspector within two weeks of the progress inspector's request for such access to perform the progress inspection. For such supplemental inspections, the Department shall be notified by the approved progress inspection agency of any unresolved deficiencies in the installed work within 180 days of such supplemental inspection.	After installation and prior to final electrical and construction inspection, except that for controls with seasonally dependent functionality, such testing shall be performed before sign-off for issuance of a Final Certificate of Occupancy	Approved construction documents, including control system narratives; ASHRAE Guideline 1: The HVAC Commissioning Process where applicable	503.2.4, 503.2.5.1, 503.2.11, 503.3, 503.4, 504.3. 504.6, 504.7; ASHRAE 90.1 – 6.3, 6.4, 6.5, 6.7.2.4, 7.4.4, 7.4.5	X	

IIB5	Duct, plenum and piping insulation and sealing: Installed duct and piping insulation shall be visually inspected to verify proper insulation placement and values. Joints, longitudinal and transverse seams and connections in ductwork shall be visually inspected for proper sealing.	After installation and prior to closing shafts, ceilings and walls	Approved construction documents; SMACNA Duct Construction Standards, Metal and Flexible	503.2.7, 503.2.8, 504.5; ASHRAE 90.1 – 6.3, 6.4.4.2, 6.8.2, 6.8.3; 7.4.3	X	
IIB6	Air leakage testing for high-pressure duct systems: For duct systems designed to operate at static pressures in excess of 3 inches w.g. (746 Pa), representative sections, as determined by the progress inspector, totaling at least 25% of the duct area, per ECC 503.2.7.1.3, shall be tested to verify that actual air leakage is below allowable amounts.	After installation and sealing and prior to closing shafts, ceilings and walls	Approved construction documents; SMACNA HVAC Air Duct Leakage Test Manual	503.2.7.1.3; ASHRAE 90.1 – 6.4.4.2		X
IIC	**Electrical Power and Lighting Systems**					
IIC1	Electrical metering: The presence and operation of individual meters or other means of monitoring individual apartments shall be verified by visual inspection for all apartments.	Prior to final electrical and construction inspection	Approved construction documents	505.7	X	
IIC2	Lighting in dwelling units: Lamps in permanently installed lighting fixtures shall be visually inspected to verify compliance with high-efficacy requirements.	Prior to final electrical and construction inspection	Approved construction documents	505.5.3	X	
IIC3	Interior lighting power: Installed lighting shall be verified for compliance with the lighting power allowance by visual inspection of fixtures, lamps, ballasts and transformers.	Prior to final electrical and construction inspection	Approved construction documents	505.5; ASHRAE 90.1 –9.1, 9.2, 9.5, 9.6; 1RCNY §101-07(c)(3)(v)(C)4	X	
IIC4	Exterior lighting: Installed lighting shall be verified for compliance with source efficacy and/or the lighting power allowance by visual inspection of fixtures, lamps, ballasts and relevant transformers.	Prior to final electrical and construction inspection	Approved construction documents	505.6; ASHRAE 90.1 – 9.4.4, 9.4.5; 1RCNY §101-07(c)(3)(v)(C)4	X	
IIC5	Lighting controls: Each type of required lighting controls, including: - occupant sensorsmanual interior lighting controls - light-reduction controls - automatic lighting shut-off - daylight zone controls - sleeping unit controls - exterior lighting controls shall be verified by visual inspection and tested for functionality and proper operation.	Prior to final electrical and construction inspection	Approved construction documents, including control system narratives	505.2, 505.2.2.2; ASHRAE 90.1 – 9.4.1, 9.4.1.2 (as modified by section ECC A102)	X	
IIC6	Exit signs: Installed exit signs shall be visually inspected to verify that the label indicates that they do not exceed maximum permitted wattage.	Prior to final electrical and construction inspection	Approved construction documents	505.4; ASHRAE 90.1 – 9.4.3	X	
IIC7	Tandem wiring: Tandem wiring shall be tested for functionality.	Prior to final electrical and construction inspection	Approved construction documents	505.3; ASHRAE 90.1 – 9.4.2		X
IIC8	Electric motors (including but not limited to fan motors): Where required by the construction documents for energy code compliance, motor listing or labels shall be visually inspected to verify that they comply with the respective energy requirements in the construction documents.	Prior to final electrical and construction inspection	Approved construction documents	503.2.10; ASHRAE 90.1 – 10.4		X
IID	**Other**					
IID1	Maintenance information: Maintenance manuals for mechanical, service hot water and electrical equipment and systems requiring preventive maintenance shall be reviewed for applicability to installed equipment and systems before such manuals are provided to the owner. Labels required for such equipment or systems shall be inspected for accuracy and completeness.	Prior to sign-off or issuance of Final Certificate of Occupancy	Approved construction documents, including electrical crawings where applicable; ASHRAE Guideline 4: Preparation of Operating and Maintenance Documentation for Building Systems	303.3, 503.2.9.3; ASHRAE 90.1 – 4.2.2.3, 6.7.2.2, 8.7.2	X	

GENERAL NYCECC NOTE

The energy efficiency system will be designed and installed in accordance with the full requirements of the New York City Energy 2011 Conservation Code.

1. Load calculations performed at a maximum of 72 degrees F for heating and a minimum of 75 degrees F for cooling.
2. The building thermal envelope shall meet the requirement of NYCECC 502.
3. Per 502.3, the vertical fenestration area, not including opaque doors, shall not exceed the percentage of the gross area wall area of 40% in climate 4A areas.
4. Vertical Fenestration U-factor, PF and SHGC to comply with table 502.3.
5. Skylight to roof ratio to be 3% maximum per 502.3.
6. Air leakage of all window and doors to be 0.3cfm/SF per 502.4.1.
7. Air leakage of all commercial glazed swinging or revolving doors to be 1.0cfm/SF per 502.4.1.
8. A continuous air barrier shall be installed: sealing all seams, openings and penetrations of the building and shall be sealed with caulking materials or closed with gasketing systems compatible with the construction materials and location.
9. Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the bldg envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a max leakage rate of 4 cfm/sf at 1.0 in. wg.
10. Cargo doors and loading dock doors shall be equipped with weather seals to restrict infiltration when vehicles are parked in doorway.
11. Vestibule to be provided at door separating conditioned space from the exterior, except for doors that open directly from a space less than 3000 SF in area.
12. Recessed luminaires installed in the building thermal envelope shall be sealed to maximum air leakage 2cfm.
13. Vented cladding shall include the following minimum clear air spaces:
- Stucco with a $^{3}/_{8}$-inch (9.52 mm) clear airspace with $^{3}/_{8}$-inch (9.52 mm) continuous slot vent openings at the top and bottom of each wall.
- Brick with a 2-inch (51 mm) clear airspace behind the brick with vents at both the top and bottom of the brick. The vents shall be $^{3}/_{8}$ inch × 2.5-inch (9.52 mm × 63 mm) openings every third brick at both the bottom and top.
- Stone or masonry veneer with a 2-inch (51 mm) clear airspace behind the stone with vents at the top and bottom. The vents shall have at least 1 square inch of vent area for every 24 inches (610 mm) of wall.
- Panel siding with $^{3}/_{8}$-inch (9.52 mm) clear airspace with $^{3}/_{8}$-inch (9.52 mm) continuous slot vent openings at both the top and bottom of each wall.
- Manufactured stone veneer with a $^{3}/_{8}$-inch (9.52 mm) clear airspace with $^{3}/_{8}$-inch (9.52 mm) continuous slot vent openings at both the top and bottom of each wall.

14. Minimum and maximum temperatures for interior design loads shall be determined in accordance with the procedures described in the ASHRAE/ACCA 183. Heating and cooling equipment shall not exceed calculated loads.
15. HVAC system controls to be provided per 503.2.4.
16. When mechanical ducts are provided, they shall be insulated with R-5 in unconditioned spaces, R-8 for outdoor spaces, all duct joints and seams shall be sealed.
17. All low pressure ducts, if provided, operating at 2" of W.G. or less shall be properly sealed with approved methods in accordance with NYECC 503.2.7.7.1.
18. Hot water piping shall provide insulation thickness of min. 1.5" for pipe less than 1.5" diameter, and min. 2" for piping greater than 1.5" in diameter. Where k for insulation is 0.27 or less.
19. If air system is provided, each supply air outlet, and zone terminal device shall be provided with means of balancing. Discharge dampers prohibited on constant volume and VAV fans with motors greater than 10 HP.
20. If hydronic system is provided, all heating and cooling coils to be provided with a means of balancing and pressure test.
21. Contractor shall provide manual as specified in mechanical specifications.
22. Service water heating shall meet efficiency requirements of table 504.2.
23. Internally illuminated exit signs shall not exceed 5 watts per side.
24. Install separate electrical meters required for separate dwelling units.
25. Lighting within dwelling units shall have a minimum of 50 percent of the permanently installed interior light fixtures fitted with high-efficacy lamps. For lamps with less than 15 watts, minimum efficacy is 40 lumen / watt, for lamps with 15-40 watts, minimum efficacy is 50 lumen / watt, for lamps with more than 40 watts, minimum efficacy is 60 lumen / watt.

56 FROST STREET

BROOKLYN, NY 11211

Architect
DE-JAN LU, RA
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Design Consultant
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Structural Engineer

Mechanical Engineer
JERRY PITERA P.E. JW FIRE
SPRINKLE DESIGN
5 MEZBISH PLACE UNIT 2001
MONROE, NY 10950
845.234.4599

REVISION TABLE

No.	Date	Description

Owner
56 Frost Realty LLC
PO BOX 110810
Brooklyn, NY 11210

General Contractor

REGISTERED ARCHITECT DE-JAN LU 034322 STATE OF NEW YORK

ENERGY ANALYSIS

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

EN-002.00

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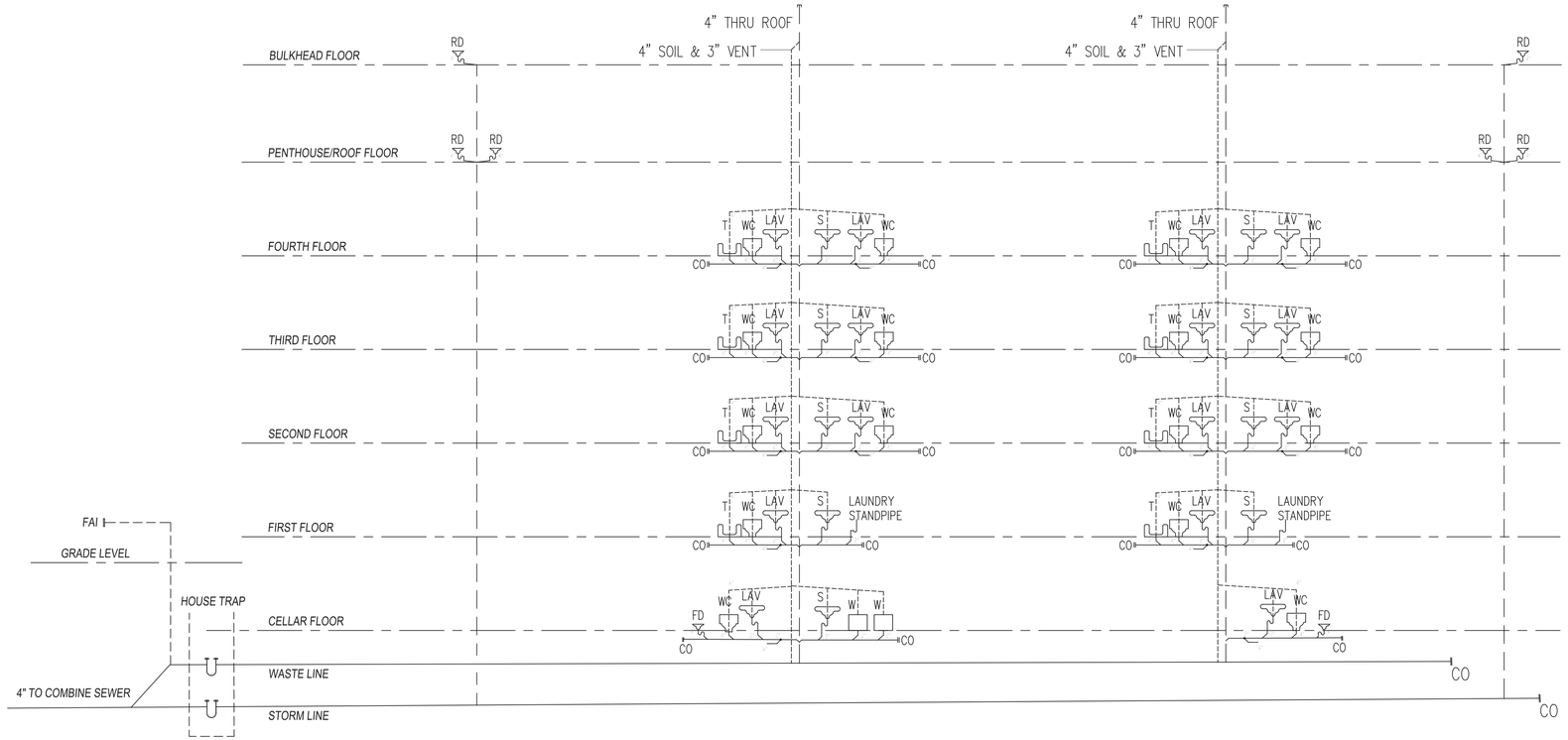
DOB BSCAN STICKER

PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL



NEW YORK CITY BUILDING DEPARTMENT PLUMBING NOTES:

THE PLUMBING SYSTEMS (SANITARY, WASTE, VENT, WATER DISTRIBUTION AND GAS) AND ALL ASSOCIATED EQUIPMENT WILL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE FULL REQUIREMENTS OF THE NEW YORK CITY 2008 PLUMBING CODE.

1. *THE SANITARY SYSTEM SHALL BE PROVIDED IN FULL ACCORDANCE WITH THE GENERAL PROVISIONS OF SECTION PC301.*
2. *THE MATERIALS USED IN THE PLUMBING SYSTEMS WILL BE PROVIDED IN FULL ACCORDANCE WITH SECTIONS PC302 AND PC303.*
3. *EQUIPMENT HOOK-UP AND THE JOINING WILL BE FULL COMPLIANCE WITH SECTIONS PC605 AND PC705.*
4. *THE INSTALLATION OF FIXTURES WILL BE IN FULL ACCORDANCE WITH PC CHAPTER 4.*
5. *TRAPS FOR FIXTURES AND DRAIN LINES WILL BE PROVIDED AND CLEANOUTS INSTALLED IN FULL COMPLIANCE WITH SECTIONS PC412, PC708 AND PC CHAPTER 10.*
6. *VERTICAL AND HORIZONTAL PIPING WILL BE HUNG AND SUPPORTED AS DIRECTED IN SPECIFICATIONS AND WITH THE FULL COMPLIANCE WITH SECTION PC308.*
7. *THE WATER SUPPLY SYSTEMS OF THE SUBJECT BUILDING SHALL BE INSTALLED AND MAINTAINED IN FULL COMPLIANCE WITH PC CHAPTER 6.*
8. *THE SANITARY DRAINAGE SYSTEM WILL BE SIZED AND INSTALLED IN FULL COMPLIANCE WITH PC CHAPTER 7.*
9. *THE VENT PIPING FOR THE SANITARY DRAINAGE SYSTEM OF THE SUBJECT BUILDING WILL BE INSTALLED IN FULL COMPLIANCE WITH SECTION PC702 & PC CHAPTER 9.*
10. *THE STORM DRAINAGE SYSTEM AND PIPING WILL BE INSTALLED IN FULL COMPLIANCE WITH PC CHAPTER 11.*
11. *GAS PIPING AND EQUIPMENT WILL BE INSTALLED IN FULL COMPLIANCE WITH THE NEW YORK CITY FUEL GAS CODE.*
12. *ALL TRENCHING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC306.*
13. *RAT PROOFING SHALL BE IN ACCORDANCE WITH SECTION PC304.*
14. *TEMPORARY TOILET FACILITIES SHALL BE PROVIDED FOR WORKMAN AS PER SECTION PC311.*

PLUMBING FIXTURE SCHEDULE

FIXTURE	*SYMBOL*	*SOIL*	*VENT*	*HOT WATER*	*COLD WATER*
WATER CLOSET ⅛" FL MTD W/LOW SET TANK SILENT FLUSH	WC		3"	2"	2"
LAVATORY	L	2"	1½"	½"	½"
SINK	S	2"	1½"	½"	½"
BATHTUB - C.I.	T	2"	1½"	½"	½"
FD					
*HWH**	HWH	2"	1½"	½"	½"

HOT WATER HEATER

ELEC. HWH: A.O.SMITH 66 GAL.
MODEL: ECT-66
ENERGY EFFICIENCY: 0.88
UL 174

NO GAS IN HOUSEHOLD. ALL EQUIPMENT ARE TO BE ELECTRICAL.

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Brooklyn, NY 11210

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PLUMBING
ELECTRICAL
MECHANICAL
STRUCTURAL
ARCHITECTURAL

PLUMBING RISER DIAGRAM

DOB JOB #	320878074
BIN #	3338066
DATE	09.02.14
DRAWN BY	ME
SCALE	AS NOTED

P-700.00

21 OF 21

DOB BSCAN STICKER

APPENDIX 1
CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and 56 Frost Street, 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, 56 Frost Street, 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, Alysha Alfieri, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 676-0459

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

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

Repositories. A document repository is maintained in the nearest public library that maintains evening and weekend hours. This document repository is intended to 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. 56 Frost Street LLC will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

Brooklyn Public Library: Leonard

81 Devoe Street, Brooklyn, NY 11211

(718) 486-3365

10:am to 6:00 pm

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. 56 Frost Street, LLC is not aware of any issues of public concern at the present time.

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 56 Frost Street, LLC, reviewed and approved by OER prior to distribution and mailed by 56 Frost Street, LLC. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

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

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

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

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

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

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

PUBLIC NOTICE IN THE FORM OF A FACT SHEET IS SENT TO ALL PARTIES LISTED ON THE SITE CONTACT LIST ANNOUNCING THE COMPLETION OF REMEDIATION, PROVIDING A LIST OF ALL INSTITUTIONAL AND ENGINEERING CONTROLS IMPLEMENTED FOR TO THE SITE AND ANNOUNCING THE ISSUANCE OF THE NOTICE OF COMPLETION.

APPENDIX 2
SUSTAINABILITY STATEMENT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Paperless Brownfield Cleanup Program. 56 Frost Street, LLC is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program. 56 Frost Street, 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.

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

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

APPENDIX 3

SOIL/MATERIALS MANAGEMENT PLAN

1.1 SOIL SCREENING METHODS

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

1.2 STOCKPILE METHODS

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

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

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

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

1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

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

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

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

1.5 OFF-SITE MATERIALS TRANSPORT

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

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

1.6 MATERIALS DISPOSAL OFF-SITE

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

The Remedial Action Report will include an itemized account of the destination of all materials 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.

1.7 MATERIALS REUSE ON-SITE

None of the excavated materials will be reused on site..

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 will meet the unrestricted soil cleanup objectives.

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

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

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

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

Source Screening and Testing

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

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and

- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

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

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 FLUIDS MANAGEMENT

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

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

1.11 STORM-WATER POLLUTION PREVENTION

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

1.12 CONTINGENCY PLAN

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

1.13 ODOR, DUST AND NUISANCE CONTROL

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If

odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

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

Dust Control

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

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

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

Other Nuisances

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

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

APPENDIX 4

HEALTH AND SAFETY PLAN

Appendix 4
Construction Health and Safety Plan

for
56 Frost Street
Remedial Action Plan

56 Frost Street; Brooklyn, NY 11211
Block 2737, Lot 10
NYC VCP Number: 16CVCP007K
OER Project Number 14EHAZ352K

Submitted to:
New York City Office of Environmental Remediation
100 Gold Street, 2nd Floor
New York, NY 10038

Prepared for:
56 Frost LLC
2917 Avenue I
Brooklyn, NY 11210

Prepared by:
TENEN ENVIRONMENTAL
121 West 27th Street, Suite 1004
New York, NY 10001

August 2015

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1.0 INTRODUCTION

This Construction Health and Safety Plan (CHASP) has been prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and guidance that govern site investigation activities, other applicable regulations, and Tenen Environmental LLC (Tenen) health and safety policies and procedures. The purpose of this CHASP is the protection of Tenen field personnel and others during the implementation of the Remedial Action Plan.

The Site is located at 56 Frost Street in the Greenpoint section of Brooklyn, New York on the south side of 56 Frost Street between Lorimer and Leonard Streets. The Site is 2,315 square feet and contains a vacant, one-story building. The property is zoned M1-2/R6, which is a special mixed-use zoning district with residential and manufacturing/industrial uses. Several properties to the north and west are located in separate zoning districts, which are also special districts for mixed residential and industrial use.

The proposed development will consist of a 4-story residential building with a basement and a penthouse. The total excavation depth will be approximately 7 feet and two inches below grade from 56 Frost Street, and will be within the footprint of the proposed building.

1.1 Scope of CHASP

This CHASP includes safety procedures to be used by Tenen staff during the following activities:

- Implementation of remedial oversight and air monitoring activities during soil excavation for the proposed basement.

Contractors performing remedial construction work will ensure that performance of the work is in compliance with this CHASP and applicable laws and regulations. The CHASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Satisfaction.

2.0 PROJECT SAFETY AUTHORITY

The following personnel are responsible for project health and safety under this CHASP.

- Project Manager – Mohamed Ahmed
- Health and Safety Officer (HSO) – Matthew Carroll

In addition, each individual working at the Site will be responsible for compliance with this CHASP and general safe working practices. All Site workers will have the authority to stop work if a potentially hazardous situation or event is observed.

2.1 Designated Personnel

The Project Manager is responsible for the overall operation of the project, including compliance with the CHASP and general safe work practices. The Project Manager may also act as the Health and Safety Officer (HSO) for this project.

Tenen will appoint one of its on-site personnel as the on-site HSO. This individual will be responsible for the implementation of the CHASP. The HSO will have a 4-year college degree in occupational safety or a related science/engineering field, and at least two (2) years of experience in implementation of air monitoring and hazardous materials sampling programs. The HSO will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards.

The HSO will be present on-site during all field operations involving soil excavation or other subsurface disturbance, and will be responsible for all health and safety activities and the delegation of duties to the field crew. The HSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the HSO must be absent from the field, a replacement who is familiar with the Construction Health and Safety Plan, air monitoring and personnel protective equipment (PPE) will be designated.

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

Known previous occupants of the site were listed under commercial names with industrial style buildings. Occupancy includes an auto house along the frontage of Frost Street, a welder to the rear (along Meeker Avenue), an auto repair shop to the rear, and storage for mineral water to the rear of the Site.

Adjacent and nearby properties had similar historic uses, as well as residential, commercial and a variety of industrial uses. Operations with recognized environmental concerns include a brass refinery and brass foundries, an iron yard, tannery, lumber yard, a "moulding" company, a galvanizing works, cedar-ware manufacturing, varnish works, an electrical supply company (including a plating and machine shop), a fur cleaning/dyeing plant, furniture and fabric manufacturing, various auto repair shops and auto houses, some containing underground gasoline storage tanks, a filling station, and an oil drum reclamation facility; these are operations that may have used petroleum products or chlorinated solvents. Commercial uses, which may be assumed to have included some processing uses, include a poultry market, a bottle dealer, wagon houses, an engine company, electrical supplies with batteries, and a carpentry company.

The findings of the Phase II investigations conducted in January 2014 indicate the following:

- Fill material consisting of cinders, ash, coal fragments, red brick fragments, and pieces of glass with tan to black sandy silt is located from grade to a depth of approximately 9 ft-bg;
- Groundwater has been measured at a depth of approximately 7 ft-bg. Groundwater flow is estimated to be toward the northwest;
- There is no evidence of USTs or other significant subsurface anomalies;
- There is evidence of conductive utility lines. Main electric and gas lines were detected along the north side of the current building along Frost Street, a water service line runs along the western wall of the current building and a sanitary sewer line was detected in the middle of the building;
- Petroleum-related compounds were not detected above the Unrestricted Use or Restricted Residential Use SCOs. However, methyl tert-butyl ether (MTBE) was detected in one of eight soil sample locations below both SCOs, which is assumed to be associated with two petroleum releases identified in two databases, NY SPILLS (Spill #9103795) and LTANKS (Spill #9007766). Each spill was reported to the New York State Department of Environmental Conservation (NYSDEC);
- Tetrachloroethene (PCE), trichloroethene (TCE), and carbon tetrachloride were not detected in soil vapor. However, the reporting limits for carbon tetrachloride at each location, are above the New York State Department of Health (NYSDOH)-reference indoor air background concentrations, and 1,1,1-trichloroethane (1,1,1-TCA) was detected in one soil vapor sample above the NYSDOH 2003 Fuel Oil Indoor Air guidance value;

- Chloromethane, 1,3-butadiene, n-hexane, toluene, ethylbenzene, p/m-xylene and o-xylene were detected in soil vapor above the New York State Department of Health (NYSDOH)-referenced indoor air background concentrations;
- All volatile organic compounds (VOCs), pesticides and polychlorinated biphenyls (PCBs) in soil are below the Part 375/CP-51 Restricted-Residential Use soil cleanup objectives (SCOs);
- PCE, TCE, 1,1,1-TCA and carbon tetrachloride were not detected in soil.
- Seven fill-related SVOCs, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene and 3-mehylphenol/4-methylphenol were detected in samples at concentrations above the Unrestricted Use SCOs. 3-methylphenol/4-methylphenol may also be related to tire treatment by creosote, based on the Site's historic use as an auto repair shop and auto housing area. Four of the compounds, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene, exceeded the Restricted-Residential Use SCOs.
- Nine metals, arsenic, barium, cadmium, copper, lead, mercury, nickel, silver and zinc, were detected in soil samples above Unrestricted Use SCOs. Seven of these compounds, arsenic, barium, cadmium, copper, lead, mercury and zinc, were detected above the Restricted Residential Use SCO;
- All pesticides and PCBs in groundwater are below the TOGS 1.1.1 Class GA Standards;
- One petroleum-related compound, methyl tert-butyl ether, was detected in one of three sample locations above the Class GA Standard;
- PCE, TCE, Carbon tetrachloride and 1,1,1-TCA were not detected in groundwater;
- One fill-related SVOC, benzo(b)fluoranthene, was detected in groundwater in one sample location above the Class GA Standards; and
- Nine metals – antimony, cadmium, copper, iron, lead, manganese, mercury, sodium and zinc – were detected in one or more groundwater sample locations above the Class GA Standards. All metals, except for mercury, were detected above Class GA Standards in dissolved form in one or more of these sample locations.

The Site is mapped on the Brooklyn, NY Quadrangle 7.5 Minute Topographic Map, published by the United States Geological Survey (USGS 2003) (Figure 1). Review of the topographic map reveals that the Site is located at approximately 20 feet above the National Geodetic Vertical Datum of 1929 (an approximation of mean sea level) (USGS). The surface topography at the Site and surrounding area is relatively flat with a downward slope to the northwest.

During environmental and geotechnical sampling, the subsurface lithology to the depth of 10 feet was determined to be fill material with some wetness at 7 to 9-feet below grade (ft-bg). The fill material at the Site is typical of that encountered in New York City (predominantly coal and brick fragments, cinders and sands). Wet material was found at 7 ft-bg at three of the four soil boring locations, and at 9ft-bg at one of the four locations.

Groundwater has been measured at depths of 6.50 to 7.65 ft-bg.

3.1 Human Exposure Pathways

The media of concern at the Site include potentially-impacted soil, groundwater and soil vapor. Potential exposure pathways include dermal contact, incidental ingestion and inhalation of vapors. The risk of dermal contact and incidental ingestion will be minimized through general safe work practices, a personal hygiene program and the use of PPE. The risk of inhalation will be minimized through the use of an air monitoring program for volatile organic compounds and particulates.

3.2 Chemical Hazards

Based on historic research and sampling data, the following contaminants of concern are present at the Site:

Chlorinated Solvents

- 1,1,1-trichlorethane (1,1,1-TCA)
- carbon tetrachloride
- chloromethane

Petroleum Constituents

- 1,3-butadiene
- ethylbenzene
- methyl tert-butyl ether (MTBE)
- n-hexane
- toluene
- o- and p/m- xylenes

Metals

- antimony
- arsenic
- barium
- cadmium
- copper
- iron
- lead
- magnesium
- mercury

Metals (continued)

- nickel
- silver
- sodium
- zinc

Semivolatile Organic Compounds

- Polyaromatic Hydrocarbons (PAHs)including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene and 3-methylphenol/4-methylphenol

Material Safety Data Sheets (MSDSs) for each contaminant of concern are included in Appendix C. All personnel are required to review the MSDSs included in this CHASP.

3.3 Physical Hazards

The physical hazards associated with the field activities likely present a greater risk of injury than the chemical constituents at the Site. Activities within the scope of this project shall comply with New York State and Federal OSHA construction safety standards.

Head Trauma

To minimize the potential for head injuries, field personnel will be required to wear National Institutes of Occupational Safety and Health (NIOSH)-approved hard hats during field activities. Hats must be worn properly and not altered in any way that would decrease the degree of protection provided.

Foot Trauma

To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed. To afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

Eye Trauma

Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed to prevent eye injuries caused by contact with chemical or physical agents.

Noise Exposure

Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed. High noise areas are those areas in which a conversation can be clearly understand as each individual speaks at

normal level

Buried Utilities and Overhead Power Lines

Boring locations were cleared by an underground utility locator service during the Phase II Investigation in January 2014. In addition, prior to any intrusive activities, the drilling subcontractor will contact the One Call Center to arrange for a utility mark-out, in accordance with New York State requirements. Protection from overhead power lines will be accomplished by maintaining safe distances of at least 15 feet at all times.

Thermal Stress

The effects of ambient temperature can cause physical discomfort, personal injury, and increase the probability of accidents. In addition, heat stress due to lack of body ventilation caused by protective clothing is an important consideration. Heat-related illnesses commonly consist of heat stroke and heat exhaustion.

The symptoms of heat stroke include: sudden onset; change in behavior; confusion; dry, hot and flushed skin; dilated pupils; fast pulse rate; body temperature reaching 105° or more; and/or deep breathing, later followed by shallow breathing.

The symptoms of heat exhaustion include: weak pulse; general weakness and fatigue; rapid shallow breathing; cold, pale and clammy skin; nausea or headache; profuse perspiration; unconsciousness; and/or appearance of having fainted.

Heat-stress monitoring will be conducted if air temperatures exceed 70 degrees Fahrenheit. The initial work period will be set at 2 hours. Each worker will check his/her pulse at the wrist for 30 seconds early in each rest period. If the pulse rate exceeds 110 beats per minute, the next work period will be shortened by one-third.

One or more of the following precautions will reduce the risk of heat stress on the Site:

- Provide plenty of liquids to replace lost body fluids; water, electrolytic drinks, or both will be made available to minimize the risk of dehydration and heat stress
- Establish a work schedule that will provide appropriate rest periods
- Establish work regimens consistent with the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
- Provide adequate employee training on the causes of heat stress and preventive measures

In the highly unlikely event of extreme low temperatures, reasonable precautions will be made to avoid risks associated with low temperature exposure.

Traffic

Field activities will occur near public roadways. As a result, vehicular traffic will be a potential hazard during these activities and control of these areas will be established using barricades or traffic cones. Additional staff will be assigned, as warranted, for the sole purpose of coordinating traffic. Personnel will also be required to wear high-visibility traffic vests while working in the vicinity of the public roadways and local requirements for lane closure will be observed as needed. All work in public rights-of-way will be coordinated with local authorities and will adhere to their requirements for working in traffic zones.

Hazardous Weather Conditions

All Site workers will be made aware of hazardous weather conditions, specifically including extreme heat, and will be requested to take the precautions described herein to avoid adverse health risks. All workers are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain or high wind. Conditions of sleet, snow or freezing are extremely unlikely.

Slip, Trip and Fall

Areas at the Site may be slippery from mud or water. Great care should be taken by all Site workers to avoid slip, trip and fall hazards. Workers shall not enter areas that not have adequate lighting. Additional portable lighting will be provided at the discretion of the HSO.

Biological Hazards

Drugs and alcohol are prohibited from the Site. Any on-site personnel violating this requirement will be immediately expelled from the Site.

It is the responsibility of any worker or oversight personnel with a medical condition that may require attention should inform the HSO of such condition. The HSO will describe appropriate measures to be taken if the individual should become symptomatic.

Due to the Site location in an urban area, it is highly unlikely that poisonous snakes, spiders, plants, and insects will be encountered. However, other animals (dogs, cats, etc.) may be encountered, and care should be taken to avoid contact.

4.0 AIR MONITORING

The NYSDOH Generic Community Air Monitoring Plan (CAMP), included as Appendix 1A of DER-10, will be implemented during all ground-intrusive sampling and remedial activities. Continuous monitoring will be implemented during all soil handling activities, boring installation (soil borings, monitoring wells and soil vapor points) and periodic monitoring will be implemented during sampling (groundwater and soil vapor samples).

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis, or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring should be performed using equipment appropriate for the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.
4. All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should 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 must 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.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.
3. All readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protection equipment required for various kinds of site investigation tasks is based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, "General Description and Discussion of the Levels of Protection and Protective Gear."

Tenen field personnel and other site personnel will wear Level D personal protective equipment. During activities such as drilling, well installation, or sampling, where there is a chance of contact with contaminated materials, modified Level D equipment will be worn. The protection will be upgraded to Level C if warranted by the results of the air monitoring. A description of the personnel protective equipment for Levels D and C is provided below.

Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, long pants, nitrile gloves

Modified Level D
Respiratory Protection: None
Protective Clothing: Hard hat, steel-toed shoes, coveralls/tyvek, nitrile gloves

Level C
Respiratory Protection: Air purifying respirator with organic vapor cartridges and filters.
Protective Clothing: Same as modified Level D

6.0 EXPOSURE MONITORING

Selective monitoring of workers in the exclusion area may be conducted, as determined by the HSO, if sources of hazardous materials are identified. Personal monitoring may be conducted in the breathing zone at the discretion of the Project Manager or HSO and, if workers are wearing respiratory protective equipment, outside the face-piece.

7.0 SITE ACCESS

Access to the Site during the investigation will be controlled by the Project Manager or HSO. Unauthorized personnel will not be allowed access to the Site.

8.0 WORK AREAS

During any activities involving drilling or other subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, clarify the type of protective equipment needed, and provide an area for decontamination.

The Exclusion Zone is defined as the area where potentially contaminated materials are generated as the result of drilling, sampling, or similar activities. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located adjacent to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a field phone, fire extinguisher and/or first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all Site workers will assemble in the event of an emergency. These zones shall be designated daily, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Control measures such as "Caution" tape and traffic cones will be placed around the perimeter of the work area when work is being done in the areas of concern (i.e., areas with exposed soil) to prevent unnecessary access.

9.0 DECONTAMINATION PROCEDURES

Personnel Decontamination

Personnel decontamination (decon), if deemed necessary by the HSO, will take place in the designated decontamination area delineated for each sampling location. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

Equipment Decontamination

Sampling equipment, such as split-spoons and bailers, will be decontaminated in accordance with U.S. Environmental Protection Agency methodologies, as described in the work plan. Because site soil is considered essentially non-hazardous, there is no need to decontaminate vehicles used for transporting equipment and personnel over the Site.

Disposal of Materials

Purged well water, water used to decontaminate any equipment and well cuttings will be containerized and disposed off-site in accordance with federal, state and local regulations.

10.0 GENERAL SAFE WORK PRACTICES

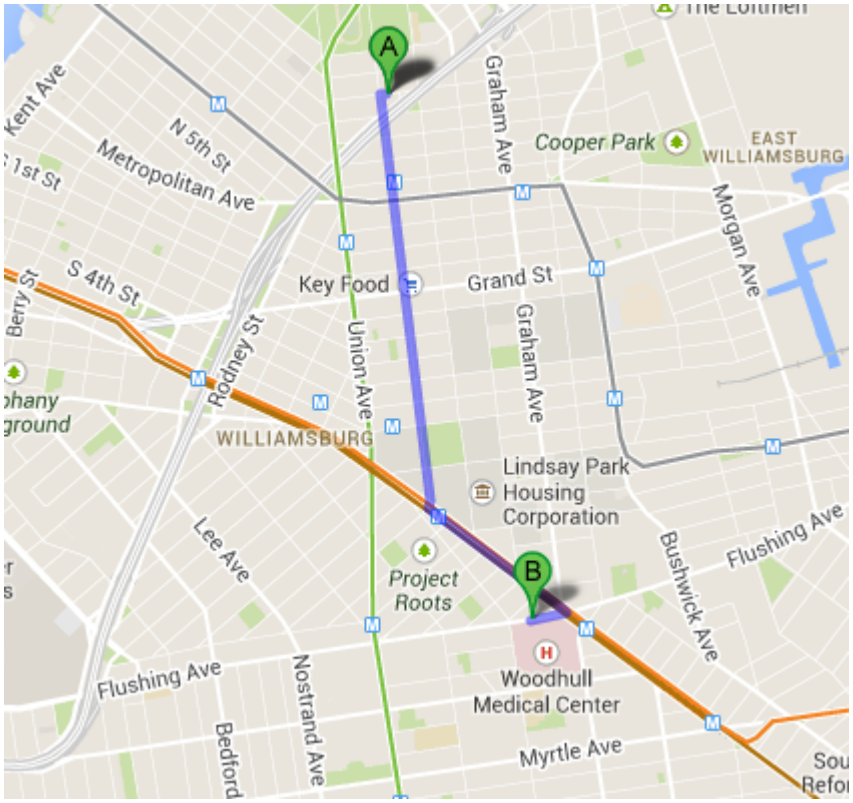
To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the HSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the site.
- Removal of potential contamination from PPE and equipment by blowing, shaking or any means that may disperse materials into the air is prohibited.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.
- Personnel will be cautioned to inform each other of symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- No excessive facial hair that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

11.0 EMERGENCY PROCEDURES

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the HSO will determine the nature of the emergency and will have someone call for an ambulance, if needed. If the nature of the injury is not serious—i.e., the person can be moved without expert emergency medical personnel—on-site personnel should drive him/her to a hospital. **The nearest emergency room is at Woodhull Medical Center at 760 Broadway, Brooklyn, NY 11206. The phone number is (718) 963-8000.** The route to the hospital is shown and detailed on the next page.

11.1 Route to Hospital



1. Head west on Frost Street toward Lorimer Street
2. At the first intersection, turn left onto Lorimer Street, go 0.9 mile
3. Turn left onto Broadway, go 0.4 mile
4. Turn right onto Flushing Avenue
5. Drive <0.1 mile, following Emergency signs
6. **The emergency room is on the left, 400 feet after Broadway (before Throop Avenue).**

11.2 Emergency Contacts

There will be an on-site field phone. Emergency and contact telephone numbers are listed below:

Table 1 – Emergency Contacts

Ambulance	911
Emergency Room	(718) 963-8000
NYSDEC Spill Hotline	(800) 457-7362
Tenen QEP, Mohamed Ahmed	(917) 612-6018
On-site Field Phone, Matthew Carroll	(646) 827-1061

12.0 TRAINING

All personnel performing the field activities described in this CHASP will have received the initial safety training required by 29 CFR, 1910.120. Current refresher training status also will be required for all personnel engaged in field activities.

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All field personnel must attend a training program covering the following areas:

- potential hazards that may be encountered;
- the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- the purpose and limitations of safety equipment; and
- protocols to enable field personnel to safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. The HSO will be responsible for conducting the training program.

13.0 MEDICAL SURVEILLANCE

All Tenen and subcontractor personnel performing field work involving drilling or other subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). The medical examination for Tenen employees will, at a minimum, be provided annually and upon termination of hazardous waste site work.

Appendix A
Acknowledgement of CHASP

ACKNOWLEDGMENT OF CHASP

Below is an affidavit that must be signed by all Tenen Environmental employees who enter the site. A copy of the CHASP must be on-site at all times and will be kept by the HSO.

AFFIDAVIT

I have read the Construction Health and Safety Plan (CHASP) for the 56 Frost Street Site. I agree to conduct all on-site work in accordance with the requirements set forth in this CHASP and understand that failure to comply with this CHASP could lead to my removal from the site.

Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____

Appendix B

Injury Reporting Form (OSHA Form 300)

How to Fill Out the Log

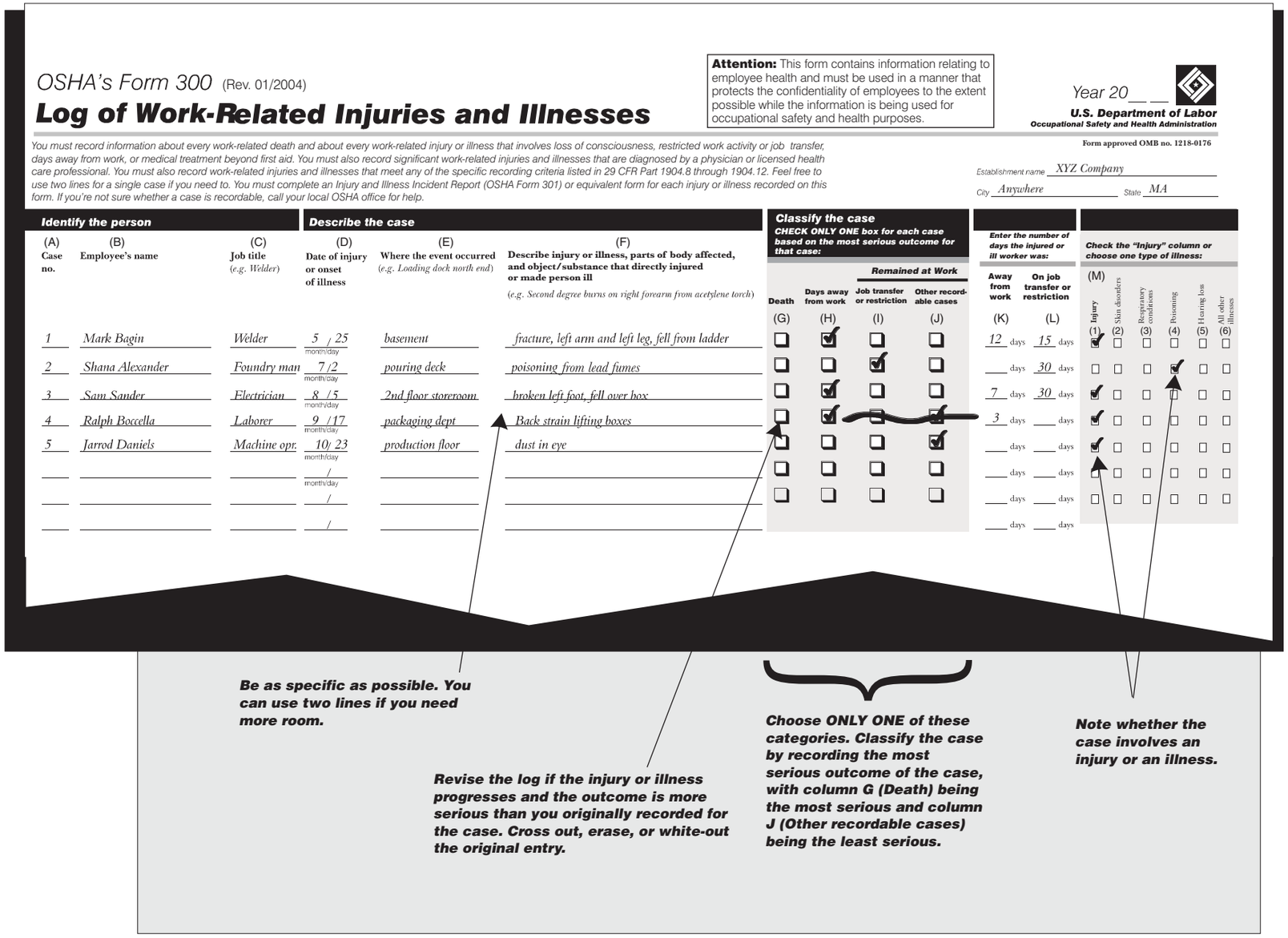
The *Log of Work-Related Injuries and Illnesses* is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened.

If your company has more than one establishment or site, you must keep separate records for each physical location that is expected to remain in operation for one year or longer.

We have given you several copies of the *Log* in this package. If you need more than we provided, you may photocopy and use as many as you need.

The *Summary* — a separate form — shows the work-related injury and illness totals for the year in each category. At the end of the year, count the number of incidents in each category and transfer the totals from the *Log* to the *Summary*. Then post the *Summary* in a visible location so that your employees are aware of injuries and illnesses occurring in their workplace.

You don't post the Log. You post only the Summary at the end of the year.



OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name XYZ Company
City Anywhere State MA

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
							Remained at Work										
(A) Case no.	(B) Employee's name	(C) Job title (*e.g. Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g. Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g. Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	(M) Injury (1)	Skin disorders (2)	Respiratory conditions (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
1	Mark Bagin	Welder	5/25	basement	fracture, left arm and left leg, fell from ladder	☐	☑	☐	☐	12 days	15 days	☑	☐	☐	☐	☐	☐
2	Shana Alexander	Foundry man	7/2	pouring deck	poisoning from lead fumes	☐	☐	☑	☐	___ days	30 days	☐	☐	☐	☑	☐	☐
3	Sam Sander	Electrician	8/5	2nd floor storeroom	broken left foot, fell over box	☐	☑	☐	☐	7 days	30 days	☑	☐	☐	☐	☐	☐
4	Ralph Boccella	Laborer	9/17	packaging dept	Back strain lifting boxes	☐	☑	☐	☐	3 days	___ days	☑	☐	☐	☐	☐	☐
5	Jarrod Daniels	Machine opr.	10/23	production floor	dust in eye	☐	☐	☐	☑	___ days	___ days	☑	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	___ days	___ days						

Be as specific as possible. You can use two lines if you need more room.

Revise the log if the injury or illness progresses and the outcome is more serious than you originally recorded for the case. Cross out, erase, or white-out the original entry.

Choose ONLY ONE of these categories. Classify the case by recording the most serious outcome of the case, with column G (Death) being the most serious and column J (Other recordable cases) being the least serious.

Note whether the case involves an injury or an illness.

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

City _____ State _____

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case:)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
								Remained at Work				(M)					
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
			___/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
			___/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
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			___/ month/day			☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
Page totals ➤						___	___	___	___	___	___	___	___	___	___	___	___

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Injury (1) | Skin disorder (2) | Respiratory condition (3) | Poisoning (4) | Hearing loss (5) | All other illnesses (6)

Appendix C

Material Safety Data Sheets (MSDS)

ZINC METAL
MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Zinc Metal

NOTE: In the form in which it is sold this product is not regulated. This Material Safety Data Sheet is provided for information purposes only.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
Teck Metals Ltd.
1500-120 Adelaide Street, W.
Toronto, Ontario
M5H 1T1

MSDS Preparer:
Teck Metals Ltd.
3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Revision/Edit: June 1, 2009.

Product Use: Zinc metal is used to coat steel for corrosion protection (galvanizing, electroplating, electrogalvanizing), as an alloying element in bronze, brass, aluminum and other metal alloys, for zinc die casting alloys, for zinc dry cell and zinc/air batteries, for the production of zinc sheet for architectural and coinage applications, as a reducing agent in organic chemistry and for other chemical applications.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)		LD_{50} / LC_{50} Species and Route
Zinc	99+%	7440-66-6	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	No Data

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration. ACGIH - American Conference of Governmental Industrial Hygienists. NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit. PEL – Permissible Exposure Limit. TLV – Threshold Limit Value. REL – Recommended Exposure Limit.

NOTE: While there is no established OEL for zinc as such, there are OELs for zinc oxide which may be formed during burning, welding or other fuming processes.

The OSHA PEL final rule limits for zinc oxide dust are 10 mg/m³ (total) and 5 mg/m³ (respirable); the OSHA PEL final rule limit for zinc oxide fume is 5 mg/m³. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. They are 15 mg/m³ (total) and 5 mg/m³ (respirable) while the transitional PEL for zinc oxide fume is 5 mg/m³. The ACGIH TLV for zinc oxide is 2 mg/m³ (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m³ (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m³ 10 hr TWA with a 15 mg/m³ ceiling limit (15 minute sample) for zinc oxide dust and a 10 mg/m³ STEL for zinc oxide fume (15 minute sample).

Trade Names and Synonyms: High Grade Zinc; Special High Grade Zinc; TADANAC® Zinc; C-CAST® Zinc; Zn

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A lustrous bluish-silver metal that does not burn but may form explosive mixtures if dispersed in air as a fine powder. Contact with acids or alkalis generates flammable hydrogen gas which can accumulate in poorly-ventilated areas. Do NOT use water or foam in fire fighting. Apply dry chemical, sand or special powder extinguishing media. Zinc is relatively non-toxic and poses little immediate health hazard to personnel or the environment in an emergency situation.

Potential Health Effects: Pure zinc dust is relatively non-toxic to humans by inhalation. However, acute over-exposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting. Ingestion of soluble salts may cause abdominal irritation resulting in nausea and vomiting. In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. (see Toxicological Information, Section 11)

Potential Environmental Effects: In the form in which the product is sold, zinc metal does not represent a significant threat to the environment. However, extended exposure in the aquatic or terrestrial environments may lead to the release of zinc in a bioavailable form. (see Ecological Information, Section 12)

EU Risk Phrase(s): Not applicable - zinc is not listed as a dangerous substance.

SECTION 4. FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: If symptoms are experienced remove source of contamination or move victim to fresh air. Obtain medical advice. NOTE: Metal fume fever may develop 3-10 hours after exposure. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

Ingestion: If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if irritation or discomfort occurs, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not considered a fire or explosion hazard. However, finely divided metallic dust or powder may form flammable or explosive dust clouds when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Bulk dust in a damp state may heat spontaneously and ignite on exposure to air. Contact with acids and alkali hydroxides results in evolution of hydrogen gas which is potentially explosive. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

Extinguishing Media: Apply dry chemical, dry sand, or special powder extinguishing media. Do NOT use water, carbon dioxide or foam on molten metals. Water may be ineffective for extinguishing a fire but should be used to keep fire-exposed containers cool.

Fire Fighting: If possible, move material from fire area and cool material exposed to flame. Apply dry chemical, sand, or special powder extinguishing media. Zinc oxide fumes may evolve in fires. Fire fighters should be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Lower Flammable Limit (Zinc Dust): 500 g/m^3; Upper Flammable Limit: Not Applicable.

Autoignition Temperature: Approximately 680ºC (dust cloud in air), 460ºC (dust layer).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Solid metal is recyclable. Vacuuming recommended for accumulated metal dust. Molten metal should be allowed to solidify prior to clean-up. Return uncontaminated spilled material to the process if possible. Place contaminated and non-recyclable material in suitable labeled containers for later disposal. Treat or dispose of waste material in accordance with all local, regional and national requirements, as applicable.

Personal Precautions: Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with zinc dust or powder. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash.

Environmental Precautions: Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, contamination of water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store zinc in a DRY covered area, separate from incompatible materials. Zinc ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Ingots may contain cavities that collect moisture. Entrained moisture will expand explosively when immersed in a molten bath. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate designated areas. No special packaging materials are required.

EU Safety Phrase(s): Not applicable - zinc in ingot form is not listed as a dangerous substance.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when zinc is processed. Eye protection should be worn where fume or dust is generated. Respiratory protection may be required where zinc oxide fume is generated. Where hot or molten metal is handled, heat resistant gloves, face shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Ventilation: Use adequate local or general ventilation to maintain the concentration of zinc oxide fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Where metallic dust particles of zinc metal are being collected and transported by a ventilation system, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Locate dust collectors and fans outdoors if possible and provide dust collectors with explosion vents or blow out panels.

Respirators: Where zinc oxide dust or fumes are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Bluish-silver lustrous metal	**Odour:** None	**Physical State:** Solid	**pH**: Not Applicable
Vapour Pressure: 1 mm at 487ºC Negligible at 20ºC	**Vapour Density:** Not Applicable	**Boiling Point/Range:** 908º C	**Freezing/Melting Point/Range:** 420º C
Specific Gravity: 7.1	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Odour Threshold:** None
Solubility: Insoluble in Water			

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable under normal temperatures and pressures. It slowly becomes covered with a white coating of a hydrated basic zinc carbonate on exposure to moist air. Fine, condensed zinc dust or powder may heat spontaneously and ignite on exposure to air when damp. Zinc metal will react with acids and strong alkalis to generate hydrogen gas. A violent, explosive reaction may occur when powdered zinc is heated with sulphur. Powdered zinc will become incandescent or ignite in the presence of fluorine, chlorine or bromine. Powdered zinc can also react explosively with halogenated hydrocarbons if heated. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

Incompatibilities: Contact with acids and alkalis will generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic and antimony compounds may evolve highly toxic ARSINE or STIBINE gas. Incompatible with strong oxidizing agents such as chlorine, fluorine, bromine, sodium potassium or barium peroxide, sodium or potassium chlorate, chromium trioxide and fused ammonium nitrate. Also incompatible with elemental sulphur dust, halogenated hydrocarbons or chlorinated solvents and chlorinated rubber.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate zinc oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever, a transient influenza-like illness.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Zinc, especially in the metal form, is relatively non-toxic. However, it can react with other materials, such as oxygen or acids, to form compounds that can be potentially toxic. The primary route of exposure would be through the generation and inhalation of zinc oxide fume from welding or burning or overheated melting pots.

Acute:
Skin/Eye: In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc metal is not chemically irritating to the eyes.

Inhalation: If excessive quantities of zinc oxide fume are inhaled, it can result in the condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest and coughing, which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after affects, or chronic affects that result from this condition.

Ingestion: When ingested in excessive quantities, zinc can irritate the stomach resulting in nausea and vomiting.

Chronic: There is no chronic form of metal fume fever but in rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia. Some workers may develop a short-term immunity (resistance) so that repeated exposure to zinc oxide fumes does not cause metal fume fever. This immunity (resistance) however is quickly lost after short absences from work (weekends or vacations). Workers exposed to finely-divided metallic zinc for up to 35 years revealed no acute or chronic illnesses attributable to zinc. Prolonged or repeated skin contact with zinc dust or powder may cause dryness, irritation and cracking (dermatitis) since zinc is astringent and may tend to draw moisture from the skin. Zinc dust is not listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

SECTION 12. ECOLOGICAL INFORMATION

Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, its processing or extended exposure in the environment may result in the formation of bioavailable zinc compounds. In aquatic systems, zinc bioaccumulates in both plants and animals. In terrestrial systems, the mobility of zinc in soil is dependent on soil conditions, such as cation exchange capacity, pH, redox potential, and chemical species present in the soil. Zinc also bioaccumulates in terrestrial plants, vertebrates, and mammals, with plant uptake from soil dependent on the plant species, soil pH, and soil composition.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not applicable – not regulated.
U.S. DOT AND TRANSPORT CANADA HAZARD CLASSIFICATION .... Not applicable
U.S. DOT AND TRANSPORT CANADA PID..... Not applicable
MARINE POLLUTANT ..... No
IMO CLASSIFICATION ..... Not regulated

SECTION 15. REGULATORY INFORMATION

U.S.
INGREDIENT LISTED ON TSCA INVENTORY ..... Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD ..... No

CERCLA SECTION 103 HAZARDOUS SUBSTANCES ..... Zinc ..... Yes.....RQ: 1,000 lb. (454 kg.)*
* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE ..... No

EPCRA SECTION 311/312 HAZARD CATEGORIES ..... No Hazard Categories Apply

EPCRA SECTION 313 Toxic Release Inventory: ..... This product does not contain any toxic chemicals subject to the Toxic Release reporting requirements. However, potential by-products from working with this product - "Zinc (Fume or Dust)" CAS 7440-66-6 are reportable.

CANADIAN:

INGREDIENTS LISTED ON DOMESTIC SUBSTANCES LIST..... Yes

WHMIS CLASSIFICATION:..... Not applicable. Zinc is not a Controlled Product under CPR.

EUROPEAN UNION:

LISTED ON THE EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS)..... Yes

EU CLASSIFICATION: ..... Not applicable. Zinc in ingot form is not listed as a dangerous substance.

SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition.
- American Conference of Governmental Industrial Hygienists, 2006, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2005, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, Ontario, CHEMINFO Record No. 239 – Zinc (Last Revision 2006-01).
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, 2003, Hazardous Substance Data Bank. (on-line version).
- Oak Ridge National Laboratory, Oak Ridge, Tennessee – Toxicity Summary for Zinc and Zinc Compounds, April 1992.
- Patty's Toxicology, Fifth Edition, 2001 E. Bingham, B. Cohrssen & CH Powell (Eds.).
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition (September 2005).
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, August 2005, Toxicological Profile for Zinc.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Metals Ltd. extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations; therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

Material Safety Data Sheet

Revision Issued: 6/09/98 Supercedes: 9/17/97 First Issued: 4/10/89

Section I - Chemical Product And Company Identification

Product Name: Xylene

CAS Number: 1330-20-7 HBCC MSDS No. CX01000

HILL BROTHERS Chemical Co.
1675 NORTH MAIN STREET • ORANGE, CALIFORNIA 92867-3499
(714) 998-8800 • FAX: (714) 998-6310
http://hillbrothers.com

1675 No. Main Street, Orange, California 92867
Telephone No: 714-998-8800 | Outside Calif: 800-821-7234 | Chemtrec: 800-424-9300

Section II - Composition/Information On Ingredients

			Exposure Limits (TWAs) in Air		
Chemical Name	CAS Number	%	ACGIH TLV	OSHA PEL	STEL
Xylene	1330-20-7	79-82	100 ppm	100 ppm	150 ppm
			435 mg/m³	435 mg/m³	
Ethylbenzene	100-41-4	18-20	100 ppm	100 ppm	125 ppm
			435 mg/m³	435 mg/m³	
Toluene	108-88-3	< 1	50 ppm	50 ppm	150 ppm

Section III - Hazard Identification

Ingestion: Liquid ingestion may result in vomiting; aspiration (breathing) of vomitus into the lungs must be avoided as even small quantities in the lungs may result in chemical pneumonitis and pulmonary edema/hemorrhage.

Inhalation: High vapor/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death. Negligible hazard at ambient temperature (-18 to 38 Deg C; 0 to 100 Deg F)

Skin: Prolonged and repeated liquid contact can cause defatting and drying of the skin which may result in skin irritation and dermatitis.

Eyes: Short-term liquid or vapor contact may result in slight eye irritation. Prolonged and repeated contact may be more irritating. High vapor/aerosol concentrations (greater than approximately 1000 ppm) are irritating to the eyes.

Summary of Chronic Health Hazards: N/A

Signs and Symptoms of Exposure: Prolonged or repeated skin contact with this product tends to remove oils possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Effects of Overexposure: High vapor concentration (greater than approximately 1000 ppm) are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic, and may have other central nervous system effects including death.

Medical Conditions Generally Aggravated by Exposure: Petroleum Solvents/Petroleum Hydrocarbons - Skin contact may aggravate an existing dermatitis.

Note to Physicians: If more than 2.0 ml per kg has been ingested and vomiting has not occurred, emesis should be induced with supervision. Keep victim's head below hips to prevent aspiration. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before emesis, gastric lavage using a cuffed endotracheal tube should be considered. Inhalation of high concentrations of this material, as could incur in enclosed spaces or during deliberate abuse, may be associated with

cardiac arrhythmias. Sympathomimetic may initiate cardiac arrhythmias in persons exposed to this material. This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity when deciding whether to induce vomiting. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions), kidney, auditory system. Individuals with preexisting heart disorders may be mre susceptible to arrhythmias (irregular heartbeats) if exposed to high concentrations of this material.

Section IV - First Aid Measures

Ingestion: If individual is drowsy or unconscious, do not give anyhting by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended. GET MEDICAL ATTENTION IMMEDIATELY.

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. GET MEDICAL ATTENTION IMMEDIATELY.

Skin: Wash with soap and water. Remove contaminated clothing and shoes; do not reuse until cleaned. If persistent irritation occurs, GET MEDICAL ATTENTION IMMEDIATELY.

Eyes: If splashed into eyes, flush with water for 15 minutes while holding eyelids open or until irritation subsides. If irritation persists, GET MEDICAL ATTENTION IMMEDIATELY.

Section V - Fire Fighting Measures

Flash Point: 80°F (26.6°C) **Autoignition Temperature:** 980°F (526.6°C)

Lower Explosive Limit: 1% **Upper Explosive Limit:** 6.6%

Unusual Fire and Explosion Hazards: Vapors are heavier than air and may accumulate in low areas and may travel along the ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from handling point. Flashback of flame to the handling site may occur. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. The following may form: carbon dioxide, and carbon monoxide, and various hydrocarbons.

Extinguishing Media: Use water fog, foam, dry chemical or CO_2. Do not use a direct stream of water. Product will float and can be reignited on surface of water.

Special Firefighting Procedures: Evacuate hazard area of unprotected personnel. Wear proper protective clothing including a NIOSH approved self-contained breathing apparatus. Cool fire-exposed containers with water. In the case of large fires, also cool surrounding equipment and structures with water. If a leak or spill has not ignited, use water spray to disperse the vapors.

Section VI - Accidental Release Measures

[Spills may need to be reported to the National Response Center (800/424-8802) CERCLA Reportable Quantity (RQ) is 1000 pounds]. Shut off and eliminate all ignition sources. Keep people away. Recover by pumping (use an explosion proof or hand pump) or with a suitable absorbent such as sand, earth or other suitable absorbent to spill area. Do not use combustible materials such as sawdust. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.

Section VII - Handling and Storage

Keep away from heat, sparks and open flames. Keep containers tightly closed. Store away from strong oxidizing agents in a cool, dry place with adequate explosion-proof ventilation. Ground equipment to prevent accumulation of static charge. If pouring or transferring materials, containers must be bonded and grounded.

Other Precautions: Do Not weld, heat or drill on or near container; even emptied containers can contain explosive vapors.

Section VIII - Exposure Controls/Personal Protection

Respiratory Protection: Use either an atmosphere-supplying respirator or an air-purifying respirator in confined or enclosed spaces for organic vapors, if needed.

Ventilation: Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. Use explosion-proof equipment.

Protective Clothing: Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular

clothing which could result in prolonged or repeated skin contact.
Eye Protection: Use chemical splash goggles or face shield when eye contact may occur.
Other Protective Clothing or Equipment: Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.
Work/Hygienic Practices: Minimize breathing vapor or mist. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean and dry before reuse. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

Section IX - Physical and Chemical Properties

Physical State: Liquid
pH: N/A
Melting Point/Range: N/A
Boiling Point/Range: 279°F (137.2°C)
Appearance/Color/Odor: Colorless, light aromatic odor
Solubility in Water: Less than 0.08%
Vapor Pressure(mmHg): 2.4 @ 68°F
Specific Gravity(Water=1): 0.87
Molecular Weight: 106
Vapor Density(Air=1): 3.7
% Volatiles: 100
How to detect this compound : N/A
Evaporation Rate, n-BuAcetate=1: 0.86
Odor Threshold: 0.5 ppm
Freezing Point: -54.0°F (-47.7°C)

Section X - Stability and Reactivity

Stability: Stable
Hazardous Polymerization: Will Not Occur
Conditions to Avoid: Avoid heat, sparks, and open flames.
Materials to Avoid: Strong oxidizing agents, concentrated nitric and sulfuric acids, and molten sulphur. Temperatures above ambient.
Hazardous Decomposition Products: Fumes, smoke, carbon monoxide, aldehydes, various hydrocarbons, and other organic compounds may be formed during combustion.

Section XI - Toxicological Information

N/A

Section XII - Ecological Information

N/A

Section XIII - Disposal Considerations

Use non-leaking containers, seal tightly and label properly. Dispose of in accordance with applicable local, county, state and federal regulations.

Section XIV - Transport Information

DOT Proper Shipping Name: Xylene
DOT Hazard Class/ I.D. No.: 3, UN1307, III

Section XV - Regulatory Information

CALIFORNIA PROPOSITION 65: WARNING
This product contains the following substance known to the state of California to cause cancer: Benzene
This product contains the following substance known to the state of California to cause birth defects: Toluene
Reportable Quantity: 1000 Pounds (454 Kilograms) (139.50 Gals)
NFPA Rating: Health - 2; Fire - 3; Reactivity - 0
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme
Carcinogenicity Lists: No **NTP:** No **IARC Monograph:** No **OSHA Regulated:** Yes

Section 313 Supplier Notification: This product contains the following toxic chemcial(s) subject to the reporting requirements of SARA TITLE III Section 313 of the Emergency Planning and Community Right-To Know Act of 1986 and of 40 CFR 372:

CAS #	Chemical Name	% By Weight
1330-20-7	Xylene	79-82%
100-41-1	Ethylbenzene	18-20%
108-88-3	Toluene	< 1%

Section XVI - Other Information

Synonyms/Common Names: Xylol; Dimethyl Benzene; Methyl Toluene
Chemical Family/Type: Aromatic Hydrocarbon

IMPORTANT! Read this MSDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This MSDS has been prepared according to the OSHA Hazard Communication Standard [29 CFR 1910.1200]. The MSDS information is based on sources believed to be reliable. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control, **Hill Brothers Chemical Company** makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Also, additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks prior to use, and then to exercise appropriate precautions for protection of employees and others.

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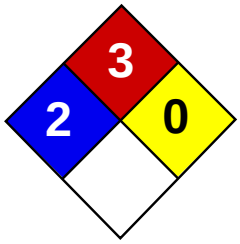

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N2O4; AgClO4; BrF3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Cauess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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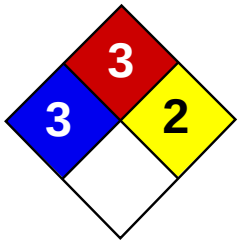
Last Updated: 11/01/2010 12:00 PM



Material Safety Data Sheet
Sodium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium

Catalog Codes: SLS3505

CAS#: 7440-23-5

RTECS: VY0686000

TSCA: TSCA 8(b) inventory: Sodium

CI#: Not applicable.

Synonym: Natrium

Chemical Name: Sodium

Chemical Formula: Na

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium	7440-23-5	100

Toxicological Data on Ingredients: Sodium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 115°C (239°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Extremely flammable in presence of moisture. Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. Moisture reactive material. SMALL FIRE: Obtain advice on use of water. Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid that, in contact with water, emits flammable gases. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep under inert atmosphere. Keep container dry. Do not breathe dust. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 22.99 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 881.4°C (1618.5°F)

Melting Point: 97.8°C (208°F)

Critical Temperature: Not available.

Specific Gravity: 0.97 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Highly reactive with oxidizing agents, acids, moisture. The product reacts violently with water to emit flammable but non toxic gases.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant). Hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Material is destructive to tissue of the mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.3: Material that emits flammable gases on contact with water.

Identification: : Sodium : UN1428 PG: I

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Sodium Massachusetts RTK: Sodium TSCA 8(b) inventory: Sodium CERCLA: Hazardous substances.: Sodium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R17- Spontaneously flammable in air. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 3

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 3

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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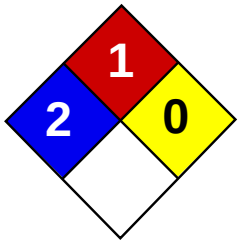
Last Updated: 05/21/2013 12:00 PM



Material Safety Data Sheet
Silver MSDS

Section 1: Chemical Product and Company Identification

Product Name: Silver

Catalog Codes: SLS4222, SLS2005, SLS3427, SLS1210, SLS2632, SLS4054, SLS1837

CAS#: 7440-22-4

RTECS: VW3500000

TSCA: TSCA 8(b) inventory: Silver

CI#: Not applicable.

Synonym:

Chemical Formula: Ag

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Silver	7440-22-4	100

Toxicological Data on Ingredients: Silver: ORAL (LD50): Acute: 100 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact: No known effect on skin contact, rinse with water for a few minutes.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Splash goggles. Lab coat.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (mg/m3) from OSHA (PEL) TWA: 0.01 (mg/m3) from OSHA NIOSH Australia: TWA: 0.1 (mg/m3)Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder. Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 107.87 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2212°C (4013.6°F)

Melting Point: 961°C (1761.8°F)

Critical Temperature: Not available.

Specific Gravity: 10.4 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Is not dispersed in cold water, hot water.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 100 mg/kg [Mouse].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Very hazardous in case of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Silver Pennsylvania RTK: Silver Minnesota: Silver Massachusetts RTK: Silver New Jersey: Silver TSCA 8(b) inventory: Silver TSCA 8(a) PAIR: Silver TSCA 8(d) H and S data reporting: Silver SARA 313 toxic chemical notification and release reporting: Silver: 1% CERCLA: Hazardous substances.: Silver: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC): R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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MATERIAL SAFETY DATA SHEET

Polyaromatic Hydrocarbons

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION	
IDENTITY Decanter Tank Tar Sludge Polyaromatic Hydrocarbons (TDG name - Toxic Solid, organic NOS (Waste) (Pyrene)	**DATE PREPARED** February 7, 2007
SYNONYMS, CHEMICAL NAMES, COMMON NAMES Aromatics, PAH, Yellow Sludge	**USE:** Waste Sludge
MANUFACTURER'S NAME Cancarb Ltd.	**EMERGENCY TELEPHONE NUMBER (Health)** (403) 502-6614
ADDRESS P.O. Box 1000, Station M Calgary, Alberta Canada, T2P 4K5	**TELEPHONE NUMBER – TECHNICALINFORMATION** (403)-527-1121

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS			
HAZARDOUS COMPONENTS	**OSHA PEL**	**ACGIH TLV**	**%/wt**
Variable blend of Polynuclear Aromatic Hydrocarbons (PAHs) plus inert solids in water. Concentrations will vary depending upon the extent of product dryness. Hazardous ingredients may include:			
Pyrene (CAS# 129-00-0)	0.2 mg m^{3*}	None established	<7%
Benzo (g,h,i) Fluoroanthrene (CAS# 203-12-3)	None established	None established	<6%
Fluoroanthene (CAS# 206-44-0)	None established	None established	<4%
Phenanthrene (CAS# 85-01-8)	0.2 mg/m^{3*}	None established	<2%
Cyclopenta(d,e,f)Phenanthrene (CAS#203-64-5)	None established	None established	<2%
Anthracene (CAS# 120-12-7)	0.2 mg/m^{3*}	None established	<1%
Benzo(a)Pyrene (CAS# 50-32-8)		None established	<0.1%
Benzo(a)Anthracene (CAS# 56-55-3)	0.2 mg/m^{3*}	None established	<0.1%
Benzo(b)Fluoroanthene CAS # 205-99-2)	None established	None established	<0.1%
Benzo(j)Fluoroanthene (CAS# 205-82-3)	None established	None established	<0.1%
Benzo(k)Fluoroanthene (CAS# 207-08-9)	None established	None established	<0.1%
Indeno(1,2,3)Pyrene (CAS# 193-39-5)	None established	None established	<0.1%
	None established		
*Coal Tar Pitch Volatile. Remaining components are not hazardous.			

EMERGENCY OVERVIEW
Black, brown or yellow aqueous sludge May cause skin and eye irritation Suspected carcinogenic components.

SECTION 3 -HAZARDS IDENTIFICATION

PRIMARY ROUTE(s) OF EXPOSURE: Skin; Eyes. Inhalation if Sludge is Dry

IRRITATION DATA: May cause irritation to skin and eyes and burns to skin with sunlight..

INHALATION:

ACUTE: Not a likely route of exposure in sludge state. Mist may cause respiratory irritation.

CHRONIC: Repeated and prolonged exposure may cause toxicity to the liver and blood. Suspected carcinogenicity .

SKIN CONTACT:

ACUTE: Prolonged and repeated contact may cause irritation. Contact in the presence of sunlight may enhance irritant effects leading to skin burns..

CHRONIC: Systemic toxicity. Suspected carcinogenicity.

EYE CONTACT:

ACUTE: May be irritating, resulting in tearing, reddening, and swelling.

CHRONIC: None known.

INGESTION:

ACUTE: May cause gastric irritation and disturbance.

CHRONIC: Chronic effects of phenanthrene ingestion include liver effects; chronic effects of pyrene ingestion include muscle contraction or spasticity and blood changes; effects of chronic fluoranthene ingestion include kidney, urethra, and bladder effects.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

Persons with pre-existing skin disorders may be at increased risk from exposure.

SECTION 4 - EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove from exposure to fresh air immediately. If breathing has stopped, give artificial respiration. Oxygen may be given if breathing is difficult. Get medical attention.

SKIN CONTACT: Remove contaminated clothing and shoes immediately. Wash affected area with soap and water until no evidence of the chemical remains. Get medical attention if irritation develops.

EYE CONTACT: Flush thoroughly with water for at least 15 minutes, occasionally lifting the upper and lower lids, until no evidence of the chemical remains. Get medical attention if irritation develops.

INGESTION: Do not induce vomiting. Treat symptomatically and supportively. Get medical attention if irritation develops.

SECTION 5 - FIRE FIGHTING MEASURES

FLASH POINT: None	**FLAMMABLE LIMITS:**	**LEL:** Not applicable	**UEL:** Not applicable

AUTOIGNITION TEMPERATURE: Will not ignite as aqueous solution. If dried, will support combustion.

EXTINGUISHING MEDIA

Water spray, foam, or dry chemical powder. Carbon dioxide may be ineffective on large fires.

SPECIAL FIRE FIGHTING PROCEDURES

Firefighters should wear full protective NIOSH approved self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS

None Known.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Stop discharge and control spill to avoid discharge to the environment. Use wet vacuum to limit spreading and place in suitable container for further handling and disposal. For dry material avoid generation of dust, use limited wetting to prevent spreading and use wet vacuum. Place in metal drum for disposal.

SECTION 7 - HANDLING AND STORAGE

Handling: KEEP WET. Do not allow to dry. Place wet vacuum discharge in metal drum. Empty drum into settling pond tanks. Avoid prolonged or repeated skin contact. Observe good personal and industrial hygiene practices.

Storage: Do not freeze.

SECTION 8 – EXPOSURE CONTROLS, PERSONAL PROTECTION

RESPIRATORY PROTECTION

Where airborne concentrations may exceed guidelines for permissible air concentrations, choose a respirator in accordance with OSHA Respirator Standard 29 CFR 1910.134. (i.e. organic vapor and P100 cartridges, powered air hoods.

VENTILATION

Use general dilution or local exhaust ventilation to maintain exposure below the exposure limits.

PROTECTIVE GLOVES

Choose appropriate gloves in accordance with OSHA Personal Protective Equipment Standard 29 CFR 1910.132.

EYE PROTECTION:

Safety glasses with side shields or choose in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT

Appropriate protective clothing to minimize repeated and prolonged skin contact. (i.e. Sarnex or Coated Sarnex).

RECOMMENDED EXPOSURE LIMITS

OH&S, OSHA and ACGIH have not set exposure limits for this waste mixture.
See Section 2 for exposure guidelines for the components of this waste.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES			
BOILING POINT	100° C	**SPECIFIC GRAVITY**	> 1
pH	Not available	**FREEZING POINT**	0° C
VAPOR PRESSURE (mm Hg)	Same as Water	**SOFTENING POINT**	Not applicable
VAPOR DENSITY (Air = 1)	Not available	**EVAPORATION RATE**	Not applicable
SOLUBILITY IN WATER	PAHs low solubility		
SOLUBILITY	Dry material soluble in hydrocarbon solvents		
COEFFICIENT OF WATER/OIL DISTRIBUTION:	Not available .		
APPEARANCE AND ODOR:	Black, Brown or Yellow Sludge.		

SECTION 10 - STABILITY AND REACTIVITY			
STABILITY	**Unstable**		**Conditions to Avoid**
	Stable	X	None Known. Stable under normal temperature and pressure.
INCOMPATIBILITY (Materials to Avoid) Strong oxidizing agents.			
HAZARDOUS DECOMPOSITION PRODUCTS Thermal decomposition may release toxic and/or hazardous gases from dried sludge.			
HAZARDOUS	**May Occur**		**Conditions to Avoid**
POLYMERIZATION	**Will Not Occur**	X	None known.

SECTION 11 - TOXICOLOGICAL INFORMATION

This waste sludge has not been tested for acute or chronic toxicity. The following data is for its components >1%:

Pyrene	Oral LD_{50} (mouse): 800 mg/kg
	Inhalation LC_{50} (rat): 170 mg/m^3
Fluoranthene	Oral LD_{50} (rat): 2 gm/kg
	Dermal LD_{50}(rabbit): 3180 mg/kg
Phenanthrene	Oral LD_{50} (mouse): 700 mg/kg

TARGET ORGANS: Skin and eyes

CARCINOGENICITY: Some low level PAH components have been identified as suspected carcinogens by IARC and ACGIH. These include benzo(a)anthracene, benzo(a)pyrene, benz(b,j&k)fluoranthene, and indeno(1,2,3-cd) pyrene.

TUMORIGENIC DATA (RTECS): Phenanthrene, Clclopenta (def) phenanthrene, Benzo fluoranthrene, Pyrene, and fluoranthene.

MUTAGEN DATA (RTECS): Phenanthrene, Cyclopenta (def) phenanthrene, Pyrene, Benzo fluoroanthrene, Fluoranthene, Benzo (ghi) fluoranthene.

OTHER EFFECTS:

PAHs contained in the sludge have the property of photoallergenicity. In the presence of sunlight, these materials have the capacity to irritate the skin to a much greater degree, possibility leading to skin burns, than exposure without sunlight.

SECTION 12 - ECOLOGICAL INFORMATION

Sludge has not been tested for ecotoxicity.

SECTION 13 - DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable federal, provincial, and local environmental regulations. Residual solids may be present in any containers used to handle this sludge. Do not reuse for food, clothing or products for human or animal consumption.

SECTION 14 - TRANSPORT INFORMATION

PROPER SHIPPING NAME	TDG CLASSIFICATION	TDG UN/NA
Waste Type 97 Decantar Tank Tar Sludge	6.1 PG II	UN 9397

SECTION 15 - REGULATORY INFORMATION

OSHA: This material is classified as hazardous under OSHA regulations.

WHMS: This material is considered a D2A, D2B Controlled Product.
This material has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

IDL: The following components are on the Canadian Ingredient Disclosure List:

Pyrene
Fluoranthene
Benzanthracene
Phenanthrene
Indeno (1,2,3-cd) pyrene
Benzopyrene
Naphthalene
Anthacene

SARA Title III - Toxic chemicals list 40 CFR 372.65:

Pyrene
Naphthalene
Anthracene

CERCLA Toxic Chemicals List 40 CFR 302:

Pyrene	RQ: 5000 pounds
Fluoranthene	RQ: 100 pounds
Benzanthrcene	RQ: 10 pounds
Phenanthrene	RQ: 5000 pounds
Indeno (1,2,3-cd) pyrene	RQ: 100 pounds
Benzopyrene	RQ: 1 pound
Naphthalene	RQ: 100 pounds
Anthracene	RQ: 5000 pounds

RCRA Hazardous Waste Codes 40 CFR 261.24, 261.33 :

Fluoranthene	U120
Benzanthracene	U108
Indeno(1,2,3-cd)pyrene	U137
Benzopyrene	U022
Naphthalene	U165

SECTION 16 - OTHER INFORMATION

HMIS Ratings:

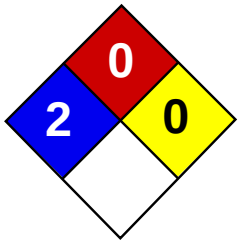
Health	2*
Flammability	1
Reactivity	0

where 0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

This MSDS was prepared by: CANCARB Health, Safety & Environment Department
Telephone Number (403) 527-1121

R: 45; 36/37/38
S: 36/37/39

The information and recommendations set forth herein are made in good faith and are believed to be accurate as of the date of preparation. CANCARB makes no warranty, either express or implied, with respect to this information and disclaims all liability from reliance thereon.



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to skin. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion. Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode. Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion. Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable. TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Insoluble in Ammonia. Soluble in dilute Nitric Acid. Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. Causes damage to the following organs: skin. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc: LDL [Rat] - Route: Oral; Dose: 5000 mg/kg LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Nickel dust and fume can irritate skin. Eyes: Nickel dust and fume can irritate eyes. Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis. Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation). Chronic Potential Health Effects: Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis. Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count). Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy.

Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis. Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal Connecticut hazardous material survey.: Nickel metal Illinois toxic substances disclosure to employee act: Nickel metal Illinois chemical safety act: Nickel metal New York release reporting list: Nickel metal Rhode Island RTK hazardous substances: Nickel metal Pennsylvania RTK: Nickel metal Michigan critical material: Nickel metal Massachusetts RTK: Nickel metal Massachusetts spill list: Nickel metal New Jersey: Nickel metal New Jersey spill list: Nickel metal Louisiana spill reporting: Nickel metal California Director's List of Hazardous Substances: Nickel metal TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R43- May cause sensitization by skin contact. S22- Do not breathe dust. S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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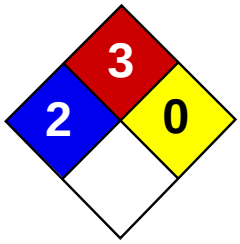

Material Safety Data Sheet
Methyl tert-butyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl tert-butyl ether

Catalog Codes: SLM2152

CAS#: 1634-04-4

RTECS: KN5250000

TSCA: TSCA 8(b) inventory: Methyl tert-butyl ether

CI#: Not available.

Synonym:

Chemical Name: Methyl tert-Butyl Ether

Chemical Formula: C5-H12-O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl {tert-}butyl ether	1634-04-4	100

Toxicological Data on Ingredients: Methyl tert-butyl ether: ORAL (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 224°C (435.2°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 2.5% UPPER: 15.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Characteristic. (Strong.)

Taste: Not available.

Molecular Weight: 88.15 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 55.2°C (131.4°F)

Melting Point: -109°C (-164.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.7405 (Water = 1)

Vapor Pressure: 245 mm of Hg (@ 20°C)

Vapor Density: 3.1 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:

Soluble in methanol, diethyl ether. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 4000 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 23576 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Extremely hazardous in case of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Methyl tert-butyl ether : UN2398 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Methyl tert-butyl ether Massachusetts RTK: Methyl tert-butyl ether TSCA 8(b) inventory: Methyl tert-butyl ether SARA 313 toxic chemical notification and release reporting: Methyl tert-butyl ether CERCLA: Hazardous substances.: Methyl tert-butyl ether

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Material Safety Data Sheet

Mercury

MSDS# 14020

Section 1 - Chemical Product and Company Identification

MSDS Name:	Mercury
Catalog Numbers:	13-410, 13-411, 13-480, 13-481, 13-482, 13-485, 13501, M139-1LB, M139-5LB, M140-14LB, M140-1LB, M140-5LB, M141-1LB, M141-6LB
Synonyms:	Colloidal mercury; Hydrargyrum; Metallic mercury; Quick silver; Liquid silver.

Company Identification:	Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	201-796-7100
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#:	7439-97-6
Chemical Name:	Mercury
%:	100
EINECS#:	231-106-7

Hazard Symbols: T+ N

Risk Phrases: 61 26 48/23 50/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! Corrosive. This substance has caused adverse reproductive and fetal effects in animals. May be absorbed through intact skin. May cause central nervous system effects. May cause liver and kidney damage. Inhalation of fumes may cause metal-fume fever. Possible sensitizer. Toxic if inhaled. Causes irritation and possible burns by all routes of exposure. Target Organs: Blood, kidneys, central nervous system, liver, brain.

Potential Health Effects

Eye:	Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.
Skin:	May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes skin irritation and possible burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion:	May cause severe and permanent damage to the digestive tract. May cause perforation of the digestive tract. May cause effects similar to those for inhalation exposure. May cause systemic effects.
Inhalation:	Causes chemical burns to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause respiratory sensitization.
	May cause liver and kidney damage. May cause reproductive and fetal effects. Effects may be delayed. Chronic

Chronic: exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, personality changes. Chronic ingestion may cause accumulation of mercury in body tissues. Prolonged or repeated exposure may cause inflammation of the mouth and gums, excessive salivation, and loosening of the teeth.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

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

Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Treat symptomatically and supportively. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.

Antidote: The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

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

Extinguishing Media: Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 3; flammability: 0; instability: 0;

Section 6 - Accidental Release Measures

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

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes. Do not breathe vapor.

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

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Mercury	0.025 mg/m3; Skin - potential significant contribution to	0.05 mg/m3 TWA (vapor) 10 mg/m3 IDLH	0.1 mg/m3 Ceiling

	overall exposure by the cutaneous route			

OSHA Vacated PELs: Mercury: 0.05 mg/m3 TWA (vapor)

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Personal Protective Equipment

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

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: silver

Odor: odorless

pH: Not available

Vapor Pressure: 0.002 mm Hg @ 25C

Vapor Density: 7.0

Evaporation Rate: Not available

Viscosity: 15.5 mP @ 25 deg C

Boiling Point: 356.72 deg C (674.10°F)

Freezing/Melting Point: -38.87 deg C (-37.97°F)

Decomposition Temperature: Not available

Solubility in water: Insoluble

Specific Gravity/Density: 13.59 (water=1)

Molecular Formula: Hg

Molecular Weight: 200.59

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: High temperatures, incompatible materials.

Incompatibilities with Other Materials: Metals, aluminum, ammonia, chlorates, copper, copper alloys, ethylene oxide, halogens, iron, nitrates, sulfur, sulfuric acid, oxygen, acetylene, lithium, rubidium, sodium carbide, lead, nitromethane, peroxyformic acid, calcium, chlorine dioxide, metal oxides, azides, 3-bromopropyne, methylsilane + oxygen, tetracarbonylnickel + oxygen, boron diiodophosphide.

Hazardous Decomposition Products: Mercury/mercury oxides.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 7439-97-6: OV4550000

LD50/LC50: RTECS: Not available. Other:

Carcinogenicity: Mercury - IARC: Group 3 (not classifiable)

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity:
Fish: Rainbow trout: LC50 = 0.16-0.90 mg/L; 96 Hr; Unspecified
Fish: Bluegill/Sunfish: LC50 = 0.16-0.90 mg/L; 96 Hr; Unspecified
Fish: Channel catfish: LC50 = 0.35 mg/L; 96 Hr; Unspecified
Water flea Daphnia: EC50 = 0.01 mg/L; 48 Hr; Unspecified

Other: Harmful to aquatic life in very low concentrations.

Section 13 - Disposal Considerations

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

Section 14 - Transport Information

US DOT
Shipping Name: MERCURY
Hazard Class: 8
UN Number: UN2809
Packing Group: III
Canada TDG
Shipping Name: MERCURY
Hazard Class: 8
UN Number: UN2809
Packing Group: III

USA RQ: CAS# 7439-97-6: 1 lb final RQ; 0.454 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T+ N

Risk Phrases:

R 61 May cause harm to the unborn child.

R 26 Very toxic by inhalation.

R 48/23 Toxic : danger of serious damage to health by prolonged exposure through inhalation.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 7439-97-6: 3

Canada

CAS# 7439-97-6 is listed on Canada's DSL List

Canadian WHMIS Classifications: D2A, E

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 7439-97-6 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 7439-97-6 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 6/15/1999

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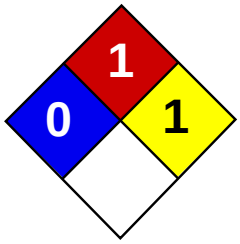

Material Safety Data Sheet
Magnesium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Magnesium

Catalog Codes: SLM4408, SLM2263, SLM3637

CAS#: 7439-95-4

RTECS: OM2100000

TSCA: TSCA 8(b) inventory: Magnesium

CI#: Not applicable.

Synonym: Magnesium ribbons, turnings or sticks

Chemical Name: Magnesium

Chemical Formula: Mg

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Magnesium	7439-95-4	100

Toxicological Data on Ingredients: Magnesium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Flammable in presence of acids, of moisture. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of acids, of moisture.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Magnesium turnings, chips or granules, ribbons, are flammable. They can be easily ignited. They may reignite after fire is extinguished. Produces flammable gases on contact with water and acid. May ignite on contact with water or moist air. Magnesium fires do not flare up violently unless moisture is present.

Special Remarks on Explosion Hazards: Reacts with acids and water to form hydrogen gas with is highly flammable and eplosive

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage:
Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Moisture sensitive. Dangerous when wet.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 24.31 g/mole

Color: Silver-white

pH (1% soln/water): Not applicable.

Boiling Point: 1100°C (2012°F)

Melting Point: 651°C (1203.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.74 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in hot water. Insoluble in cold water. Insoluble in chromium trioxides, and mineral acids, alkalies. Slightly soluble with decomposition in hot water. Soluble in concentrated hydrogen fluoride, and ammonium salts.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, incompatible materials, water or moisture, moist air.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Violent chemical reaction with oxidizing agents. Reacts with water to create hydrogen gas and heat. Must be kept dry. Reacts with acids to form hydrogen gas which is highly flammable and explosive. Magnesium forms hazardous or explosive mixtures with aluminum and potassium perchlorate; ammonium nitrate; barium nitrate, barium dioxide and zinc; beryllium oxide; boron phosphodiiodide; bromobenzyl trifluoride; cadmium cyanide; cadmium oxide; calcium carbide; carbonates; carbon tetrachloride; chlorine; chlorine trifluoride; chloroform; cobalt cyanide; copper cyanide; copper sulfate(anhydrous), ammonium nitrate, potassium chlorate and water; cupric oxide; cupric sulfate; fluorine; gold cyanide; hydrogen and calcium carbonate; hydrogen iodide; hydrogen peroxide; iodine; lead cyanide; mercuric oxide; mercury cyanide; methyl chloride; molybdenum trioxide; nickel cyanide; nitric acid; nitrogen dioxide; oxygen (liquid); performic acid; phosphates; potassium chlorate; potassium perchlorate; silver nitrate; silver oxide; sodium perchlorate; sodium peroxide; sodium peroxide and carbon dioxide; stannic oxide; sulfates; trichloroethylene; zinc cyanide; zinc oxide.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation by mechanical action. May get mechanical injury or embedding of chips/particles in skin. The particles that are embedded in the wounds may retard healing. Eyes: May cause eye irritation by mechanical action. Mechanical injury may occur. Particles or chips may embed in eye and retard healing. Inhalation: Low hazard for ususal industrial handling. It may cause respiratory tract irritation. However, it is unlikely due to physical form. When Magnesium metal is heated during welding or smelting process, Metal Fume Fever may result from inhalation of magnesium fumes. Metal Fume Fever is a flu-like condition consisting of fever, chills, sweating, aches, pains, cough, weakness, headache, nausea, vomiting, and breathing difficulty. Other symptoms may include metallic taste, increased white blood cell count. There is no permanent ill-effect. Ingestion: Low hazard for usual industrial handling. There are no known reports of serious industrial poisonings with Magnesium. Ingeston of large amounts of chips, turnings or ribbons may cause gastrointestinal tract irritation with nausea, vomiting, and diarrhea. Acute ingestion may also result in Hypermagnesia. Hypermagnesia may cause hypotension, bradycardia, CNS depression, respiratory depression, and impairment of neuromuscular transmission (hyporeflexia, paralysis).

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Magnesium UNNA: 1869 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Magnesium Rhode Island RTK hazardous substances: Magnesium Pennsylvania RTK: Magnesium Massachusetts RTK: Magnesium Massachusetts spill list: Magnesium New Jersey: Magnesium TSCA 8(b) inventory: Magnesium

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid. CLASS B-6: Reactive and very flammable material.

DSCL (EEC):
R11- Highly flammable. R15- Contact with water liberates extremely flammable gases. S7/8- Keep container tightly closed and dry. S43- In case of fire, use dry chemical. Never use water.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 3

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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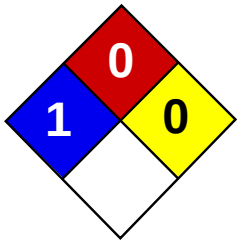
Last Updated: 11/01/2010 12:00 PM



Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m3) from OSHA (PEL) [United States] TWA: 0.03 (mg/m3) from NIOSH [United States] TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

pH (1% soln/water): Not applicable.

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/01/2010 12:00 PM

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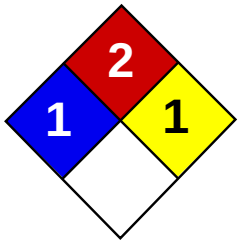

Material Safety Data Sheet
Iron Metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Iron Metal

Catalog Codes: SLI2047, SLI1996

CAS#: 7439-89-6

RTECS: NO4565500

TSCA: TSCA 8(b) inventory: Iron Metal

CI#: Not applicable.

Synonym:

Chemical Name: Iron

Chemical Formula: Fe

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Iron Metal, powder	7439-89-6	100

Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to liver, cardiovascular system, upper respiratory tract, pancreas. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Chlorine Trifluoride reacts with iron with incandescence. Powdered iron reacts with fluorine below redness with incandescence. Reduced iron decomposes with nitrogen dioxide @ ordinary temperature with incandescence. Reacting mass formed by mixture of phosphorus and iron can become incandescent when heated. This material is flammable in powder form only.

Special Remarks on Explosion Hazards: Material in powdered form can explode when exposed to heat or flame

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe dust. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Moisture sensitive.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid metallic powder.)

Odor: Odorless.

Taste: Tasteless.

Molecular Weight: 55.85 g/mole

Color: Black to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 3000°C (5432°F)

Melting Point: 1535°C (2795°F)

Critical Temperature: Not available.

Specific Gravity: Density: 7.86 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, ignition sources, incompatible materials, water/moisture, air, dust generation.

Incompatibility with various substances:
Reactive with oxidizing agents, acids. Slightly reactive to reactive with moisture.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Hot iron(wire) burns in Chlorine gas. Violent decompositon of hydrogen peroxide (53% by weight or greater) may be caused by contact with iron. Readily oxidizes in moist air forming rust. Reactive with halogens. Incompatible with acetaldehyde, ammonium peroxodisulfate, chloroformamidinum, chloric acid, ammonium nitrate, dinitorgen tetroxide, nitryl fluoride, polystyrene, sodium acetylide, potassium dichromate, peroxyformic acid, sulfuric acid, sodium carbide. Readily attacked by dilute mineral acids and or attacked or dissolved by organic acids. Not appreciably attacked by cold sulfuric acid, or nitric acid, but is attacked by hot acids.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 30000 mg/kg [Rat].

Chronic Effects on Humans: May cause damage to the following organs: liver, cardiovascular system, upper respiratory tract, pancreas.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Iron metal filings or dust: May cause skin irritation by mechanical action. Iron metal wire: Not likely to cause skin irritation Eyes: Iron metal filings or dust: Can irritate eyes by mechanical action. Iron metal wire: No hazard. Will not cause eye irritation. Inhalation: Iron dust: Can irritate the respiratory tract by mechanical action. Iron metal wire or filings: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Iron metal wire: Not an ingestion hazard: Iron metal filings or dust: The amount of ingested iron which constitutes a toxic dose is not well defined. Proposed toxic doses of elemental iron are 20 mg/kg for gastrointestinal irritation to greater than 60 mg/kg for systemic toxicity. Gastrointestinal effects are the first signs to appear, with hemorrhagic vomiting and diarrhea, hematochezia, abdominal pain, lethargy, metabolic acidosis, coagulaopathy, shock, coma and convulsions developing from 0 to 6 hours after ingestion. Leukocytosis may also occur. An asymptomatic phase may ensue at 6 to 12 hours postingestion, followed by hypoglycemia or hyperglycemia, hepatic and renal failure, severe acidosis, cyanosis, fever, CNS depression (lethargy, restlessness and/or confusion seizures), hypotension, and cardiovascular collapse/cardiac failure in 12 to 48 hours. Hepatic cirrhosis, gastrointestinal scarring and/or strictures may arise in 2 to 6 weeks. It may also cause an anaphylactoid reaction. Non-cardiogenic pulmonary edema also develop in severe cases of iron intoxication. Chronic Potential Health Effects: Inhalation: Chronic inhalation of iron dust can lead to accumulation in the lungs and a characteristic stippled appearance on X-rays. This condition, called SIDEROSIS, is considered benign in that it does not interfere with lung function and does not predispose to other disease. Chronic inhalation of iron dust may also cause fibrosis in the lungs. Ingestion: Clinical signs of iron overload appear when the total body iron is 5 to 10 times higher than normal. Neurobehavioral defects including depression, decreased activity, habituation, reflex startle, and conditioned avoidance response performance may occur. However, similiar effects were also seen in iron defficiency. It is therefore likely that these behavioral effects are secondary to general toxicity. High serum iron levels may be associated with an increased risk of fatal acute myocardial infarction (MI). Skin: Prolonged or repeated contact may cause hypersensivity.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Metal powder, flammable, n.o.s. (Iron metal powder) UNNA: 3089 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California Director's List of Hazardous Substances: Iron Metal TSCA 8(b) inventory: Iron Metal

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS B-4: Flammable solid.

DSCL (EEC):
R11- Highly flammable. S16- Keep away from sources of ignition - No smoking. S22- Do not breathe dust.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 2

Reactivity: 1

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 2

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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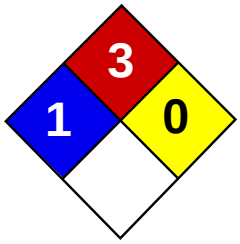

Material Safety Data Sheet
Hexanes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Hexanes

Catalog Codes: SLH2335, SLH2032

CAS#: 110-54-3

RTECS: MN9275000

TSCA: TSCA 8(b) inventory: Hexane

CI#: Not applicable.

Synonym:

Chemical Name: Hexane

Chemical Formula: C6-H14

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Hexanes	110-54-3	98.5-99.9

Toxicological Data on Ingredients: Hexane: ORAL (LD50): Acute: 25000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to peripheral nervous system, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 225°C (437°F)

Flash Points: CLOSED CUP: -22.5°C (-8.5°F). (TAG)

Flammable Limits: LOWER: 1.15% UPPER: 7.5%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards:
Extremely flammable liquid and vapor. Vapor may cause flash fire.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid, insoluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves (impervious).

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 500 (ppm) from OSHA (PEL) [United States] Inhalation TWA: 1800 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 176 (mg/m3) from ACGIH (TLV) [United States] SKIN TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 500 STEL: 1000 (ppm) from ACGIH (TLV) [United States] Inhalation TWA: 1760 STEL: 3500 (mg/m3) from ACGIH (TLV) [United States] Inhalation Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Gasoline-like or petroleum-like (Slight.)

Taste: Not available.

Molecular Weight: 86.18g/mole

Color: Clear Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 68°C (154.4°F)

Melting Point: -95°C (-139°F)

Critical Temperature: Not available.

Specific Gravity: 0.66 (Water = 1)

Vapor Pressure: 17.3 kPa (@ 20°C)

Vapor Density: 2.97 (Air = 1)

Volatility: Not available.

Odor Threshold: 130 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.9

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources, incompatibles.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Hexane can react vigorously with strong oxidizers (e.g. chlorine, bromine, fluorine)

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 25000 mg/kg [Rat]. Acute toxicity of the gas (LC50): 48000 ppm 4 hours [Rat].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: peripheral nervous system, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects based on animal data. May be tumorigenic based on animal data. May affect genetic material. Passes through the placental barrier in animal.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause mild skin irritation. It can be absorbed through the skin in harmful amounts. Eyes: May cause mild eye irritation. Inhalation: May be harmful if inhaled. Inhalation of vapors may cause respiratory tract irritation. Overexposure may affect, brain, spinal cord, behavior/central and peripheral nervous systems (lightheadness, dizziness, hallucinations, paralysis, blurred vision, memory loss, headache, euphoria, general anesthetic, muscle weakness, numbness of the extremeties, asphyxia, unconciousness and possible death), metabolism, respiration, blood, cardiovascular system, gastrointestinal system (nausea) Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation with abdominal pain and nausea. May also affect the liver, blood, brain, peripheral and central nervous systems. Symptoms of over exposure by ingestion are similar to that of overexposure by inhalation.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Hexane UNNA: 1208 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Hexanes Illinois toxic substances disclosure to employee act: Hexanes Illinois chemical safety act: Hexanes New York release reporting list: Hexanes Rhode Island RTK hazardous substances: Hexanes Pennsylvania RTK: Hexanes Florida: Hexanes Minnesota: Hexanes Massachusetts RTK: Hexanes Massachusetts spill list: Hexanes New Jersey: Hexanes New Jersey spill list: Hexanes Louisiana spill reporting: Hexanes TSCA 8(b) inventory: Hexanes SARA 313 toxic chemical notification and release reporting: Hexanes CERCLA: Hazardous substances.: Hexanes: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. R38- Irritating to skin. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R62- Possible risk of impaired fertility. R65- Harmful: may cause lung damage if swallowed. R67- Vapors may cause drowsiness or dizziness. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S29- Do not empty into drains. S33- Take precautionary measures against static discharges. S36/37- Wear suitable protective clothing and gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets. S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves (impervious). Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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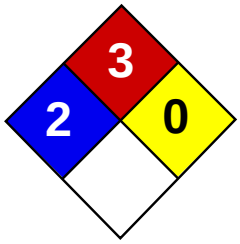

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

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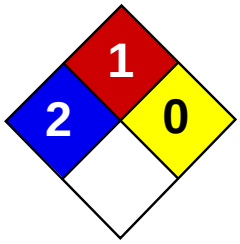

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Copper MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper

Catalog Codes: SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

CAS#: 7440-50-8

RTECS: GL5325000

TSCA: TSCA 8(b) inventory: Copper

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Cu

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Copper	7440-50-8	100

Toxicological Data on Ingredients: Copper LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH [1990] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 63.54 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2595°C (4703°F)

Melting Point: 1083°C (1981.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.94 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Copper Massachusetts RTK: Copper TSCA 8(b) inventory: Copper CERCLA: Hazardous substances.: Copper

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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Material Safety Data Sheet

Version 4.4
Revision Date 05/24/2013
Print Date 02/25/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Chloromethane
Product Number	:	295507
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
Flammable gas, Compressed Gas, Target Organ Effect, Carcinogen, Teratogen

Target Organs

Kidney, Liver, Central nervous system

GHS Classification
Flammable gases (Category 1)
Gases under pressure (Liquefied gas)
Carcinogenicity (Category 2)
Reproductive toxicity (Category 2)
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, Liver, Urogenital tract

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H351	Suspected of causing cancer.
H361fd	Suspected of damaging fertility. Suspected of damaging the unborn child.
H373	May cause damage to organs (Central nervous system, Liver, Urogenital tract) through prolonged or repeated exposure if inhaled.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P281	Use personal protective equipment as required.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.

HMIS Classification

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	4
Physical hazards:	3

NFPA Rating

Health hazard:	1
Fire:	4
Reactivity Hazard:	0

Potential Health Effects

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms	:	Methyl chloride
Formula	:	CH_3Cl
Molecular Weight	:	50.49 g/mol

Component		Concentration
Chloromethane		
CAS-No.	74-87-3	90 100 %
EC-No.	200-817-4	
Index-No.	602-001-00-7	

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. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of an oxidizing gas (eg air), a source of ignition, and when the concentration of the gas is between the lower and upper explosive limits. Keep away from heat/sparks/open flame/hot surface/oxidizing gas. No smoking.

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

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Clean up promptly by sweeping or vacuum.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Contents under pressure. Moisture sensitive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Chloromethane	74-87-3	TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Central Nervous System impairment Liver & kidney damage Testicular damage Teratogenic effects Not classifiable as a human carcinogen Danger of cutaneous absorption			
		STEL	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Central Nervous System impairment Liver & kidney damage Testicular damage Teratogenic effects Not classifiable as a human carcinogen Danger of cutaneous absorption			
	Potential Occupational Carcinogen See Appendix A			
		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.18-1969			
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.18-1969			
		Peak	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.18-1969			
		STEL	100 ppm 205 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	50 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants -

			105 mg/m3	1910.1000
	See Table Z-2			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) 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.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

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, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	compressed liquefied gas
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -97 °C (-143 °F) - lit.
Boiling point	-24.2 °C (-11.6 °F) - lit.
Flash point	no data available
Ignition temperature	632 °C (1,170 °F)
Auto-ignition	632.0 °C (1,169.6 °F)

temperature	
Lower explosion limit	7 %(V)
Upper explosion limit	17.4 %(V)
Vapour pressure	5,060.9 hPa (3,796.0 mmHg) at 20.0 °C (68.0 °F)
Density	0.915 g/cm3 at 25 °C (77 °F)
Water solubility	5.32 g/l at 25 °C (77 °F) - soluble
Partition coefficient: n-octanol/water	log Pow: 0.91
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evapouration 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
Heat, flames and sparks. Extremes of temperature and direct sunlight.

Materials to avoid
Strong oxidizing agents, Iron

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 - 1,800 mg/kg

Inhalation LC50
LC50 Inhalation - rat - male and female - 4 h - > 21,800 mg/m3

Dermal LD50
no data available

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 sensitisation
no data available

Germ cell mutagenicity

Genotoxicity in vivo - rat - male - Inhalation - negative
DNA damage DNA repair

Carcinogenicity

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Chloromethane)
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

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)
Inhalation - May cause damage to organs through prolonged or repeated exposure. - Central nervous system, Liver, Urogenital tract

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Dizziness, Drowsiness, Incoordination., Blurred vision, Headache, Nausea, Vomiting

Synergistic effects
no data available

Additional Information
RTECS: PA6300000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 550 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - 200 mg/l - 48 h Method: OECD Test Guideline 202

Persistence and degradability

Biodegradability	aerobic Result: 100 % - Readily biodegradable.

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1063 Class: 2.1
Proper shipping name: Methyl chloride
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1063 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: METHYL CHLORIDE
Marine pollutant: No

IATA
UN number: 1063 Class: 2.1
Proper shipping name: Methyl chloride
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

OSHA Hazards
Flammable gas, Compressed Gas, Target Organ Effect, Carcinogen, Teratogen

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

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

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Sudden Release of Pressure Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chloromethane	74-87-3	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Chloromethane	74-87-3	2009-09-11

16. OTHER INFORMATION

Further information

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

Material Safety Data Sheet

Version 5.3
Revision Date 01/10/2013
Print Date 02/03/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Carbon tetrachloride
Product Number	:	319961
Brand	:	Sigma-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, Target Organ Effect, Toxic by inhalation., Toxic by ingestion, Toxic by skin absorption

Target Organs

Liver, Kidney, Eyes, Nerves., HeartLiver, Kidney, Eyes, Nerves., Heart

Other hazards which do not result in classification
Rapidly absorbed through skin.

GHS Classification
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 3)
Acute toxicity, Dermal (Category 3)
Skin irritation (Category 3)
Eye irritation (Category 2B)
Carcinogenicity (Category 2)
Specific target organ toxicity - repeated exposure (Category 1)
Acute aquatic toxicity (Category 3)
Chronic aquatic toxicity (Category 3)
Hazardous to the ozone layer (Category 1)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled
H316	Causes mild skin irritation.
H320	Causes eye irritation.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

H412	Harmful to aquatic life with long lasting effects.
H420	Harms public health and the environment by destroying ozone in the upperatmosphere

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P311	Call a POISON CENTER or doctor/ physician.

HMIS Classification

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

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	Toxic 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	:	Tetrachloromethane
Formula	:	CCl_4 CCl_4
Molecular Weight	:	153.82 g/mol

Component		Concentration
Tetrachloromethane		
CAS-No.	56-23-5	-
EC-No.	200-262-8	
Index-No.	602-008-00-5	

4. FIRST AID MEASURES

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

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

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

5. FIREFIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

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

Further information
The product itself does not burn.

6. ACCIDENTAL RELEASE MEASURES

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

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

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Tetrachloromethane	56-23-5	TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Liver damage Suspected human carcinogen Danger of cutaneous absorption			
		STEL	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Liver damage Suspected human carcinogen Danger of cutaneous absorption			
		ST	2 ppm 12.6 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential Occupational Carcinogen See Appendix A			
		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.17-1967			
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.17-1967			
		Peak	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.17-1967			

		TWA	2 ppm 12.6 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) 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.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 240 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

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	liquid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -23 °C (-9 °F) - lit.
Boiling point	76 - 77 °C (169 - 171 °F) - lit.
Flash point	does not flash
Ignition temperature	no data available
Auto-ignition temperature	no data available
Lower explosion limit	no data available

Upper explosion limit	no data available
Vapour pressure	45 hPa (34 mmHg) at 0.3 °C (32.5 °F) 120 hPa (90 mmHg) at 19.8 °C (67.6 °F) 14,549 hPa (10,913 mmHg) at 24 °C (75 °F)
Density	1.594 g/cm3 at 25 °C (77 °F)
Water solubility	0.8461 g/l at 20 °C (68 °F)
Partition coefficient: n-octanol/water	log Pow: 2.83 at 25 °C (77 °F)
Relative vapor density	no data available
Odour	sweet
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
Strong oxidizing agents

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 - 2,350 mg/kg

Inhalation LC50
LC50 Inhalation - rat - 4 h - 8000 ppm

Dermal LD50
LD50 Dermal - rabbit - > 20,000 mg/kg

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Mild skin irritation - 24 h - Draize Test

Serious eye damage/eye irritation
Eyes - rabbit - Mild eye irritation - 24 h - Draize Test

Respiratory or skin sensitization

Germ cell mutagenicity
no data available

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification. Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Tetrachloromethane)
NTP:	Reasonably anticipated to be a human carcinogen (Tetrachloromethane)
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)
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Vomiting, Diarrhoea, Abdominal pain, Nausea, Dizziness, Headache, Damage to the eyes., Liver injury may occur., Kidney injury may occur., Exposure to and/or consumption of alcohol may increase toxic effects., Contact with skin can cause:, Pain, Erythema, hyperemia

Synergistic effects
no data available

Additional Information
RTECS: FG4900000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality LC50 - Danio rerio (zebra fish) - 24.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 35 mg/l - 48 h Method: OECD Test Guideline 202
Toxicity to algae	Growth inhibition EC50 - Algae - 20 mg/l - 72 h Method: OECD Test Guideline 201

Persistence and degradability
no data available

Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d Bioconcentration factor (BCF): 30

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.

Harmful to aquatic life with long lasting effects.

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: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride
Reportable Quantity (RQ): 10 lbs
Marine Pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1846 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: CARBON TETRACHLORIDE
Marine Pollutant: Marine pollutant

IATA
UN number: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Toxic by inhalation., 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
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Tetrachloromethane	56-23-5	2007-07-01

California Prop. 65 Components

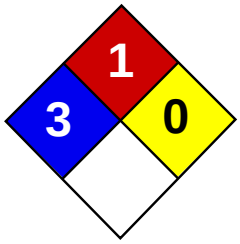
WARNING! This product contains a chemical known to the State of	CAS-No.	Revision Date

California to cause cancer. Tetrachloromethane	56-23-5	2007-09-28

16. OTHER INFORMATION

Further information

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



Health	3
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Cadmium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cadmium

Catalog Codes: SLC3484, SLC5272, SLC2482

CAS#: 7440-43-9

RTECS: EU9800000

TSCA: TSCA 8(b) inventory: Cadmium

CI#: Not applicable.

Synonym:

Chemical Name: Cadmium

Chemical Formula: Cd

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cadmium	7440-43-9	100

Toxicological Data on Ingredients: Cadmium: ORAL (LD50): Acute: 2330 mg/kg [Rat.]. 890 mg/kg [Mouse]. DUST (LC50): Acute: 50 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, liver. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 570°C (1058°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Non-flammable in presence of open flames and sparks, of heat, of oxidizing materials, of reducing materials, of combustible materials, of moisture.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 112.4 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 765°C (1409°F)

Melting Point: 320.9°C (609.6°F)

Critical Temperature: Not available.

Specific Gravity: 8.64 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Reacts violently with potassium.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 890 mg/kg [Mouse]. Acute toxicity of the dust (LC50): 229.9 mg/m3 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP. The substance is toxic to kidneys, lungs, liver.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: An allergen. 0047 Animal: embryotoxic, passes through the placental barrier.

Special Remarks on other Toxic Effects on Humans: May cause allergic reactions, exzema and/or dehydration of the skin.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport:

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cadmium California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cadmium Pennsylvania RTK: Cadmium Massachusetts RTK: Cadmium TSCA 8(b) inventory: Cadmium SARA 313 toxic chemical notification and release reporting: Cadmium CERCLA: Hazardous substances.: Cadmium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R26- Very toxic by inhalation. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 04:29 PM

Last Updated: 05/21/2013 12:00 PM

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Material Safety Data Sheet

Version 4.2
Revision Date 10/29/2012
Print Date 02/25/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Barium
Product Number	:	237094
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
Water Reactive, Irritant

GHS Classification
Substances, which in contact with water, emit flammable gases (Category 2)
Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H261	In contact with water releases flammable gases.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

Precautionary statement(s)

P231 + P232	Handle under inert gas. Protect from moisture.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P422	Store contents under inert gas.

HMIS Classification

Health hazard:	2
Flammability:	3
Physical hazards:	1

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	1
Special hazard.:	W

Potential Health Effects

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

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula	:	Ba
Molecular Weight	:	137.33 g/mol

Component		Concentration
Barium		
CAS-No.	7440-39-3	-
EC-No.	231-149-1	

4. FIRST AID MEASURES

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

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

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

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

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

5. FIREFIGHTING MEASURES

Suitable extinguishing media
Dry powder Carbon dioxide (CO2)

Extinguishing media which shall not be used for safety reasons
Water

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. - Barium oxide

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. 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.

Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. 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. Keep away from sources of ignition - No smoking.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
Barium	7440-39-3	TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen			

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

Skin and body protection
impervious clothing, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	Rods
Colour	grey

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 725 °C (1,337 °F) - lit.
Boiling point	1,640 °C (2,984 °F) - lit.
Flash point	not applicable
Ignition temperature	no data available

Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	3.6 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Reacts violently with water.

Conditions to avoid
Exposure to moisture.

Materials to avoid
Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO2), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Barium oxide
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
no data available

Inhalation LC50
no data available

Dermal LD50
no data available

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

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

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

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.

Synergistic effects
no data available

Additional Information
RTECS: CQ8370000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96 h
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium
Reportable Quantity (RQ): 1000 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1400 Class: 4.3 Packing group: II EMS-No: F-G, S-O
Proper shipping name: BARIUM
Marine pollutant: No

IATA
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium

15. REGULATORY INFORMATION

OSHA Hazards
Water Reactive, Irritant

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

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

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

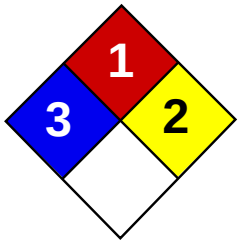
California Prop. 65 Components

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

16. OTHER INFORMATION

Further information

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



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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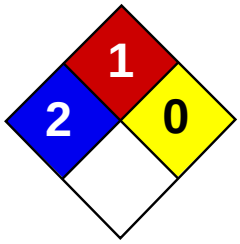
Last Updated: 05/21/2013 12:00 PM



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Antimony MSDS

Section 1: Chemical Product and Company Identification

Product Name: Antimony

Catalog Codes: SLA1453, SLA4462

CAS#: 7440-36-0

RTECS: CC4025000

TSCA: TSCA 8(b) inventory: Antimony

CI#: Not available.

Synonym: Stibium

Chemical Name: Not available.

Chemical Formula: Sb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Antimony	7440-36-0	100

Toxicological Data on Ingredients: Antimony: ORAL (LD50): Acute: 7000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, kidneys, lungs, the nervous system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In

case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 121.75 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 1635°C (2975°F)

Melting Point: 630°C (1166°F)

Critical Temperature: Not available.

Specific Gravity: 6.691 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 7000 mg/kg [Rat].

Chronic Effects on Humans: Causes damage to the following organs: blood, kidneys, lungs, the nervous system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Antimony powder UNNA: UN2871 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Antimony Massachusetts RTK: Antimony TSCA 8(b) inventory: Antimony

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 11:19 AM

Last Updated: 05/21/2013 12:00 PM

Material Safety Data Sheet

Version 3.4
Revision Date 09/10/2012
Print Date 02/05/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	4-Methylphenol
Product Number	:	442418
Brand	:	Supelco
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
Highly toxic by inhalation, Toxic by ingestion, Toxic by skin absorption

Target Organs

Central nervous system, Lungs, Eyes, Liver, Kidney

GHS Classification
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 2)
Acute toxicity, Dermal (Category 3)
Acute aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H301 + H311	Toxic if swallowed or in contact with skin
H330	Fatal if inhaled.
H401	Toxic to aquatic life.

Precautionary statement(s)

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P280	Wear protective gloves/ protective clothing.
P284	Wear respiratory protection.
P310	Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard:	3
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard: 3
Fire: 2
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be fatal 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 : p-Cresol
4-Methylphenol

Formula : C_7H_8O
Molecular Weight : 108.14 g/mol

Component		Concentration
p-Cresol		
CAS-No.	106-44-5	-
EC-No.	203-398-6	
Index-No.	604-004-00-9	

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

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.

hygroscopic Air and light sensitive. Handle and store under inert gas.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
p-Cresol	106-44-5	TWA	5 ppm 22 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
Remarks	Skin contact does contribute to exposure.			
		TWA	5 ppm 22 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin contact does contribute to exposure.			
		TWA	5 ppm 22 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Skin contact does contribute to exposure.			
		TWA	2.3 ppm 10 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	20 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Upper Respiratory Tract irritation 2010 Adoption Not classifiable as a human carcinogen Danger of cutaneous absorption			

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	crystalline
Colour	colourless

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 32 - 34 °C (90 - 93 °F) - lit.
Boiling point	202 °C (396 °F) - lit.
Flash point	85.0 °C (185.0 °F) - closed cup
Ignition temperature	559 °C (1,038 °F)
Autoignition temperature	559.0 °C (1,038.2 °F)
Lower explosion limit	1.1 %(V)
Vapour pressure	1.3 hPa (1.0 mmHg) at 20.0 °C (68.0 °F)
Density	1.034 g/mL at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 1.94
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, Bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 207.0 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Other changes. Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Ulceration or bleeding from stomach.

Inhalation LC50
LC50 Inhalation - rat - 1 h - > 710 mg/m3

Dermal LD50
LD50 Dermal - rabbit - 301.0 mg/kg
Remarks: Behavioral:Tremor. Gastrointestinal:Changes in structure or function of salivary glands. Kidney, Ureter, Bladder:Other changes.

Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Severe eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

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

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

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

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, laryngitis, Dizziness, Cardiovascular effects., Muscle cramps/spasms., Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Synergistic effects
no data available

Additional Information
RTECS: GO6475000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - other fish - 16.00 - 24.00 mg/l - 24 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 7.9 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 1.4 mg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
Does not bioaccumulate.

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

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

Toxic to aquatic life.

no data available

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: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid
Reportable Quantity (RQ): 100 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3455 Class: 6.1 (8) Packing group: II EMS-No: F-A, S-B
Proper shipping name: CRESOLS, SOLID
Marine pollutant: No

IATA
UN number: 3455 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, solid

15. REGULATORY INFORMATION

OSHA Hazards
Highly toxic by inhalation, 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
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
p-Cresol	106-44-5	2007-07-01

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

16. OTHER INFORMATION

Further information

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

Material Safety Data Sheet

Version 5.0
Revision Date 12/18/2012
Print Date 02/05/2014

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	3-Methylphenol
Product Number	:	442391
Brand	:	Supelco
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
Combustible Liquid, Target Organ Effect, Toxic by ingestion, Toxic by skin absorption, Corrosive

Target Organs

Central nervous system, Lungs, Liver, Kidney, Eyes

GHS Classification
Flammable liquids (Category 4)
Acute toxicity, Oral (Category 3)
Acute toxicity, Dermal (Category 3)
Skin corrosion (Category 1A)
Serious eye damage (Category 1)
Acute aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H227	Combustible liquid
H301 + H311	Toxic if swallowed or in contact with skin
H314	Causes severe skin burns and eye damage.
H401	Toxic to aquatic life.

Precautionary statement(s)

P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard: 3
Chronic Health Hazard: *
Flammability: 2
Physical hazards: 0

NFPA Rating

Health hazard: 3
Fire: 2
Reactivity Hazard: 0

Potential Health Effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Skin	Toxic if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : m-Cresol
3-Methylphenol

Formula : C_7H_8O
Molecular Weight : 108.14 g/mol

Component		Concentration
m-Cresol		
CAS-No.	108-39-4	-
EC-No.	203-577-9	
Index-No.	604-004-00-9	

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

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

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

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

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

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
m-Cresol	108-39-4	TWA	2.3 ppm 10 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	20 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Upper Respiratory Tract irritation 2010 Adoption Not classifiable as a human carcinogen Danger of cutaneous absorption			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) 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.

Full contact
Material: Chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 480 min
Material tested:Camapren® (KCL 722 / Aldrich Z677493, Size M)

Splash protection
Material: Nitrile rubber

Minimum layer thickness: 0.2 mm
Break through time: 32 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). 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	liquid
Colour	no data available

Safety data

pH	no data available
Melting point/freezing point	Melting point/range: 8 - 10 °C (46 - 50 °F) - lit.
Boiling point	203 °C (397 °F) - lit.
Flash point	86 °C (187 °F) - closed cup
Ignition temperature	558 °C (1,036 °F)
Auto-ignition temperature	no data available
Lower explosion limit	1.06 %(V)
Upper explosion limit	1.35 %(V)
Vapour pressure	< 1 hPa (< 1 mmHg) at 20 °C (68 °F)
Density	1.034 g/cm3 at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapor density	3.73 - (Air = 1.0)
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
Heat, flames and sparks.

Materials to avoid
Oxidizing agents, Bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 242 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Peritonitis.

Inhalation LC50
no data available

Dermal LD50
Other information on acute toxicity
no data available

Skin corrosion/irritation
Skin - rabbit - Severe skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit - Severe eye irritation

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

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

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion	Toxic if swallowed.
Skin	Toxic if absorbed through skin. Causes skin burns.
Eyes	Causes eye burns.

Signs and Symptoms of Exposure
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Cough, Shortness of breath, Headache, Nausea

Synergistic effects
no data available

Additional Information
RTECS: GO6125000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 8.9 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 18.8 mg/l - 48 h
	EC50 - Daphnia magna (Water flea) - 25 mg/l - 24 h

Persistence and degradability

Biodegradability	Biotic/Aerobic
	Biotic/Aerobic

Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d Bioconcentration factor (BCF): 17
	Leuciscus idus (Golden orfe) - Bioconcentration factor (BCF): 20

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

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

Toxic to aquatic life.

no data available

13. DISPOSAL CONSIDERATIONS

Product
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2076 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, liquid
Reportable Quantity (RQ): 100 lbs
Marine Pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 2076 Class: 6.1 (8) Packing group: II EMS-No: F-A, S-B
Proper shipping name: CRESOLS, LIQUID
Marine Pollutant: No

IATA
UN number: 2076 Class: 6.1 (8) Packing group: II
Proper shipping name: Cresols, liquid

15. REGULATORY INFORMATION

OSHA Hazards
Combustible Liquid, Target Organ Effect, Toxic by ingestion, Toxic by skin absorption, Corrosive

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

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

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
m-Cresol	108-39-4	2007-07-01

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

16. OTHER INFORMATION

Further information

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

Material Safety Data Sheet

1,3-Butadiene

Section 1. Chemical product and company identification

Product name : 1,3-Butadiene

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

Synonym : α,γ-Butadiene; trans-Butadiene; Biethylene; Bivinyl; Buta-1,3-diene; Butadiene; Divinyl; Erythrene; Pyrrolylene; Vinylethylene; (E)-CH2=CHCH=CH2; Butadieen; Buta-1,3-dieen; Butadien; Buta-1,3-dien; NCI-C50602

MSDS # : 001008

Date of Preparation/Revision : **6/6/2013.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. [COLORLESS LIQUEFIED COMPRESSED GAS WITH GASOLINE-LIKE ODOR.]

Emergency overview : WARNING!

FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CANCER HAZARD - CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.

Keep away from heat, sparks and flame. Do not puncture or incinerate container. May cause target organ damage, based on animal data. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Keep container closed.

Contact with rapidly expanding gases can cause frostbite.

Target organs : May cause damage to the following organs: the reproductive system, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

Routes of entry : Inhalation

Potential acute health effects

Eyes : Contact with rapidly expanding gas may cause burns or frostbite.

Skin : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Acts as a simple asphyxiant.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects

Carcinogenicity : Can cause cancer. Risk of cancer depends on duration and level of exposure.

Target organs : May cause damage to the following organs: the reproductive system, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
1,3-Butadiene	106-99-0	100	**ACGIH TLV (United States, 3/2012).** TWA: 4.4 mg/m³ 8 hour(s). TWA: 2 ppm 8 hour(s). **OSHA PEL (United States, 6/2010).** STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s).

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Flammable.

Auto-ignition temperature : 419.85°C (787.7°F)

Flash point : Closed cup: -76.15°C (-105.1°F).

Flammable limits : Lower: 2% Upper: 11.5%

Products of combustion : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Fire hazards in the presence of various substances : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Fire-fighting media and instructions : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

1,3-butadiene

ACGIH TLV (United States, 3/2012).
TWA: 4.4 mg/m³ 8 hour(s).
TWA: 2 ppm 8 hour(s).
OSHA PEL (United States, 6/2010).
STEL: 5 ppm 15 minute(s).
TWA: 1 ppm 8 hour(s).
OSHA PEL 1989 (United States, 3/1989).
STEL: 5 ppm 15 minute(s).
TWA: 1 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 54.1 g/mole

Molecular formula : C4-H6

Boiling/condensation point : -4.4°C (24.1°F)

Melting/freezing point : -108.9°C (-164°F)

Critical temperature : 151.9°C (305.4°F)

Vapor pressure : 21.35 (psig)

Vapor density : 1.87 (Air = 1)

Specific Volume (ft^3/lb) : 7.2098

Gas Density (lb/ft^3) : 0.621

Section 10. Stability and reactivity

Stability and reactivity : Unstable.

Conditions of instability : Under normal conditions of storage and use, hazardous polymerization will not occur. Unstable. (at high temperature)

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials. Highly reactive or incompatible with the following materials: acids and alkalis.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Hazardous polymerization may occur under certain conditions of storage or use.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
1,3-butadiene	LD50 Oral	Rat	5480 mg/kg	-
	LC50 Inhalation Vapor	Rat	285 g/m3	4 hours
	LC50 Inhalation Vapor	Rat	285000 mg/m3	4 hours
	LC50 Inhalation Gas.	Rat	128000 ppm	4 hours

IDLH : 2000 ppm

Chronic effects on humans : **CARCINOGENIC EFFECTS**: Classified 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by NIOSH, 1 (Proven for humans.) by European Union. Classified A2 (Suspected for humans.) by ACGIH.
MUTAGENIC EFFECTS: Classified 2 by European Union.
May cause damage to the following organs: the reproductive system, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects : Can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Products of degradation : Products of degradation: carbon oxides (CO, CO_2) and water.

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1010	Butadienes, stabilized	2.1	Not applicable (gas).		**Reportable quantity** 10 lbs. (4.54 kg)
TDG Classification	UN1010	Butadienes, stabilized	2.1	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Road or Rail Index** Forbidden
Mexico Classification	UN1010	Butadienes, stabilized	2.1	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: 1,3-butadiene
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: 1,3-butadiene: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements :	1,3-Butadiene	106-99-0	100
Supplier notification :	1,3-Butadiene	106-99-0	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

1,3-Butadiene

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

California Prop. 65 : **WARNING:** This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
1,3-Butadiene	Yes.	Yes.	Yes.	No.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class F: Dangerously reactive material.

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements : FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CANCER HAZARD - CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.

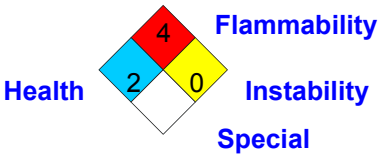
Canada

Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class F: Dangerously reactive material.

Hazardous Material Information System (U.S.A.) :

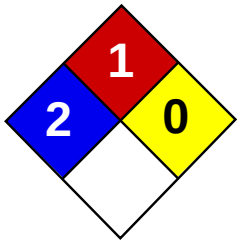
Health	*	2
Flammability		4
Physical hazards		2

National Fire Protection Association (U.S.A.) :



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



Health	2
Fire	1
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
1,1,1-Trichloroethane MSDS

Section 1: Chemical Product and Company Identification

Product Name: 1,1,1-Trichloroethane

Catalog Codes:

CAS#: 71-55-6

RTECS: KJ2975000

TSCA: TSCA 8(b) inventory: 1,1,1-Trichloroethane

CI#: Not available.

Synonym:

Chemical Formula: CH3CCl3

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{1,1,1-}Trichloroethane	71-55-6	100

Toxicological Data on Ingredients: 1,1,1-Trichloroethane: ORAL (LD50): Acute: 9600 mg/kg [Rat]. 6000 mg/kg [Mouse]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 18000 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion. Hazardous in case of skin contact (irritant, permeator), of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 537°C (998.6°F)

Flash Points: Not available.

Flammable Limits: LOWER: 7.5% UPPER: 12.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of oxidizing materials, of acids, of alkalis.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive to explosive in presence of oxidizing materials, of acids, of alkalis.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 350 STEL: 440 CEIL: 440 (ppm) from ACGIH (TLV) [1995] TWA: 1900 STEL: 2460 CEIL: 2380 (mg/m3) from ACGIH [1995]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 133.41 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 74.1°C (165.4°F)

Melting Point: -32.5°C (-26.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.3376 (Water = 1)

Vapor Pressure: 100 mm of Hg (@ 20°C)

Vapor Density: 4.6 (Air = 1)

Volatility: Not available.

Odor Threshold: 400 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 6000 mg/kg [Mouse]. Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 18000 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of skin contact (irritant, permeator), of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : 1,1,1-Trichloroethane : UN2831 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: 1,1,1-Trichloroethane Massachusetts RTK: 1,1,1-Trichloroethane TSCA 8(b) inventory: 1,1,1-Trichloroethane SARA 313 toxic chemical notification and release reporting: 1,1,1-Trichloroethane CERCLA: Hazardous substances.: 1,1,1-Trichloroethane

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

DSCL (EEC):
R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM