

144 West Street
BROOKLYN, NEW YORK
Remedial Action Work Plan

NYC VCP Project Number 16CVCP020K

OER Project Number 16HAZ057K

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OCTOBER 2015

REMEDIAL ACTION WORK PLAN

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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 and Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYS DEC	New York State Department of Environmental Conservation
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCRR	New York Codes Rules and Regulations
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
PCBs	Polychlorinated Biphenyls
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
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

CERTIFICATION

I, Paul Boyce, PE, 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 144 West Street site, site number 16CVCP020K. I certify to the following:

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

PAUL K. BOYCE
Name
074604
PE License Number
Paul Boyce
Signature
10.09.15
Date



I, Kris Almskog, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 144 West Street site, site number 16CVCP020K. I certify to the following:

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

Kris Almskog
QEP Name
[Signature]
QEP Signature
10-9-15
Date

EXECUTIVE SUMMARY

FHRB, LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 5,000-square foot site located at 144 West 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 Background

The Site is located at 144-146 West Street in the Greenpoint section in Brooklyn, New York and is identified as Block 2531 and Lots 1 and 2 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 5,000-square feet and is bounded by a residential building to the north, India Street to the south, a residential building to the east, and West Street to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is a vacant lot.

Summary of Redevelopment Plan

The proposed future use of the Site will consist of the construction of a new six story building with no basement. Layout of the proposed site development on the first floor (ground level) is presented in Figure 3 and architectural design plans are included as Appendix 1. The current zoning designation is M1-2/R6A, R6B and is situated within the Williamsburg-Greenpoint Inclusionary Housing zoned area. The proposed use is consistent with existing zoning for the property. The number of affordable and market rate units has not yet been determined.

The new building will require excavation of shallow soils up to approximately 4 feet below grade for the construction of footings. An estimated 700 cubic yards of soil will be removed for construction purposes. Groundwater is not anticipated to be encountered during the excavation

process. The first floor will contain a commercial unit and two residential units and floors two through six will contain an additional twenty-three residential units. The first floor will be a complete build-out across the site. There will be no landscaped areas. The total building square footage will be approximately 18,332 square feet. As part of the redevelopment, the two lots are expected to be merged; however the lot number is not known at this time. Draft architectural plans are included as Appendix 1.

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

Summary of Surrounding Property

The subject property is located on the corner of West Street and India Street. The adjoining areas to the north and east are single family residential houses, the property to the south is a vacant lot, and the property to the west is a warehouse. The general area surrounding the subject property consists of residential, commercial, and industrial properties. No sensitive receptors, such as schools, daycares, or hospitals were observed within a 500 foot radius of the subject property.

Summary of Past Site Uses and Areas of Concern

A Phase I ESA was completed by Hydro Tech Environmental, Corp. in August 2015. The site has been developed since at least 1887 with residential and retail uses. Lot 1 was identified as being vacant since at least 1965 and Lot 2 was identified as being vacant since at least 1980; however, a 1 story building was briefly included on Sanborn maps from 2002 to 2007; it is unclear if this was a permanent feature or a mobile building.

No areas of concern were identified in the Phase I ESA or during the site inspection.

Summary of Work Performed under the Remedial Investigation

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Conducted a geophysical survey to identify potential underground structures;
3. Installed five soil borings across the entire project Site, and collected ten soil samples for chemical analysis from the soil borings to evaluate soil quality;

4. Installed three groundwater monitoring wells throughout the Site to establish groundwater flow and collected three groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed three soil vapor probes around Site perimeter and collected three samples for chemical analysis.

Summary of Findings of Remedial Investigation

1. Elevation of the property is 11 feet.
2. Depth to groundwater ranges from 10.27 feet to 10.51 feet at the Site.
3. Groundwater flow is generally from the east to the west beneath the Site.
4. Depth to bedrock is greater than 100 feet at the Site.
5. The stratigraphy of the site, from the surface down, consists of at least six feet of historic fill material.
6. Soil/fill samples results were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8. Soil/fill results showed trace concentrations of several VOCs, but none greater than Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benzo(a)anthracene (max. of 13,000 µg/kg), benzo(a)pyrene (max. of 11,000 µg/kg), benzo(b)fluoranthene (max. of 8,200 µg/kg), benzo(k)fluoranthene (max. of 7,400 µg/kg), chrysene (max. of 13,000 µg/kg), dibenz(a,h)anthracene (max. of 1,600 µg/kg), and indeno(1,2,3-cd)pyrene (max. of 6,200 µg/kg) exceeding Restricted Residential Use SCOs within the shallow soil samples. The Pesticides 4,4'-DDE (max. of 0.32 mg/kg), 4,4'-DDT (max. of 0.79 mg/kg), and a-chlordane (max. of 0.16 mg/kg) were detected at concentrations greater than Unrestricted Use SCOs in one sample. One PCB, PCB-1254, was detected in several borings (max. of 4.8 mg/kg) exceeding Restricted Residential SCOs. Several metals including arsenic (max of 19.1 mg/kg), barium (max. of 1,180 mg/kg), cadmium (max. of 4.74 mg/kg), chromium (max. of 31.1 mg/kg), copper (max. of 204 mg/kg), lead (max. of 1,370 mg/kg), mercury (max. of 2.34 mg/kg), and zinc (max. of 763mg/kg) exceeded Unrestricted Use SCOs. Of these metals, arsenic, barium, cadmium, lead, and mercury also exceeded Restricted Residential Use SCOs in six of the ten soil samples. Overall,

the soil results were consistent with data identified at sites with urban fill material in NYC.

7. Groundwater sample results from the RI were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater results showed one VOC that exceeded GQS; tetrahydrofuran (max. at 130 µg/L) is a typical laboratory contaminant. No SVOCs or pesticides were detected in any sample. One PCB, PCB-1254, slightly exceeded its GQS. Several dissolved metals were identified in groundwater, but only magnesium (0.039 mg/L), and sodium (max. of 363 mg/L) exceeded their respective GQS.
8. Soil vapor samples collected during the RI were compared to the compounds listed in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples collected during the RI showed low levels of petroleum-related VOCs and chlorinated VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from 101.27 µg/m³ to 123.5 µg/m³. Highest concentrations were detected for acetone (max. of 9,140 µg/m³). The chlorinated VOCs, carbon tetrachloride, cis-1,2-dichloroethene (DCE), and vinyl chloride (VC) were not detected in any of the soil gas samples. The compounds 1,1,1-trichloroethane (TCA) (max. of 7.96 µg/m³), trichloroethylene (TCE) (max of 37.6 µg/m³), and Tetrachloroethylene (PCE) (max of 106 µg/m³) were detected in each of the three soil gas samples. Concentrations of the chlorinated VOCs were above the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

Summary of the Remedial Action

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of 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. Vertical and horizontal delineation of PCB hotspot area.
6. 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).
7. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs. The entire footprint of the Site will be excavated to a depth of approximately 4 feet below grade for development purposes. A small portion of property will be excavated to the depths of at least 7 feet below grade to remove PCBs hotspot area. Approximately, 700 cubic yards of soil will be excavated and removed from this site.
8. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
9. 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.
10. 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.
11. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.

12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
14. Construction of an engineered composite cover consisting of a 10 inch thick concrete building slab with a 6 inch clean granular sub-base beneath all building areas. There will be no landscaped areas at the site.
15. 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 20-mil Raven Vapor Block VBP20 vapor barrier below the slab throughout the full building area and outside all sub-grade foundation sidewalls. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. 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.
16. Installation of an active sub-slab depressurization system (SSDS) consisting of a network of horizontal pipe set in the middle of a gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal piping will consist of fabric wrapped, perforated 4-inch diameter HDPE pipe connected to a 6 inch cast iron riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consist of a 6 inch thick layer of gravel. The pipe will be finished at the roof line with a rain cap to prevent rain infiltration. The active SSDS will be hardwired and will include a RadonAway RP 265 blower installed on the roof line and a pressure gauge and alarm located in an accessible area in the mechanical room. The active SSDS is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient across the building slab to prevent vapor migration into the building.
17. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.

18. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
19. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
20. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
21. 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.
22. 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 NYC Office of Environmental Remediation (OER) provides governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies, shows the location of identified contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

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

Project Information:

- Site Address: 144 West Street, Brooklyn, NY
- NYC Voluntary Cleanup Program Project Number: 16CVCP020K

Project Contacts:

- OER Project Manager: Horace Zhang, 212-788-8841
- Site Project Manager: Kris Almskog, 631-589-6353
- Site Safety Officer: Jennifer Lewis, 631-589-6353
- Online Document Repository:

<http://www.nyc.gov/html/oer/html/repository/RBrooklyn.shtml>

Remedial Investigation and Cleanup Plan: Under the oversight of the NYC OER, a thorough 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 to 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 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 Construction Health and Safety Plan (CHASP) that is designed to protect community residents and on-Site workers. The elements of this RAWP are in compliance with applicable safety requirements of the United States Occupational Safety and Health Administration (OSHA). This RAWP includes many protective elements including those discussed below.

Site Safety Coordinator: This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is 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 applicable 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.

Stormwater Management: To limit the potential for soil erosion and discharge, this cleanup plan has provisions for stormwater management. The main elements of the stormwater 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 will conform to requirements of the NYC Department of Buildings.

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 and provides project contact names and numbers, and a link to the document repository where 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, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

Stockpile Management: Soil stockpiles will be kept covered with tarps to prevent dust, odor 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 applicable 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 the 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 the Remedial Action Report) that will be available for public review online. A link to the online document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document

Long-Term Site Management: If long-term protection is needed 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 either in the property's deed or established through a city environmental designation registered with the Department of Buildings. 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 Project Background

FHRB, LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program and/or in the “E” Designation Program to investigate and remediate a property located at 144 West Street in the Greenpoint section of Brooklyn, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 Site Location and Background

The Site is located at 144-146 West Street in the Greenpoint section in Brooklyn, New York and is identified as Block 2531 and Lots 1 and 2 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 5,000-square feet and is bounded by a residential building to the north, India Street to the south, a residential building to the east, and West Street to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is a vacant lot.

1.2 Redevelopment Plan

The proposed future use of the Site will consist of the construction of a new six story building with no basement. Layout of the proposed site development on the first floor (ground level) is presented in Figure 3 and architectural design plans are included as Appendix 1. The current zoning designation is M1-2/R6A, R6B and is situated within the Williamsburg-Greenpoint Inclusionary Housing zoned area. The proposed use is consistent with existing zoning for the property. The number of affordable and market rate units has not yet been determined.

The new building will require excavation of shallow soils up to approximately 4 feet below grade for the construction of footings. An estimated 700 cubic yards of soil will be removed for construction purposes. Groundwater is not anticipated to be encountered during the excavation process. The first floor will contain a commercial unit and two residential units and floors two through six will contain an additional twenty-three residential units. The first floor will be a complete build-out across the site. There will be no landscaped areas. The total building square footage will be approximately 18,332 square feet. As part of the redevelopment, the two lots are expected to be merged; however the lot number is not known at this time. Draft architectural plans are included as Appendix 1.

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

1.3 Description of Surrounding Property

The subject property is located on the corner of West Street and India Street. The adjoining areas to the north and east are single family residential houses, the property to the south is a vacant lot, and the property to the west is a warehouse. The general area surrounding the subject property consists of residential, commercial, and industrial properties. No sensitive receptors, such as schools, daycares, or hospitals were observed within a 500 foot radius of the subject property. Figure 4 shows the surrounding land usage.

1.4 Summary of Past Site Uses and Areas of Concern

A Phase I ESA was completed by Hydro Tech Environmental, Corp. in August 2015. The site has been developed since at least 1887 with residential and retail uses. Lot 1 was identified as being vacant since at least 1965 and Lot 2 was identified as being vacant since at least 1980; however, a 1 story building was briefly included on Sanborn maps from 2002 to 2007; it is unclear if this was a permanent feature or a mobile building.

No areas of concern were identified in the Phase I ESA or during the site inspection.

1.5 Summary of Work Performed under the Remedial Investigation

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

1.6 Summary of Findings of Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “Remedial Investigation Report, 144 West Street, Brooklyn”, dated September 2015 (RIR).

1. Elevation of the property is 11 feet.
2. Depth to groundwater ranges from 10.27 feet to 10.51 feet at the Site.
3. Groundwater flow is generally from the east to the west beneath the Site.
4. Depth to bedrock is greater than 100 feet at the Site.
5. The stratigraphy of the site, from the surface down, consists of at least six feet of historic fill material.
6. Soil/fill samples results were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8 and CP51. Soil/fill results showed trace concentrations of several VOCs, but none greater than Unrestricted Use SCOs. Several SVOCs consisting of Polycyclic Aromatic Hydrocarbons (PAHs) were detected with benz(a)anthracene (max. of 13,000 µg/kg), benzo(a)pyrene (max. of 11,000 µg/kg), benzo(b)fluoranthene (max. of 8,200 µg/kg), benzo(k)fluoranthene (max. of 7,400 µg/kg), chrysene (max. of 13,000 µg/kg),

dibenz(a,h)anthracene (max. of 1,600 µg/kg), and indeno(1,2,3-cd)pyrene (max. of 6,200 µg/kg) exceeding Restricted Residential Use SCOs within the shallow soil samples. The Pesticides 4,4'-DDE (max. of 0.32 mg/kg), 4,4'-DDT (max. of 0.79 mg/kg), and a-chlordane (max. of 0.16 mg/kg) were detected at concentrations greater than Unrestricted Use SCOs in one sample. One PCB, PCB-1254, was detected in several borings (max. of 4.8 mg/kg) exceeding Restricted Residential SCOs. Several metals including arsenic (max of 19.1 mg/kg), barium (max. of 1,180 mg/kg), cadmium (max. of 4.74 mg/kg), chromium (max. of 31.1 mg/kg), copper (max. of 204 mg/kg), lead (max. of 1,370 mg/kg), mercury (max. of 2.34 mg/kg), and zinc (max. of 763mg/kg) exceeded Unrestricted Use SCOs. Of these metals, arsenic, barium, cadmium, lead, and mercury also exceeded Restricted Residential Use SCOs in six of the ten soil samples. Overall, the soil results were consistent with data identified at sites with urban fill material in NYC.

7. Groundwater sample results from the RI were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater results showed one VOC that exceeded GQS; tetrahydrofuran (max. at 130 µg/L) is a typical laboratory contaminant. No SVOCs or pesticides were detected in any sample. One PCB, PCB-1254, slightly exceeded its GQS. Several dissolved metals were identified in groundwater, but only magnesium (0.039 mg/L), and sodium (max. of 363 mg/L) exceeded their respective GQS.
8. Soil vapor samples collected during the RI were compared to the compounds listed in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples collected during the RI showed low levels of petroleum-related VOCs and chlorinated VOCs. The total concentration of petroleum-related VOCs (BTEX) ranged from 101.27 µg/m³ to 123.5 µg/m³. Highest concentrations were detected for acetone (max. of 9,140 µg/m³). The chlorinated VOCs, carbon tetrachloride, cis-1,2-dichloroethene (DCE), and vinyl chloride (VC) were not detected in any of the soil gas samples. The compounds 1,1,1-trichloroethane (TCA) (max. of 7.96 µg/m³), trichloroethylene (TCE) (max of 37.6 µg/m³), and Tetrachloroethylene (PCE) (max of 106 µg/m³) were detected in each of the three soil gas

samples. Concentrations of the chlorinated VOCs were above the monitoring level ranges established within the NYSDOH soil vapor guidance matrix.

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

2.0 Remedial Action Objectives

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

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.

Groundwater

- Remove contaminant sources causing impact to groundwater.

Soil Vapor

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

3.0 Remedial Alternatives Analysis

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

As required, a Track 1 Unrestricted Use scenario is evaluated for the remedial action. The following is a detailed description of the alternatives analyzed to address impacted media at the Site:

Alternative 1:

- 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. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by excavating the entire Site to groundwater to remove all historic fill.

- No Engineering or Institutional Controls are required for a Track 1 cleanup, however, as part of development, a Raven Vapor Block VBP20 vapor barrier and a sub-slab depressurization system (SSDS) would be installed to prevent potential exposures from soil vapor in the future.

Alternative 2:

- Establishment of Site Specific Track 4 SCO.
- 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 end point sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by excavating one hot spot to a depth of about 7 feet. As part of development, soil beneath most of the site will be removed to a depth of 2 to 6 feet for the installation of footings. If soil/fill containing analytes at concentrations above Track 4 Site-specific SCOs is still present at the base of the excavation, additional excavation would be performed to meet Track 4 Site-Specific SCOs.
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a vapor barrier system beneath the building slab and along foundation side walls to prevent potential exposures from soil vapor;
- Installation and operation of an active Sub Slab Depressurization System (SSDS);
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. The SMP will note that the property owner and property owner's successors and 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 all soil/fill exceeding Track 1 Unrestricted Use SCO's and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contaminants leaching into groundwater.

Alternative 2 would achieve comparable protections of human health and the environment by excavation and removal of most of the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCO's, as well as by placement of Institutional and Engineering Controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan and continuing the E-designation on the property would ensure that the composite cover system remains intact and protective of public health. Establishment of Track 4 Site-Specific SCO's would minimize the risk of contamination leaching into groundwater.

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

would be prevented by installing a vapor barrier below the building slab and outside foundations walls below grade.

3.2 Balancing Criteria

Compliance with Standards, Criteria and Guidance (SCGs)

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

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

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCG's and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCO's. Compliance with SCG's for soil vapor would also be achieved by installing a vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls. A Site Management Plan would ensure that these controls remained protective for the long term. Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) will 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 short term effects during the remedial action on public health

and the environment during implementation of the remedial action, including protection of the community, protection of onsite workers and environmental impacts.

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

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

The potential adverse impact to the community, workers and the environment for both alternatives would be minimized through implementation of control plans including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) would provide protection from on-Site contaminants by using 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

Engineering Controls/Institutional Controls (ECs/ICs) that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of ECs.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill above Track 1 Unrestricted Use SCO's. Removal of on-Site contaminant sources will also prevent future groundwater contamination.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; installing a composite cover system across the Site; maintaining use restrictions; establishing an SMP to ensure long-term management of ICs and ECs; and maintaining registration as an 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 continue to provide the required level of protection.

Reduction of toxicity, mobility, or volume of contaminated material

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

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

Alternative 2 would remove most of the historic fill at the Site, and all remaining on-Site soil/fill beneath the new building will meet Track 4 Site-Specific SCO's.

Alternative 1 would remove a greater total mass of contaminants from the Site. The removal of soil to 2 to 6 feet for the new development in both scenarios would lessen the difference in contaminant mass removal between these two alternatives.

Implementability

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

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

Cost effectiveness

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

Since historic fill at the Site was found to extend to a depth of at least 6 feet below grade during the RI and may extend to groundwater at 10 feet below grade, and the new building requires excavation of the entire Site to a depth of 2 to 6 feet for footings, the costs associated with Alternative 1 would be significantly higher than Alternative 2 as additional soils will be required to be removed to achieve Track 1 SCOs. Additional costs would include installation of additional

shoring/underpinning, transport, disposal of additional soil, and import of clean soil for backfill. However, long-term costs for Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

The remedial plan would couple the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan will also consider the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during cleanup and redevelopment of the Site.

Community Acceptance

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

This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 2. Observations here will be supplemented by public comment received on the RAWP. Under both alternatives, the overall goals of the remedial program, to protect public health and the environment and eliminate potential contaminant exposures, have been broadly supported by citizens in NYC communities.

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 current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. The proposed future use of the Site includes a six story building with 25 residential units and one commercial unit. An as yet to be determined number of residential units will be offered at affordable rates and the remaining will be offered at market rate. Following remediation, the Site will meet either Track 1 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are protective of public health and the environment for its planned residential use. The proposed use is compliant with the property's zoning and is consistent with recent development patterns. The areas surrounding the site is urban and consists of predominantly mixed residential and commercial buildings and industrial buildings in zoning districts designated for such uses. The development would remediate a vacant, contaminated lot and provide a modern mixed use commercial and residential building. The proposed development would clean up the property and make it safer, create new employment opportunities, living space for affordable and supportive housing and associated societal benefits to the community, and other economic benefits from land revitalization. Temporary short-term project impacts are being mitigated through site management controls and truck traffic controls during remediation activities. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Track 4 Site-Specific SCOs, both of which are protective of public health and the environmental for its planned use.

The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is located in an urban area and not in proximity to fish or wildlife and neither alternative would result in any potential exposure pathways of contaminant migration affecting fish or wildlife. The remedial action is also protective of groundwater natural resources. The site is located in a Federal Emergency Management Agency (FEMA)-designated moderate risk zone. Both alternatives are equally protective of natural resources and cultural resources. Improvements in

the current environmental condition of the property achieved by both alternatives considered in this plan are consistent with the City's goals for cleanup of contaminated land.

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 for either alternative 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. The New York City Clean Soil Bank program is available for reuse of any clean native soils under either alternative. A complete list of green remedial activities considered as part of the NYC VCP is included in a Sustainability Statement.

4.0 Remedial Action

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is Alternative 2, the Track 4 remedial action. The preferred remedial action achieves protection of public health and the environment for the intended use of the property. The preferred remedial action will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of 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. Vertical and horizontal delineation of PCB hotspot area.
6. 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).
7. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs.

The entire footprint of the Site will be excavated to a depth of approximately 2 to 6 feet below grade for development purposes. A small portion of property will be excavated to the depths of at least 7 feet below grade to remove PCBs hotspot area. Approximately, 900 tons of soil will be excavated and removed from this site.

8. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
9. 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.
10. 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.
11. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
12. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
13. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
14. Construction of an engineered composite cover consisting of a 10 inch thick concrete building slab with a 6 inch clean granular sub-base beneath all building areas." There will be no landscaped areas at the site.
15. 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 20-mil Raven Vapor Block VBP20 vapor barrier below the slab throughout the full building area and outside all sub-grade foundation sidewalls. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. 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.

16. Installation of an active sub-slab depressurization system (SSDS) consisting of a network of horizontal pipe set in the middle of a gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal piping will consist of fabric wrapped, perforated 4-inch diameter HDPE pipe connected to a 6 inch cast iron riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consist of a 6 inch thick layer of gravel. The pipe will be finished at the roof line with a rain cap to prevent rain infiltration. The active SSDS will be hardwired and will include a RadonAway RP 265 blower installed on the roof line and a pressure gauge and alarm located in an accessible area in the mechanical room. The active SSDS is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient across the building slab to prevent vapor migration into the building.
17. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
18. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
19. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
20. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
21. Submission of an approved Site Management Plan (SMP) in the Remedial Action Report (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.
22. 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 utilized for this project:

<u>Contaminant</u>	<u>Site-Specific SCO's</u>
Total SVOCs	200 ppm
Lead	1,000 ppm
Mercury	2.5 ppm
Barium	800 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 4. 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.

Soil/Fill Excavation and Removal

Excavation will be conducted for the construction of the new building and a hot-spot excavation will be conducted in the vicinity of the SB003 boring conducted during the Remedial Investigation. The location of planned excavations is shown in Figure 5. The total quantity of soil/fill expected to be excavated and disposed off-Site is 900 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. Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

Confirmation End-point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation end-point soil sampling. The deeper samples (4 to 6 feet) collected during the Remedial Investigation will constitute the confirmation end-point sampling.

Hotspot End-point Sampling

End-point samples will be collected from the sidewalls and base of excavation at the hotspot location identified in the Remedial Investigation, according to the procedure listed below. The hotspot identified at the site is at boring SB003 for barium. 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.

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

Dedicated disposable sampling materials will be used for the collection of endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable

equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Decontamination of non-dedicated sampling equipment will consist of the following:

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

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

Import of Soils

Soil import is not planned on this project. Import of approximately 100 cubic yards of gravel for the sub-base around the SSDS is anticipated and will originate from a virgin material source, such as a rock quarry, or other acceptable source as per the SMMP.

Reuse of Onsite Soils

Soil reuse is not planned on this project.

4.3 Engineering Controls

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the site. The Site has three primary Engineering Control Systems. These are:

- (1) Composite Cover System
- (2) Soil Vapor Barrier System
- (3) Active Sub-Slab Depressurization System

Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system will be comprised of a 10 inch thick reinforced concrete slab.

Figure 6 shows the location of each cover type built at the Site.

The composite cover system will be a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials 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 Remedial Action Report.

Vapor Barrier System

Migration of soil vapor from onsite or offsite sources into the building will be mitigated with a combination of building slab and vapor barrier. The vapor barrier will consist of a 20 mil thick Raven Industries Vapor Block VBP20 membrane. The vapor barrier will be installed prior to pouring the building's concrete slab. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.

The vapor barrier will extend throughout the area occupied by the footprint of the new building and up the foundation sidewalls and will be installed in accordance with manufacturer specifications.

A plan view showing the location of the proposed vapor barrier system is provided in Figure 7. Product specification sheets are provided in Appendix 5. The Remedial Action Report will include as-built drawings and diagrams; manufacturer documentation; and photographs.

The Vapor Barrier System is a permanent engineering control and will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials 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 vapor barrier system is disturbed after the remedial action is complete. Maintenance of these systems will be described in the Site Management Plan in the Remedial Action Report.

Sub-Slab Depressurization System

Migration of soil vapor into the building will be mitigated with the construction of an active Sub-Slab Depressurization System (SSDS). The SSDS will consist of 4 inch diameter HDPE piping beneath the building slab connected to a 6 inch diameter cast iron riser pipe to the roof and a RadonAway model 265 fan or equivalent. The SSDS will be installed within a 6 inch thick gravel layer beneath the concrete slab. The SSDS system was designed in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

The SSDS is a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. Maintenance of this SSDS will be described in the Site Management Plan in the Remedial Action Report. The location and layout of the SSDS is shown in Figure 8.

4.4 Institutional Controls

A series of Institutional Controls (IC's) are required under this Remedial Action to assure permanent protection of public health by elimination of exposure to residual materials. These

IC's define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a Site Management Plan included in the final Remedial Action Report (RAR). Institutional Controls would be:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the SMP which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a SMP in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, inspection, and certification of ECs and IC's. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3).
- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for mixed use commercial and residential 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 Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) operation and maintenance of EC's; (3) inspection and certification of IC's and EC's.

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

4.6 Qualitative Human Health Exposure Assessment

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

Data and information reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA) for this project. As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk under current and future conditions by characterizing the exposure setting, identifying exposure pathways, and evaluating

contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Contaminant Sources

Based upon the results of the Remedial Investigation, historic fill exists at the site at least to a depth of 6 feet below grade. The following compounds of concern were identified in the soil at concentrations exceeding the Restricted Residential SCOs:

- SVOCs – benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
- Metals – arsenic, barium, lead, and mercury exceeding Unrestricted Use SCOs.
- PCBs – PCB-1254 was identified at elevated concentrations.

The following compounds of concern were identified in the groundwater at concentrations exceeding the Groundwater Quality Standards (GQSs):

- VOCs – Tetrahydrofuran (a typical laboratory contaminant)
- Metals – magnesium and sodium
- PCBs – PCB-1254

The following compounds of concern were identified in soil vapor:

- Chlorinated solvents – moderate levels of chlorinated solvents were identified. Trichloroethene was detected at a concentration greater than the NYSDOH guideline for indoor air.
- Petroleum compounds – moderate levels of petroleum compounds were identified throughout the site at relatively consistent concentrations.

Nature, Extent, Fate and Transport of Contaminants

Historic fill is present throughout the site at least to a depth of 6 feet below grade. Impact observed in the soil does not appear to be significantly affecting the groundwater or soil vapor at the site with the exception of relatively low concentrations of PCB-1254 observed in shallow

soils and groundwater. Metals observed in the dissolved groundwater samples are naturally occurring and are not a concern. Elevated concentrations of VOCs observed in the soil vapor are likely the result of spills from up-gradient sources migrating beneath the subject property.

Receptor Populations

On-Site Receptors: The site is currently vacant and undeveloped and access to the Site is restricted by an 8 foot high, chained and locked, perimeter fence. Onsite receptors are limited to trespassers, site representatives and visitors granted access to the property. During construction, potential on-site receptors include construction workers, site representatives, and visitors. Under proposed future conditions, potential on-site receptors include adult and child building residents, workers and visitors.

Off-Site Receptors: Potential off-site receptors within a 500 foot radius of the Site include adult and child residents; commercial and construction workers; pedestrians; and trespassers based on the following land uses within 500 feet of the Site:

1. Commercial Businesses – existing and future
2. Residential Buildings – existing and future
3. Building Construction/ Renovation – existing and future
4. Pedestrians, Trespassers, Cyclists – existing and future
5. Schools – existing and future

Potential Routes of Exposure

Three potential primary routes exist by which chemicals can enter the body: ingestion, inhalation, and dermal absorption. Exposure can occur based on the following potential media:

- Ingestion of groundwater or fill/ soil;
- Inhalation of vapors or particulates; and
- Dermal absorption of groundwater or fill/ soil.

Potential Exposure Points

Current Conditions: The site is currently capped with concrete and there are no potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill. Groundwater is not exposed at the site. The site is served by the public water supply and groundwater is not used at the site for potable supply and there is no potential for exposure. Because the site is currently undeveloped, there is no potential for soil vapor to accumulate on site.

Construction/ Remediation Conditions: During the remedial action, onsite workers will come into direct contact with surface and subsurface soils as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with exposed impacted soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. Due to the depth of groundwater, direct contact with groundwater is not expected. 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 SCOs will be removed. The site will be fully capped, preventing potential direct exposure to soil and groundwater remaining in place, and engineering controls, such as a vapor barrier and active SSDS, will prevent any potential exposure due to inhalation by preventing soil vapor intrusion. The site is served by the public water supply, and groundwater is not used at the site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

Overall Human Health Exposure Assessment

There are no complete exposure pathways for the current site condition. There are complete exposure pathways that require mitigation during implementation of the remedy. There are no complete exposure pathways under future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a mixed use

commercial and residential structure, site-wide surface cover, an active SSDS, and a subsurface vapor barrier system for the building. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

5.0 Remedial Action Management

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Miss Jennifer Lewis and Mr. Michael Gaul. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Mr. Paul Boyce, PE, and Mr. Kris Almskog, respectively.

5.2 Site Security

Site access will be controlled by locked gates along the perimeter fence.

5.3 Work Hours

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. The hours of operation will be conveyed to OER during the pre-construction meeting.

5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in Appendix 6. The Site Safety Coordinator will be Mr. Michael Gaul. 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, such as 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 will comply with all requirements of 29 CFR 1910.120. 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 CHASP. 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 bailing/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/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 will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m³ 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/m³ 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/m³ of the upwind level and in preventing visible dust migration.

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

5.6 Agency Approvals

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

5.7 Site Preparation

Pre-Construction Meeting

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

Mobilization

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

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations including NYC Building Code to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Mark-Out 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

Dewatering is not anticipated during remediation and construction.

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 pads 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 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 clean water will be utilized for the removal of soil from vehicles and equipment, as necessary.

Extreme Storm Preparedness and Response Contingency Plan

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

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, 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, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

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

Storm Response Reporting

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) 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 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 to proceed east on India Street to McGuinness Blvd. Proceed south on McGuinness Blvd to the Brooklyn-Queens Expressway and enter the highway.

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 business day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of excavation and other remedial 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 results noting all excursions. CAMP data may be reported;
- 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, and approved by, 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 with basis 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;
- Text description with thorough detail of all engineering and institutional controls (if Track 1 remedial action is not achieved)
- As-built drawings for all constructed remedial elements;
- Manifests for all soil or fill disposal;
- Photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 remedial action is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results (including all soil test results from the remedial investigation for soil that will remain on site) and all soil/fill waste characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all soil or fill material removed from the Site including a map showing the location of these excavations and hotspots, tanks or other contaminant source areas;
- Full accounting 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 (if Track 1 remedial action is not achieved);
- 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, [name], 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 [site name (address)] site, site number [VCP site number]. 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, [name], am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the [site name (address)] site, site number [VCP site number]. 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

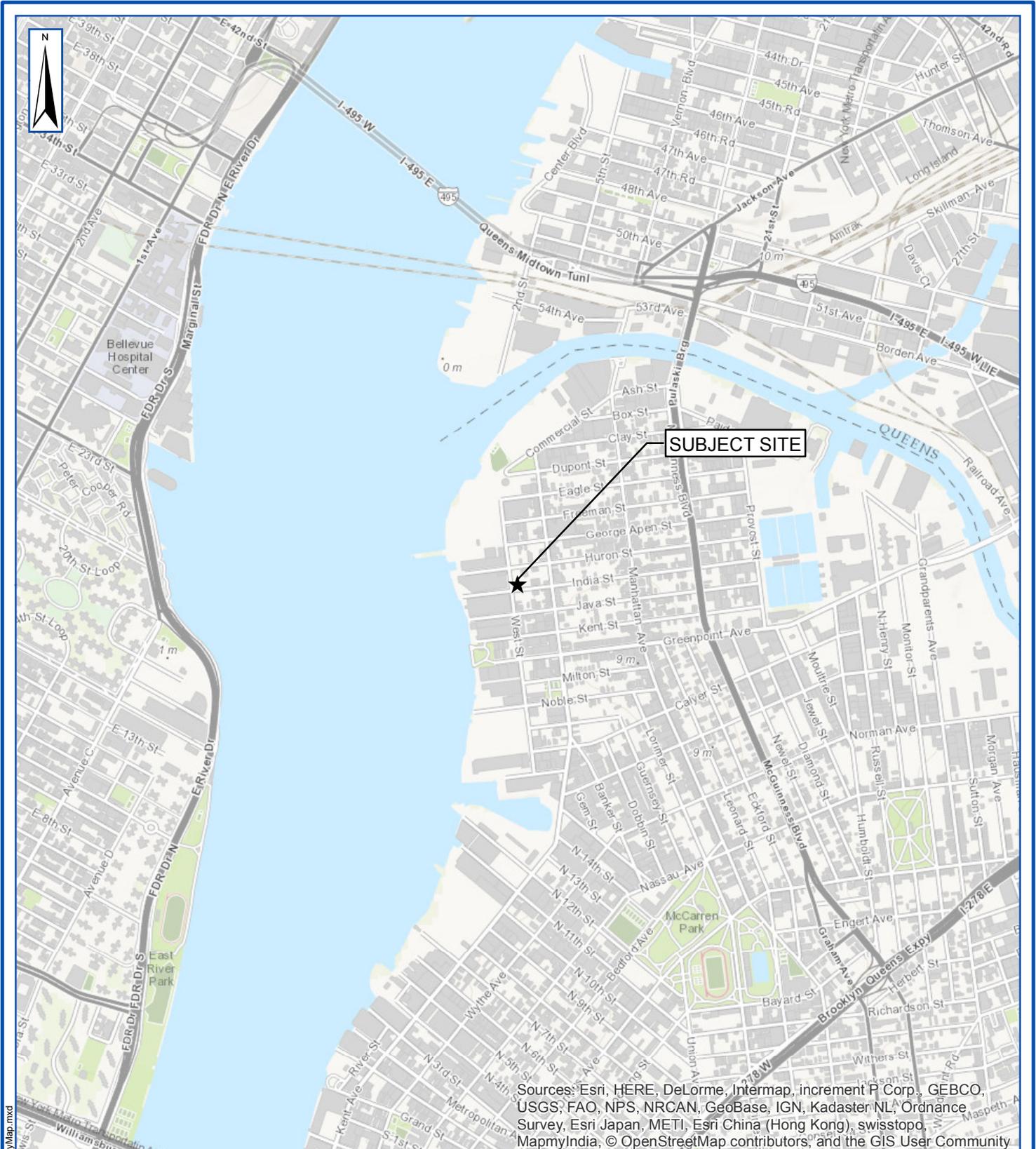
Date

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 three month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	1	1
Fact Sheet 2 announcing start of remedy	1	4
Mobilization	2	1
Remedial Excavation	3	6
Demobilization	10	1
Submit Remedial Action Report	11	12

Figures



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

SUBJECT SITE VICINITY

144-146 West Street
Brooklyn, NY



Project:	API1501
Date:	8/12/2015
Designed by:	JL
Drawn by:	UC
Approved by:	JL
Figure No:	1

Document Path: G:\Projects\A-D\API1501 - VicinityMap.mxd

PWGC
Strategic Environmental and Engineering Solutions

P.W. GROSSER CONSULTING ENGINEER
AND HYDROGEOLOGIST, P.C.

630 Johnson Avenue, Suite 7
Bohemia, NY • 11716-2618
Phone: (631) 589-6353 • Fax: (631) 589-8705
E-mail: INFO@PWGROSSER.COM



WEST ST



INDIA ST



	Site Boundary
	Adjacent Lots
	Curbline



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Project:	API1501	Designed by:	JL
Date:	9/11/2015	Drawn by:	UC
Scale:	AS SHOWN	Approved by:	JL

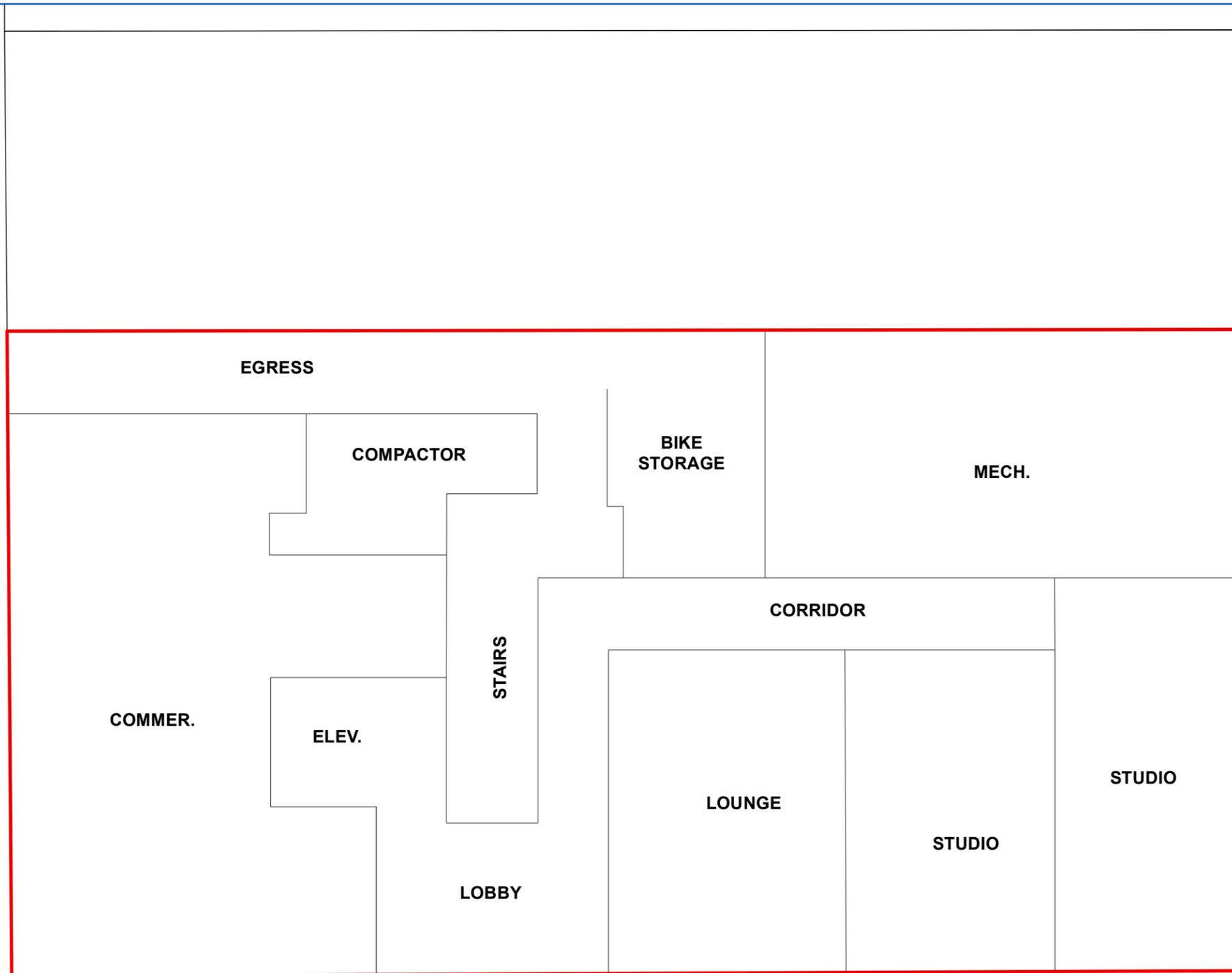
SITE PLAN
144-146 WEST ST
BROOKLYN, NY

FIGURE NO:
2

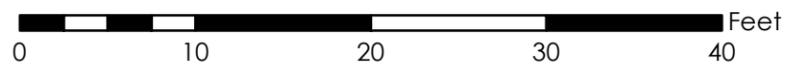
SHEET:



WEST ST



INDIA ST



- Site Boundary
- Adjacent Lots
- Interior Walls
- Curbline



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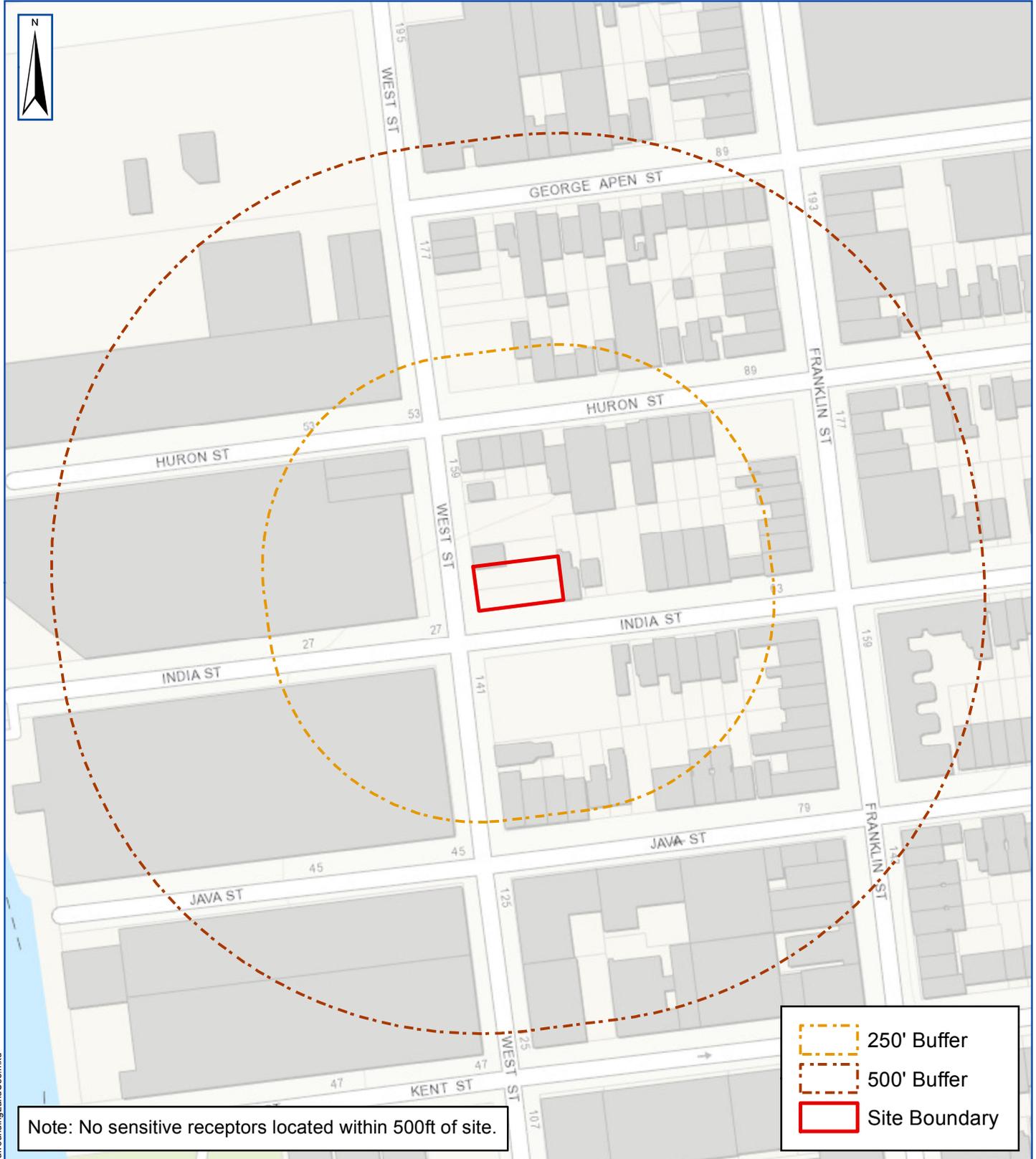
Project:	API1501	Designed by:	JL
Date:	9/30/2015	Drawn by:	UC
Scale:	AS SHOWN	Approved by:	JL

PROPOSED FLOOR PLAN

144-146 WEST ST
BROOKLYN, NY

FIGURE NO: 3

SHEET:

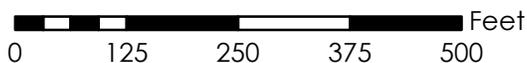


Note: No sensitive receptors located within 500ft of site.

-  250' Buffer
-  500' Buffer
-  Site Boundary

SURROUNDING LAND USE

144-146 West Street
Brooklyn, NY



Project:	API1501
Date:	10/9/2015
Designed by:	JL
Drawn by:	UC
Approved by:	JL
Figure No:	4



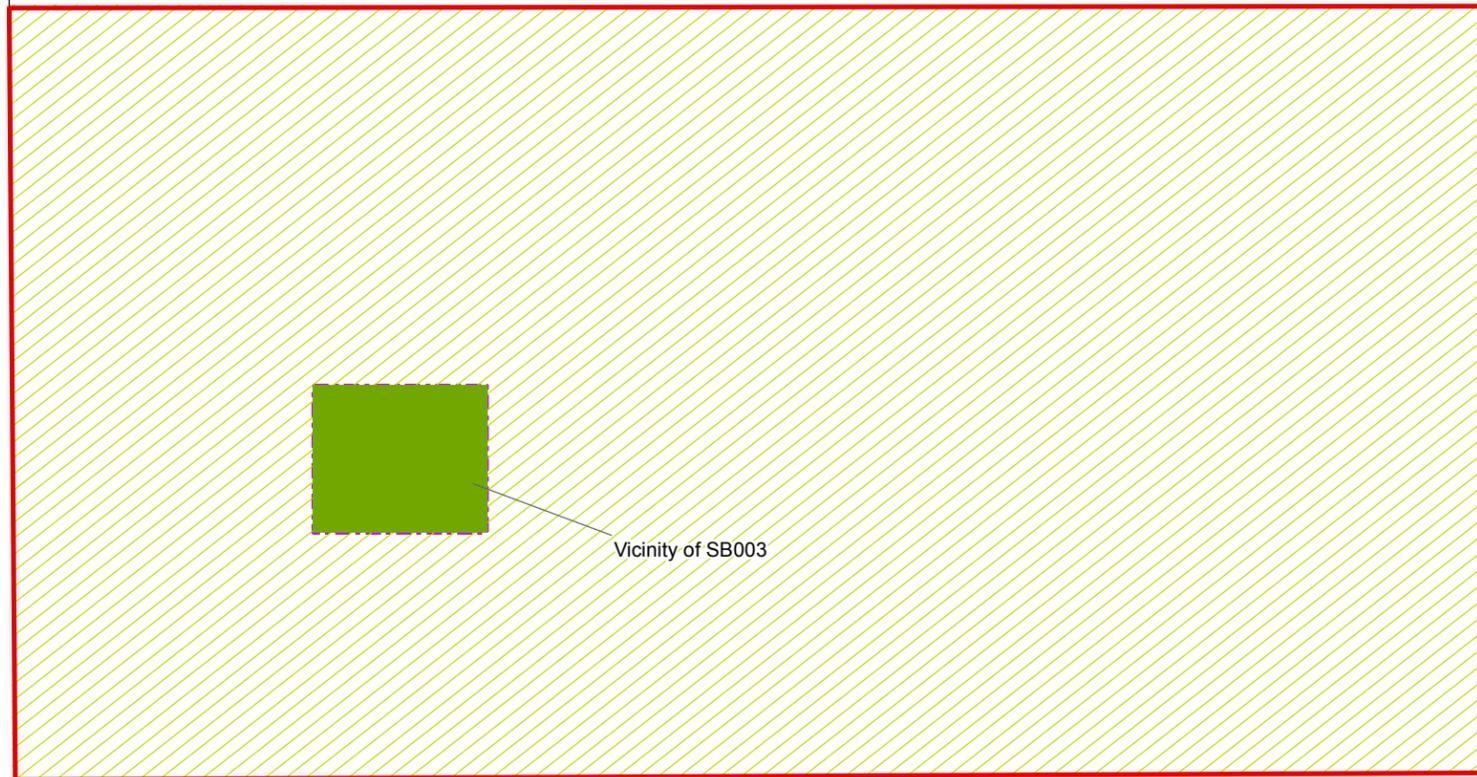
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AND HYDROGEOLOGIST, P.C.

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WEST ST



Vicinity of SB003

INDIA ST



-  Site Boundary
-  Adjacent Lots
-  Proposed Excavation to 7 ft
-  Proposed Excavation to 3-4 ft
-  Hotspot Excavation
-  Curbline



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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	API1501	Designed by:	JL
Date:	10/9/2015	Drawn by:	UC
Scale:	AS SHOWN	Approved by:	JL

PROPOSED EXCAVATION

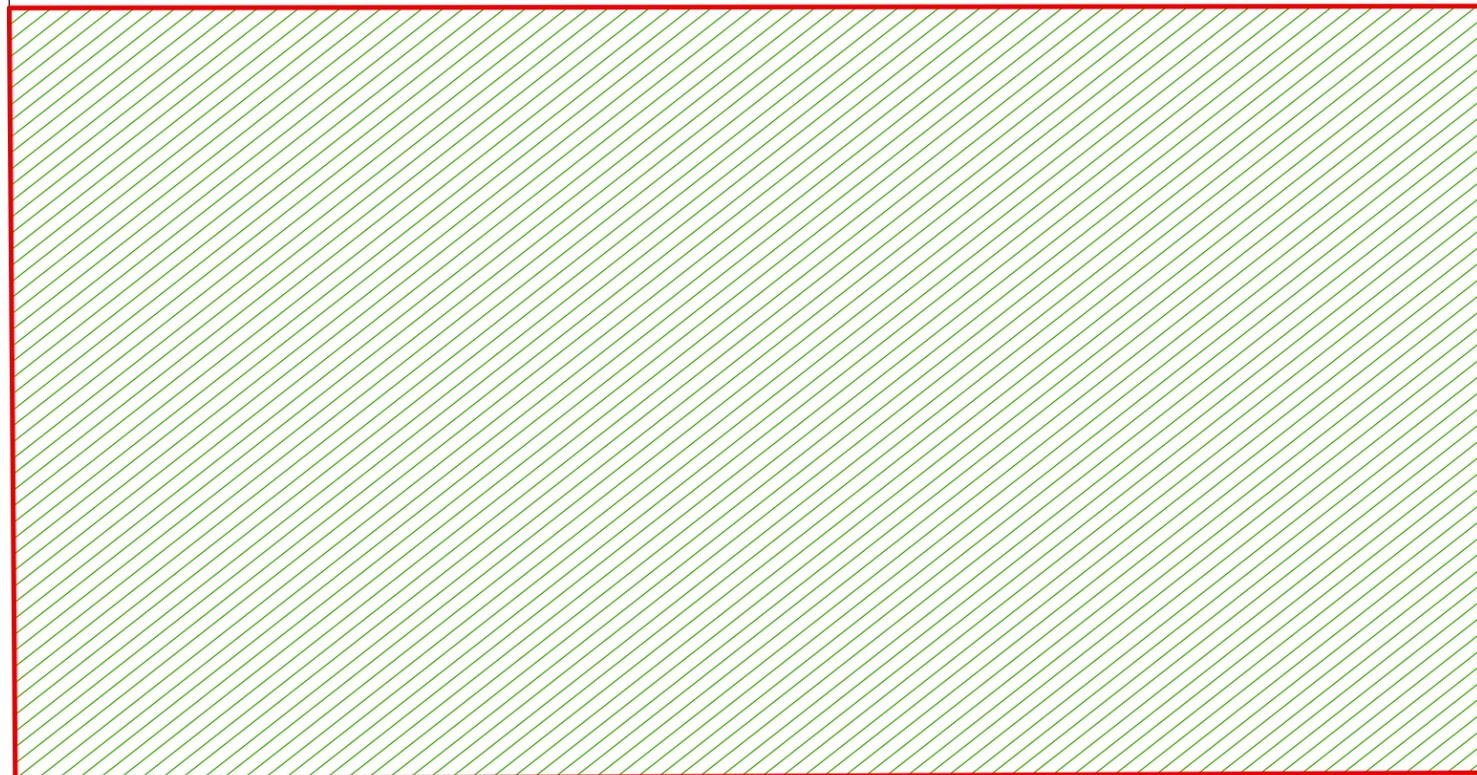
144-146 WEST ST
BROOKLYN, NY

FIGURE NO:
5

SHEET:



WEST ST



INDIA ST



	Site Boundary
	Adjacent Lots
	10inch ConcreteSlab
	Curbline



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DRAWING PREPARED FOR:

REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	API1 501	Designed by:	JL
Date:	9/18/2015	Drawn by:	UC
Scale:	AS SHOWN	Approved by:	JL

PROPOSED COMPOSITE COVER

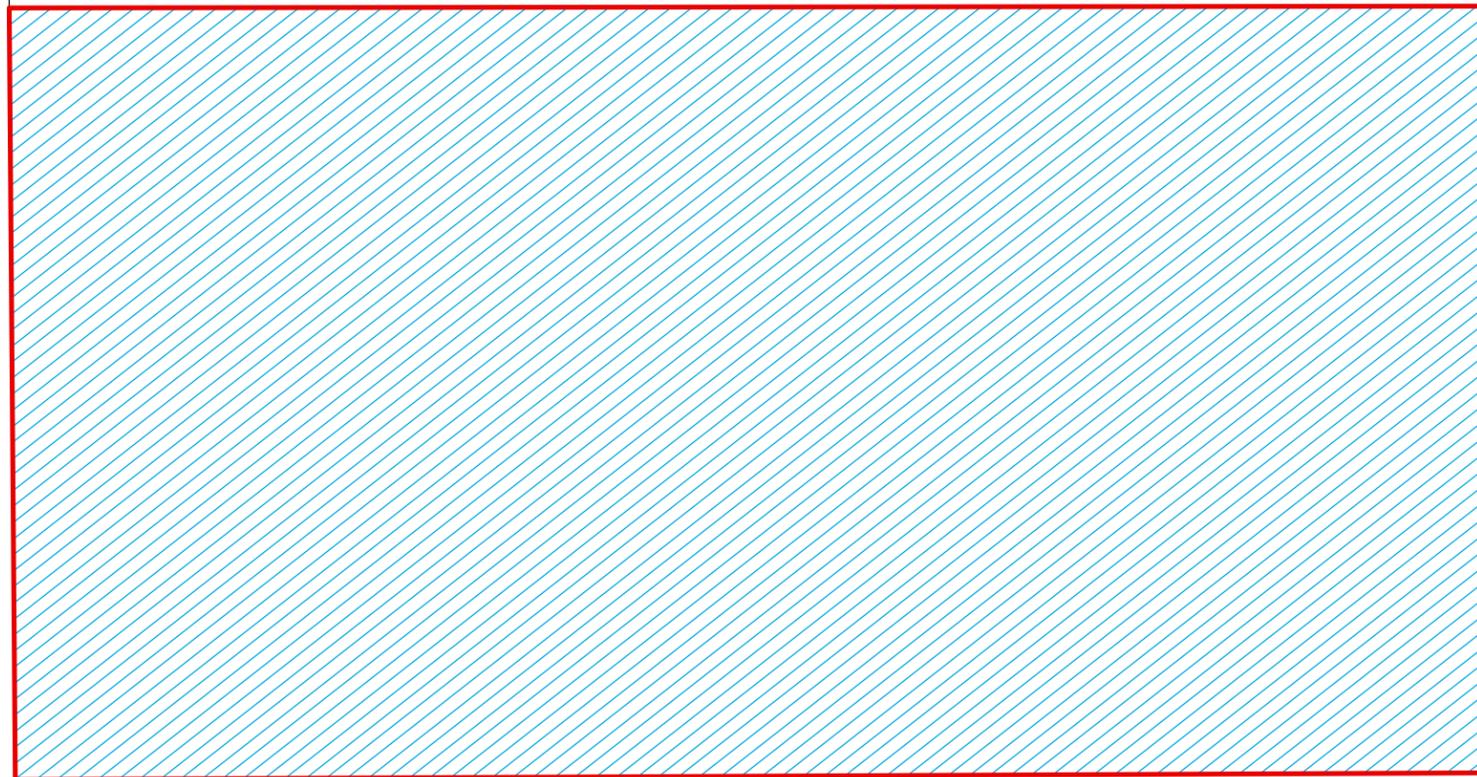
144-146 WEST ST
BROOKLYN, NY

FIGURE NO:
6

SHEET:



WEST ST



INDIA ST

-  Site Boundary
-  Adjacent Lots
-  Proposed Location of Raven industries Vapor Block VBP20
-  Curbline



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REVISION	DATE	INITIAL	COMMENTS

DRAWING INFORMATION:

Project:	API1 501	Designed by:	JL
Date:	9/18/2015	Drawn by:	UC
Scale:	AS SHOWN	Approved by:	JL

PROPOSED VAPOR BARRIER

144-146 WEST ST
BROOKLYN, NY

FIGURE NO:
7

SHEET:

CONSULTANTS

DRAFT - NOT FOR CONSTRUCTION

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DRAWINGS PREPARED FOR

FHRB, LLC

**3010 WESTCHESTER AVE,
SUITE 106
PURCHASE, NY 10577**

1	9-21-15	REGULATORY REVIEW
---	---------	-------------------

REVISION	DATE	INITIALS	COMMENTS
----------	------	----------	----------

DRAWING INFORMATION

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DESIGNED BY:	DH	DATE:	9-21-15
DRAWN BY:	MTS	SCALE:	AS-SHOWN

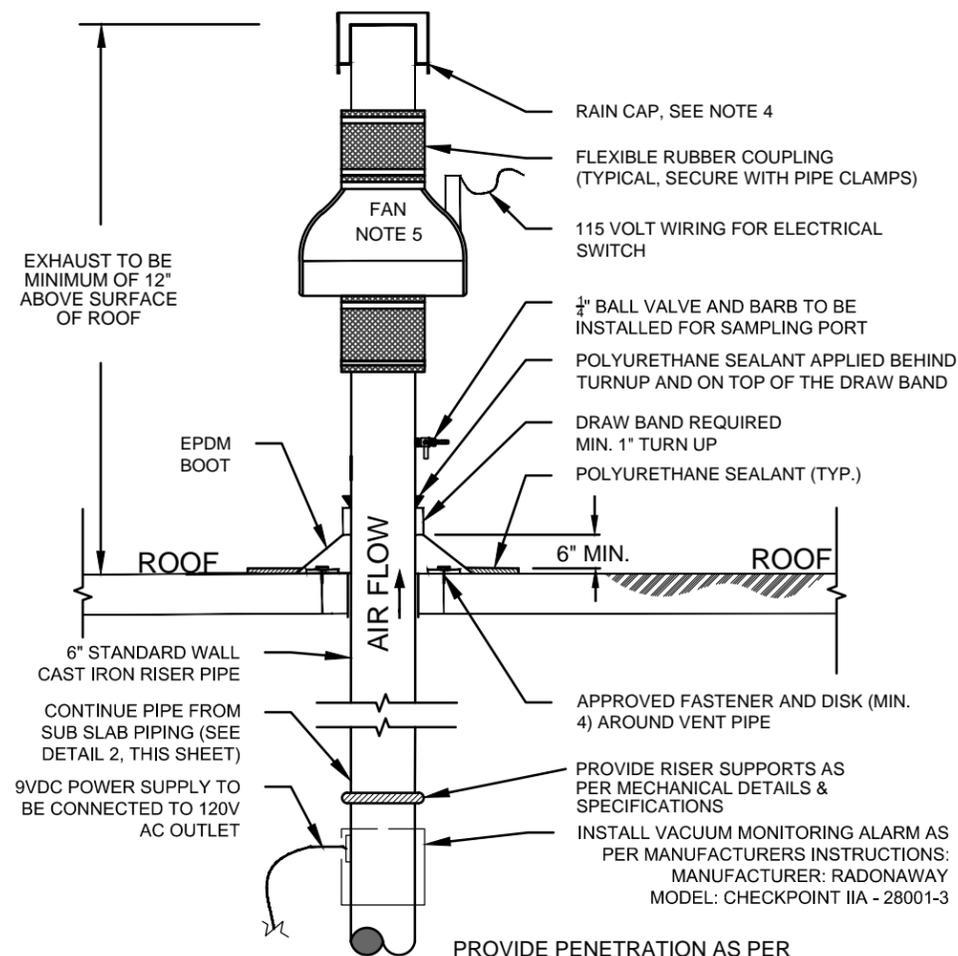
SHEET TITLE

ACTIVE SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS)

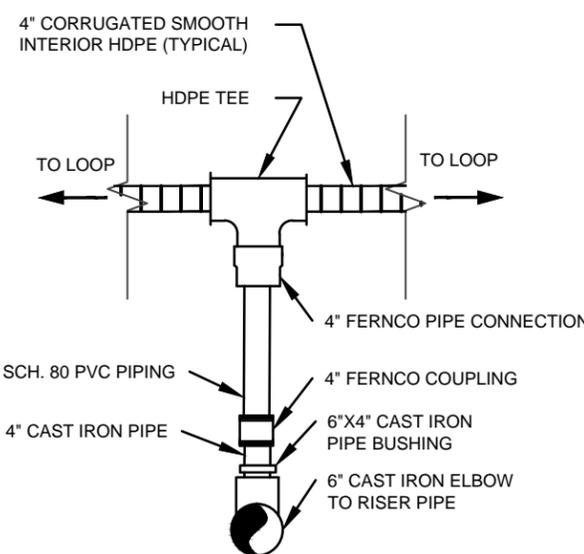
FIGURE NO

8

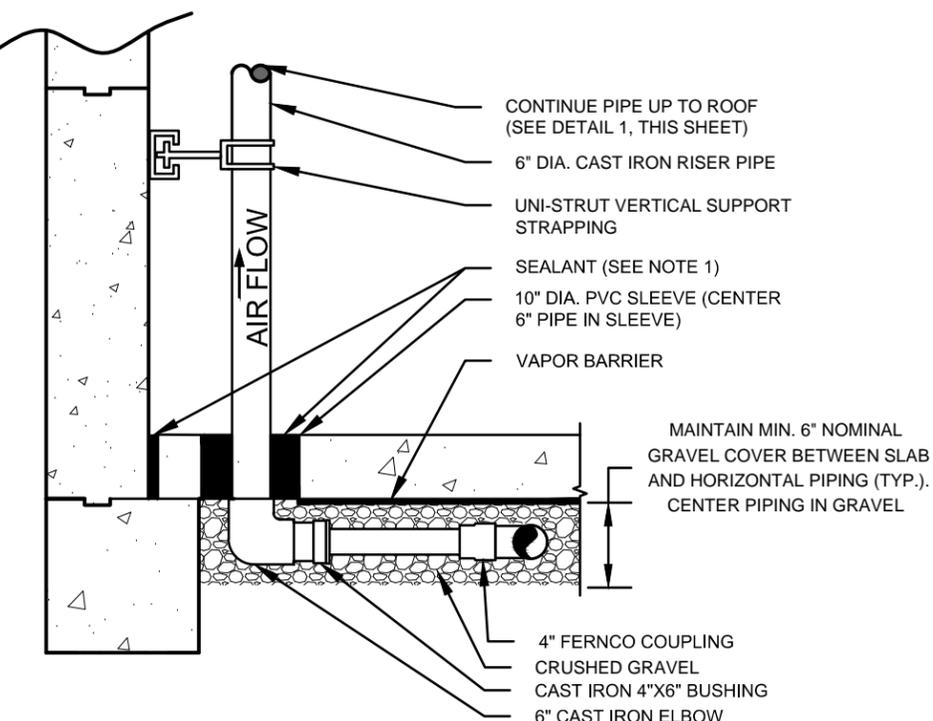
AP11501



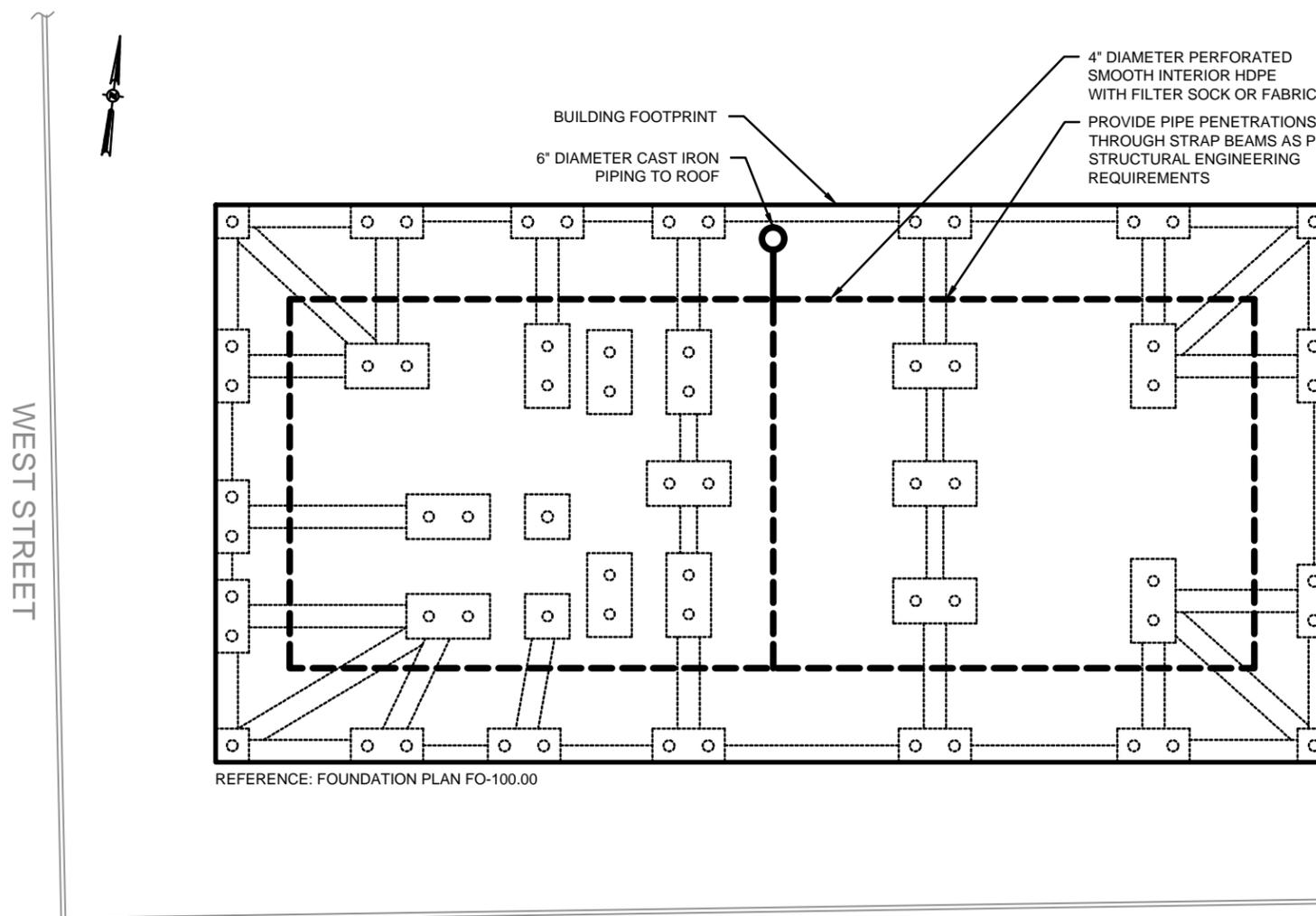
DETAIL 1 - ROOF PENETRATION
SCALE: NOT TO SCALE



DETAIL 3 - LATERAL PIPE CONNECTION
SCALE: NOT TO SCALE



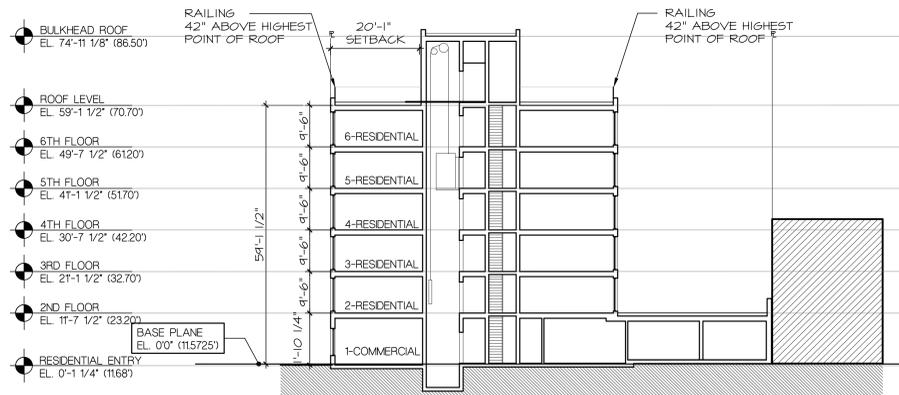
DETAIL 2 - CONNECTION TO RISER PIPING
SCALE: NOT TO SCALE



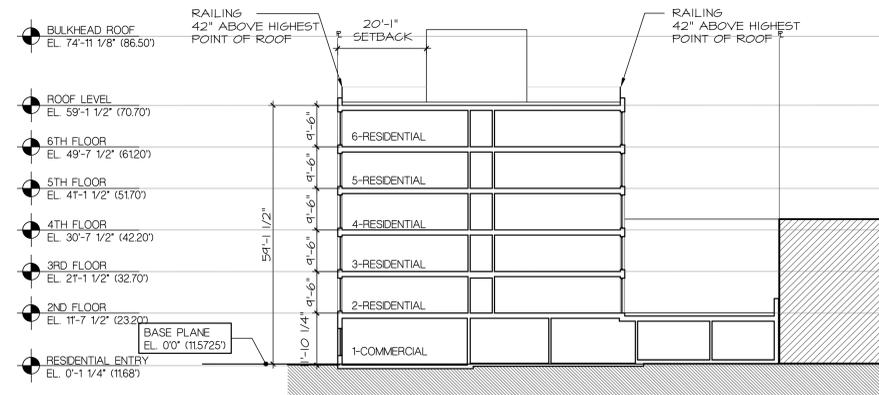
INDIA STREET
SSDS PIPING LAYOUT PLAN VIEW
SCALE: 1" = 15'

REFERENCE: FOUNDATION PLAN FO-100.00

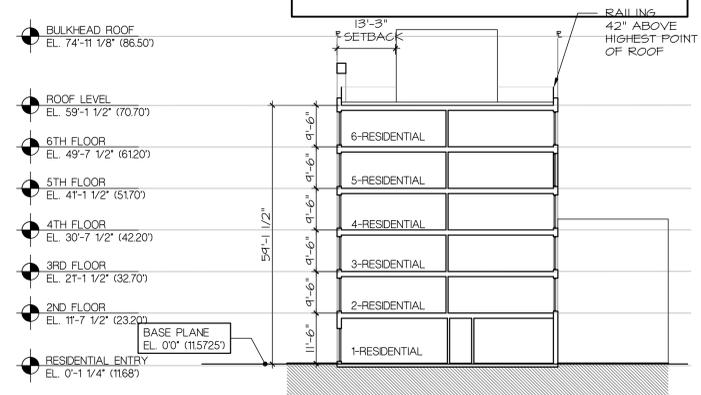
APPENDIX 1
PROPOSED DEVELOPMENT PLANS



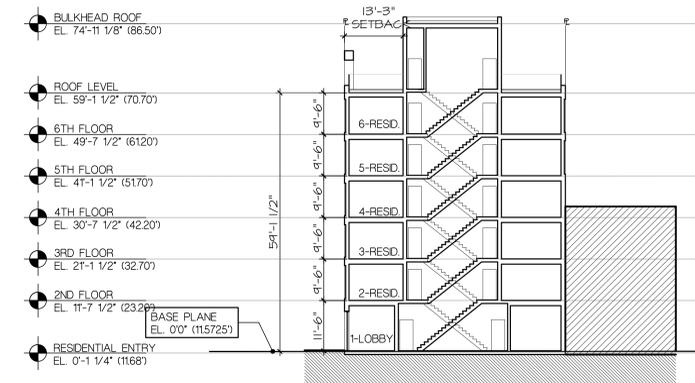
A SECTION 1
EAST TO WEST
1/16"=1'0"



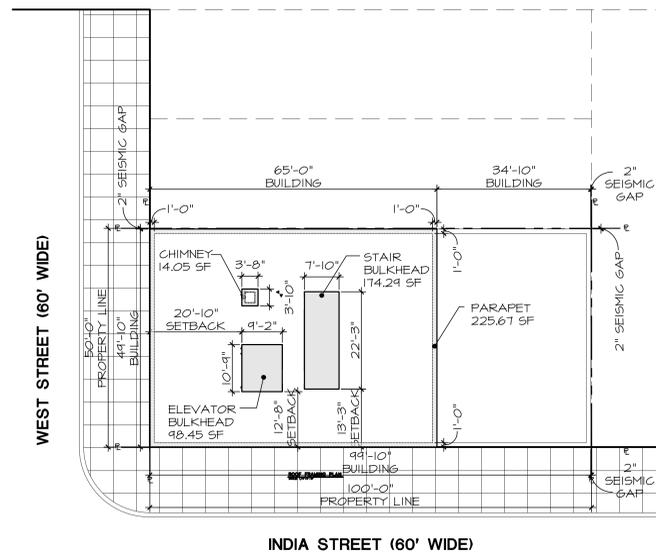
B SECTION 2
EAST TO WEST
1/16"=1'0"



C SECTION 3
NORTH TO SOUTH
1/16"=1'0"



D SECTION 4
NORTH TO SOUTH
1/16"=1'0"



E PLOT PLAN
1/16"=1'0"

STREET TREE PLANTING ANALYSIS (ZR26-41)

- 1 PER 25' OF FRONTAGE OF ZONING LOT AS PER 26-41
- TOTAL REQUIRED ON INDIA STREET: 100/25 = 4
- TOTAL PROVIDED ON INDIA STREET: 4
- TOTAL REQUIRED ON WEST STREET: 50/25 = 2
- TOTAL PROVIDED ON WEST STREET: 2
- TOTAL TREES PROVIDED : 6 (SEE SITE PLAN FOR LOCATION)

ROOFTOP STRUCTURE ANALYSIS - (BC 504.3)

ROOFTOP STRUCTURES INCLUDING BUT NOT LIMITED TO ROOF TANKS AND THEIR SUPPORTS, VENTILATING, AIR CONDITIONING, COMBINED HEAT AND POWER SYSTEMS AND SIMILAR BUILDING SERVICE EQUIPMENT, BULKHEADS, PENTHOUSES, GREENHOUSES, CHIMNEYS, AND PARAPET WALLS 4 FEET (1219 MM) OR LESS IN HEIGHT SHALL NOT BE INCLUDED IN THE BUILDING HEIGHT OF THE BUILDING OR CONSIDERED AN ADDITIONAL STORY UNLESS THE AGGREGATE AREA OF ALL SUCH STRUCTURES, EXCLUSIVE OF ANY SOLAR THERMAL AND SOLAR (PHOTOVOLTAIC) COLLECTORS AND/OR PANELS AND THEIR SUPPORTING EQUIPMENT, EXCEEDS 33 1/3 PERCENT OF THE AREA OF THE ROOF OF THE BUILDING UPON WHICH THEY ARE ERRECTED.

ROOF AREA UPON WHICH STRUCTURES ERRECTED: 3,239 SF

TOTAL ROOFTOP STRUCTURE AREA:
98.45 SF + 174.29 SF + 225.67 = 498.41 SF (15.39%)

ROOFTOP STRUCTURES NOT A STORY

BASE PLANE CALCULATION

- BASE PLANE ON INDIA STREET: $(11.34' + 12.50')/2 = 11.92'$
- BASE PLANE ON WEST STREET: $(11.11' + 11.34')/2 = 11.225'$
- BASE PLANE OF PROPERTY: $(11.92' + 11.225')/2 = 11.5725'$

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE
DESIGN DEVELOPMENT

SCALE
AS NOTED

KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING

ZONING ANALYSIS

SEAL AND SIGNATURE

DATE:

PROJECT NO: 1683.00

DRAWING BY:

CHK BY:

DWG NO:

A-004.00

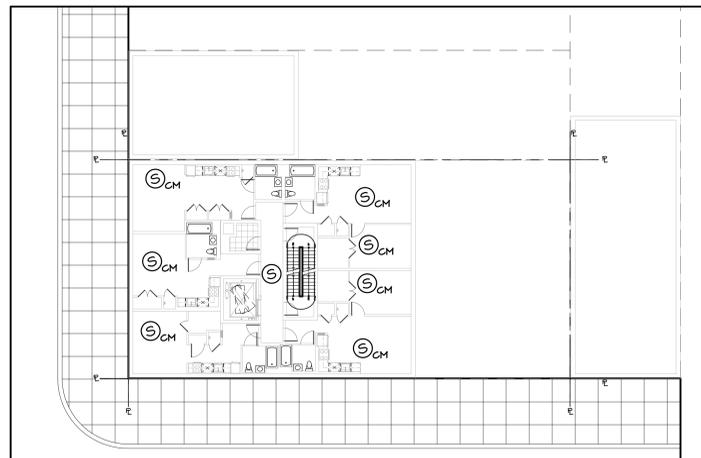
CAD FILE NO: XX OF XX

LEGEND:

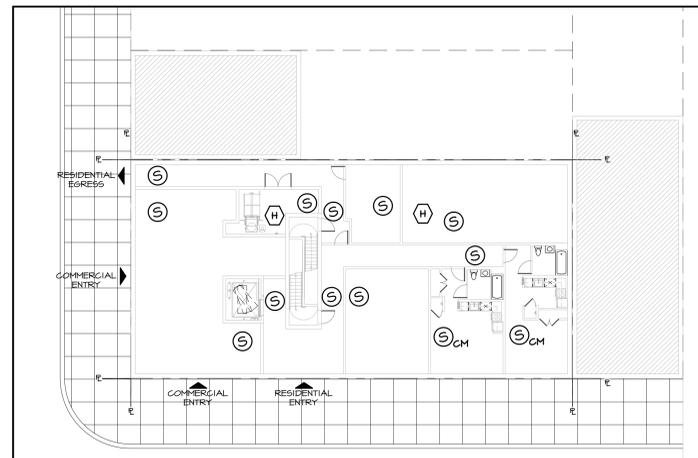
-  COMMERCIAL
-  TRAVEL DISTANCE
-  ONE HOUR RATED WALL ASSEMBLIES (45 MINUTE FIRE RATED DOORS)
-  TWO HOUR RATED WALL ASSEMBLIES (90 MINUTE FIRE RATED SELF-CLOSING DOORS)
-  THREE HOUR RATED WALL ASSEMBLIES
-  FIRE EXTINGUISHER
-  EXIT SIGNS
-  SMOKE / CARBON MONOXIDE DETECTOR
-  STAIR DESIGNATIONS
-  FLOW AND TAMPER SWITCH
-  FIRE ALARM MANUAL PULL STATION
-  FIRE ALARM CONTROL PANEL
-  FIRE ANNUNCIATOR PANEL
-  SMOKE DETECTOR
-  HEAT DETECTOR
-  CARBON MONOXIDE DETECTOR
-  SIAMESE CONNECTION (WALL MOUNTED)

NOTES:

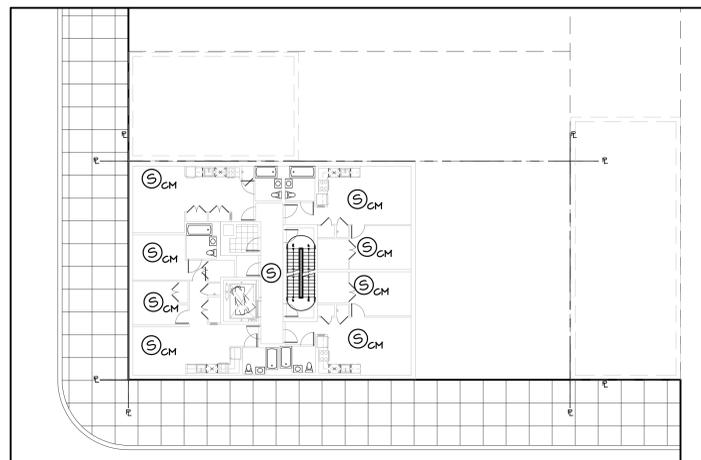
1. BUILDING IS FULLY SPRINKLERED AS PER NFPA 13
2. FOR EGRESS AND OCCUPANCY LOAD CALCULATIONS REFER TO DWG A-001. ALL CORRIDORS TO BE 2HR RATED
3. MAX TRAVEL DISTANCE = 200 FT
4. MAX DEAD END CORRIDOR = 90 FT (R-2 OCCUPANCIES)
5. MAX DEAD END CORRIDOR = 20 FT
6. MAX COMMON PATH OF TRAVEL = 125 FT



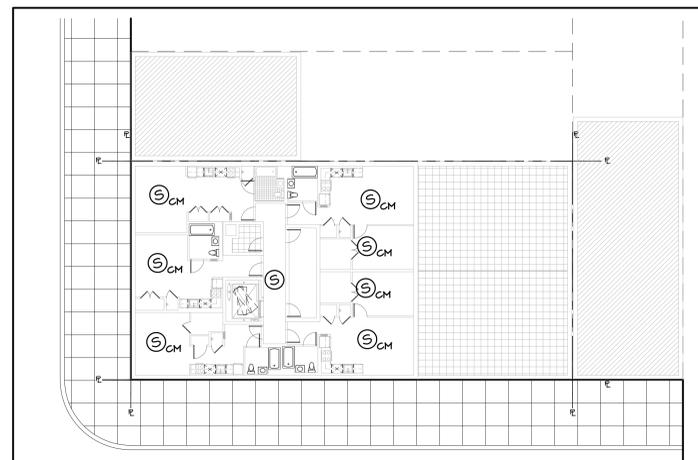
D 4TH FLOOR EGRESS PLAN
FOR OCCUPANCY AND EGRESS CALCULATIONS SEE SHEET A-008 1/16"=1'-0"



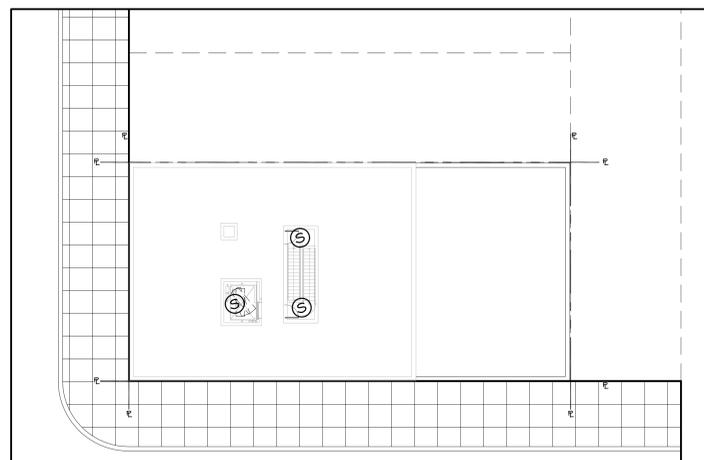
A 1ST FLOOR EGRESS PLAN
FOR OCCUPANCY AND EGRESS CALCULATIONS SEE SHEET A-008 1/16"=1'-0"



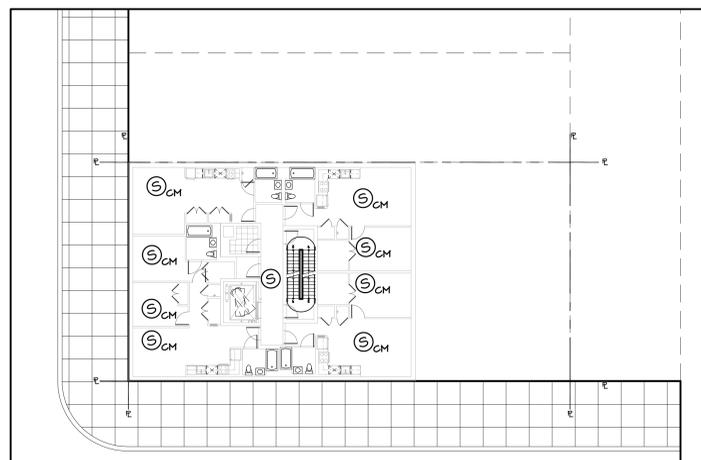
E 5TH FLOOR EGRESS PLAN
FOR OCCUPANCY AND EGRESS CALCULATIONS SEE SHEET A-008 1/16"=1'-0"



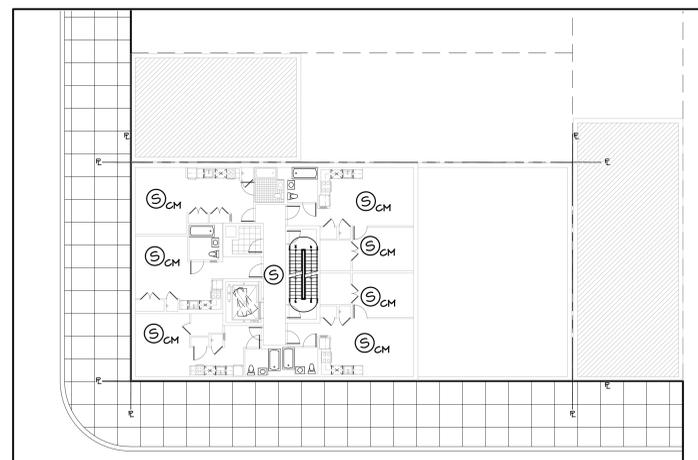
B 2ND FLOOR EGRESS PLAN
FOR OCCUPANCY AND EGRESS CALCULATIONS SEE SHEET A-008 1/16"=1'-0"



G ROOF EGRESS PLAN
FOR OCCUPANCY AND EGRESS CALCULATIONS SEE SHEET A-008 1/16"=1'-0"



F 6TH FLOOR EGRESS PLAN
FOR OCCUPANCY AND EGRESS CALCULATIONS SEE SHEET A-008 1/16"=1'-0"



C 3RD FLOOR EGRESS PLAN
FOR OCCUPANCY AND EGRESS CALCULATIONS SEE SHEET A-008 1/16"=1'-0"

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER _____

STRUCTURAL ENGINEER _____

MECHANICAL ENGINEER _____

OWNER _____

ISSUE
DESIGN DEVELOPMENT

SCALE
AS NOTED

KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
FIRE PROTECTION PLANS & EGRESS
DIAGRAMS

SEAL AND SIGNATURE _____ DATE: _____
PROJECT NO.: 1683.00

DRAWING BY: _____
CHK BY: _____
DWG NO: _____

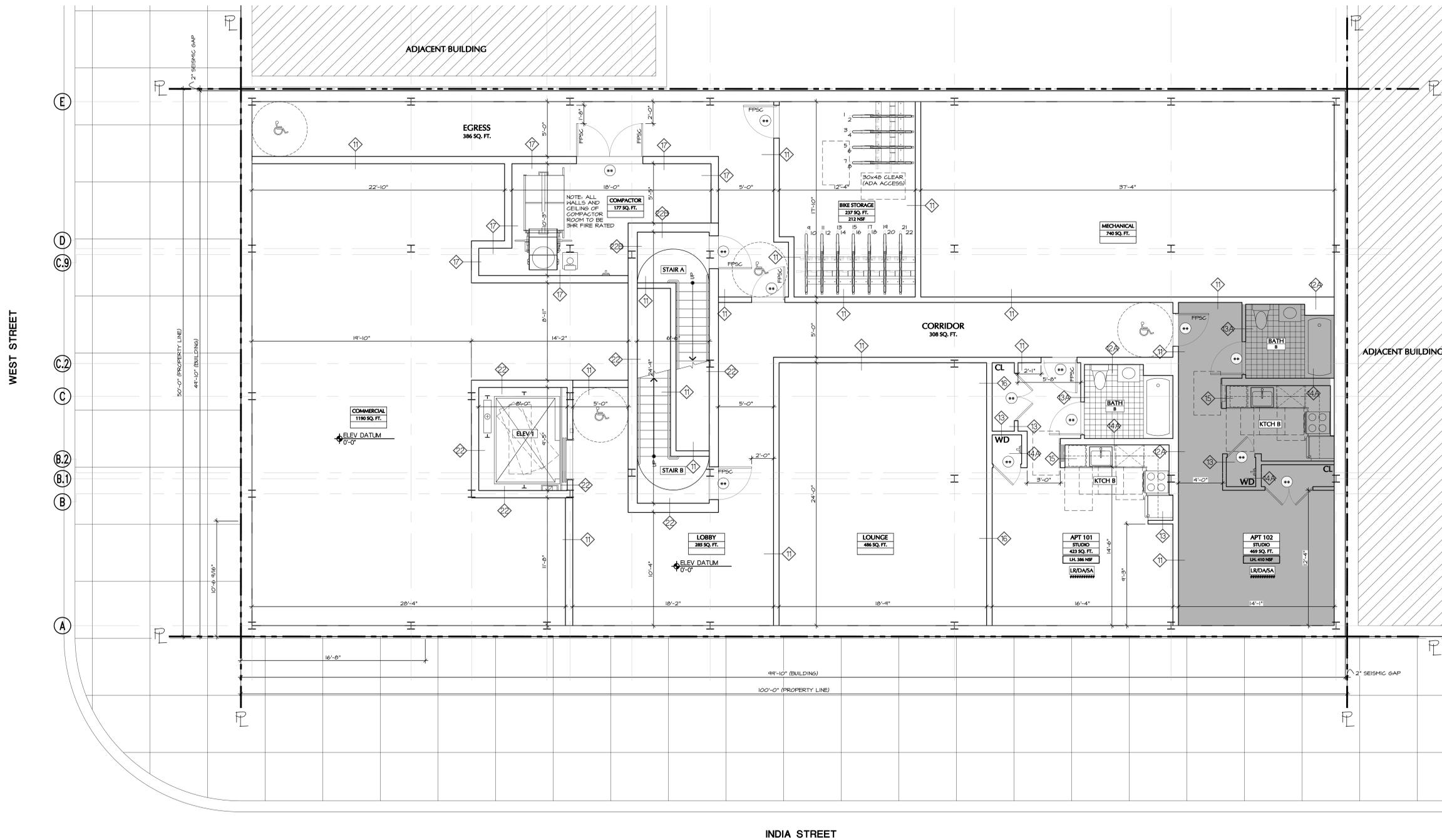
A-006.00
CAD FILE NO: _____ XX OF XX

LIGHT AND AIR REQUIREMENTS FOR HABITABLE ROOMS (SF)			
UNIT	101	102	REC ROOM A
ROOM	LA/DA/SA	LA/DA/SA	LOUNGE
AREA	0.0	0.0	0.0
LIGHT REQ'D (SF)	0.0	0.0	0.0
LIGHT PROVIDED (SF)	0.0	0.0	0.0
AIR REQ'D (SF)	0.0	0.0	0.0
AIR PROVIDED (SF)	0.0	0.0	0.0

NOTE: BC1203.4.1.2.1 - EXCEPTION #1: 2.5% OPERABLE REQUIRED BUT NO LESS THAN 5.5 SF

B LIGHT & AIR CALCULATIONS

NTS



A 1ST FLOOR PLAN - T.O.S. ##'## (##'##)

1/4"=1'-0"



MATERIALS LEGEND:

	CMU
	CONCRETE
	BRICK (SEE ELEVATIONS)
	PRECAST (SEE ELEVATIONS)
	SLAB STEP (T.O.S.) INDICATOR
	SLOPED SLAB TRANSITION

LEGEND:

	APT 202 STUDIO 437 SQ. FT.	INDICATES AREA MEASURED FROM CENTER OF DEMISING WALL TO EXTERIOR FACE OF EXTERIOR WALL
	I.H. 426 NSF	INDICATES AREA MEASURED TO INSIDE FACE OF DEMISING WALL AS PER HPD REQUIREMENTS

INCLUSIONARY HOUSING UNITS

	INDICATES INCLUSIONARY HOUSING UNITS
	I.H. 410 NSF
LIST OF INCLUSIONARY UNITS	
APT 102	410 NSF
APT 201	417 NSF
APT 305	591 NSF
APT 404	585 NSF
APT 502	775 NSF

UFAS MI - DENOTES UFAS UNITS FOR MOBILITY IMPAIRED.
UFAS HVI - DENOTES UFAS UNITS FOR HEARING AND VISUALLY IMPAIRED.

LIST OF UFAS UNITS - MI		LIST OF UFAS UNITS - HVI	
APT 201	491 SF	APT 305	670 SF
APT 301	491 SF		

- NOTES**
- ALL DIMENSIONS FINISH TO FINISH
 - REFER TO A-### & A-### FOR STAIR DIMENSIONS AND DETAILS
 - BUILDING TO BE IN FULL COMPLIANCE WITH NYS ENERGY CODE
 - FOR KITCHEN AND BATHROOM DETAILS AND DIMENSIONS SEE A-### & A-###
 - FIRESTOP AND FIRESEAL ALL PENETRATIONS THROUGH RATED WALLS AND RATED FLOORS/SLABS
 - ALL CORRIDOR WALLS TO BE MIN. 2HR RATED
 - GAS RISERS IN DEMISING WALLS TO BE SEPARATED BY A 2 HR RATED INDEPENDENT ENCLOSURE. GAS RISERS MAY NOT BE LOCATED IN CONCEALED SPACES WITHIN RATED WALLS BETWEEN APARTMENTS AND APARTMENTS, AND APARTMENTS AND CORRIDORS

144 - 146 WEST STREET
 BROOKLYN, NY 11222
 ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
 LOT: 1,2
 JOB: #1683.00

DEVELOPER _____
 STRUCTURAL ENGINEER _____
 MECHANICAL ENGINEER _____
 OWNER _____

ISSUE
 DESIGN DEVELOPMENT

SCALE
 AS NOTED

KEY PLAN

PROJECT
 144 - 146 WEST STREET
 BROOKLYN, NY 11222

DRAWING
 1ST FLOOR PLAN

SEAL AND SIGNATURE _____ DATE _____
 PROJECT NO. 1683.00
 DRAWING BY: _____
 CHK BY: _____
 DWG NO: _____
A-102.00
 CAD FILE NO: _____ XX OF XX

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

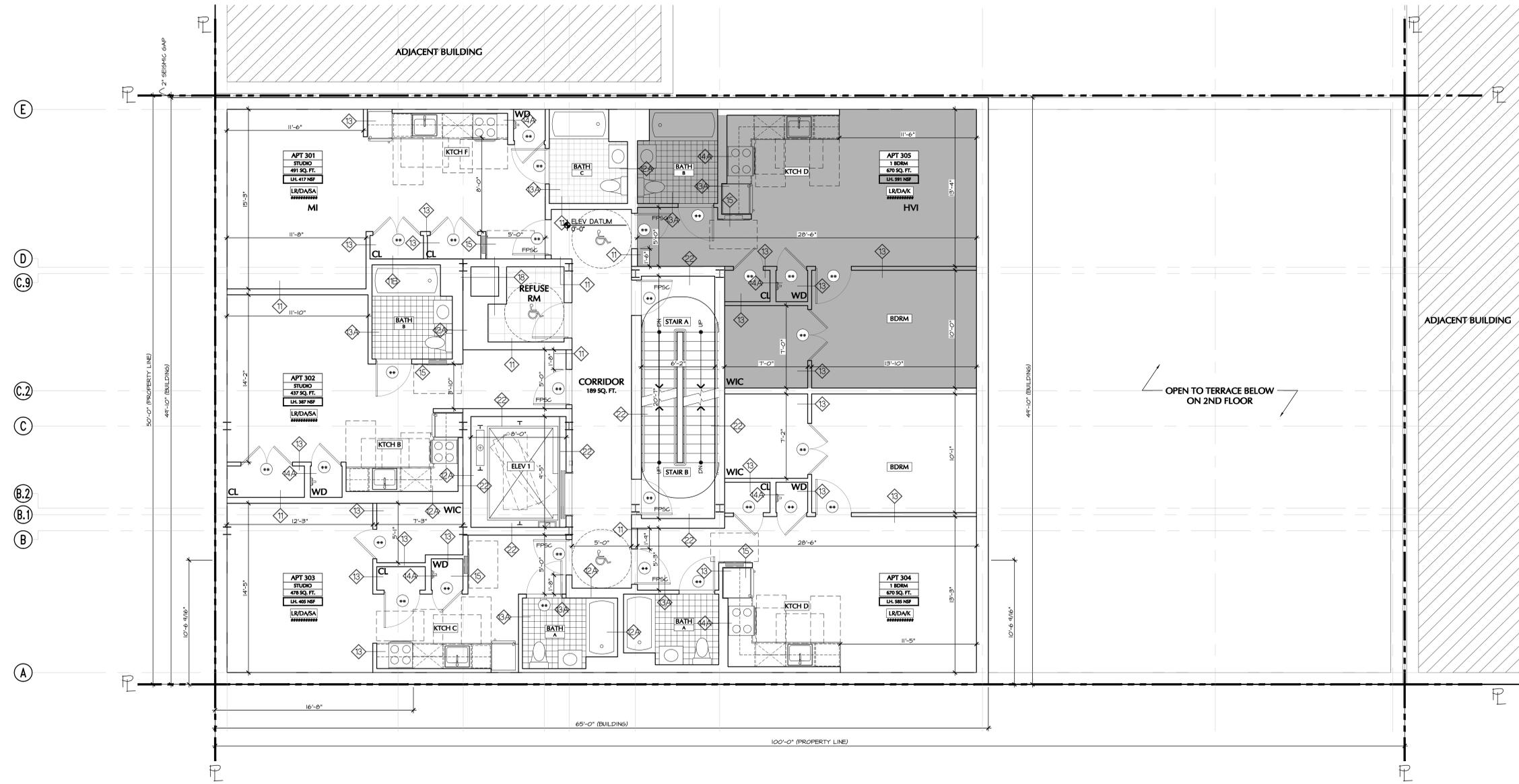
DRAWING
3RD FLOOR PLAN

SEAL AND SIGNATURE
DATE: _____
PROJECT NO.: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO.: _____
A-104.00
CAD FILE NO.: _____ XX OF XX

LIGHT AND AIR REQUIREMENTS FOR HABITABLE ROOMS (SF)								
UNIT	301		302		303		304	
ROOM	LA/DA/SA	LA/DA/SA	LA/DA/SA	LA/DA/SA	LR	BR	LR	BR
AREA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIGHT REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIGHT PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOTE: BC1203.4.1.2.1 - EXCEPTION #1: 2.5% OPERABLE REQUIRED BUT NO LESS THAN 5.5 SF

B LIGHT & AIR CALCULATIONS



A 3RD FLOOR PLAN - T.O.S. ##'-##" (##.##)

MATERIALS LEGEND:

	CMU
	CONCRETE
	BRICK (SEE ELEVATIONS)
	PRECAST (SEE ELEVATIONS)
	SLAB STEP (T.O.S.) INDICATOR
	SLOPED SLAB TRANSITION

LEGEND:

	APT 202 STUDIO 431 SQ. FT.	INDICATES AREA MEASURED FROM CENTER OF DEMISING WALL TO EXTERIOR FACE OF EXTERIOR WALL
	I.H. 426 NSF	INDICATES AREA MEASURED TO INSIDE FACE OF DEMISING WALL AS PER HPD REQUIREMENTS

INCLUSIONARY HOUSING UNITS

INDICATES INCLUSIONARY HOUSING UNITS

I.H. 410 NSF

LIST OF INCLUSIONARY UNITS	
APT 102	410 NSF
APT 201	417 NSF
APT 305	591 NSF
APT 404	585 NSF
APT 502	775 NSF

UFAS MI - DENOTES UFAS UNITS FOR MOBILITY IMPAIRED.

UFAS HVI - DENOTES UFAS UNITS FOR HEARING AND VISUALLY IMPAIRED.

LIST OF UFAS UNITS - MI		LIST OF UFAS UNITS - HVI	
APT 201	491 SF	APT 305	670 SF
APT 301	491 SF		

- NOTES**
- ALL DIMENSIONS FINISH TO FINISH
 - REFER TO A-### & A-### FOR STAIR DIMENSIONS AND DETAILS
 - BUILDING TO BE IN FULL COMPLIANCE WITH NY'S ENERGY CODE
 - FOR KITCHEN AND BATHROOM DETAILS AND DIMENSIONS SEE A-### & A-###
 - FIRESTOP AND FIRESEAL ALL PENETRATIONS THROUGH RATED WALLS AND RATED FLOORS/SLABS
 - ALL CORRIDOR WALLS TO BE MIN. 2HR RATED
 - GAS RISERS IN DEMISING WALLS TO BE SEPARATED BY A 2 HR RATED INDEPENDENT ENCLOSURE. GAS RISERS MAY NOT BE LOCATED IN CONCEALED SPACES WITHIN RATED WALLS BETWEEN APARTMENTS AND APARTMENTS, AND APARTMENTS AND CORRIDORS

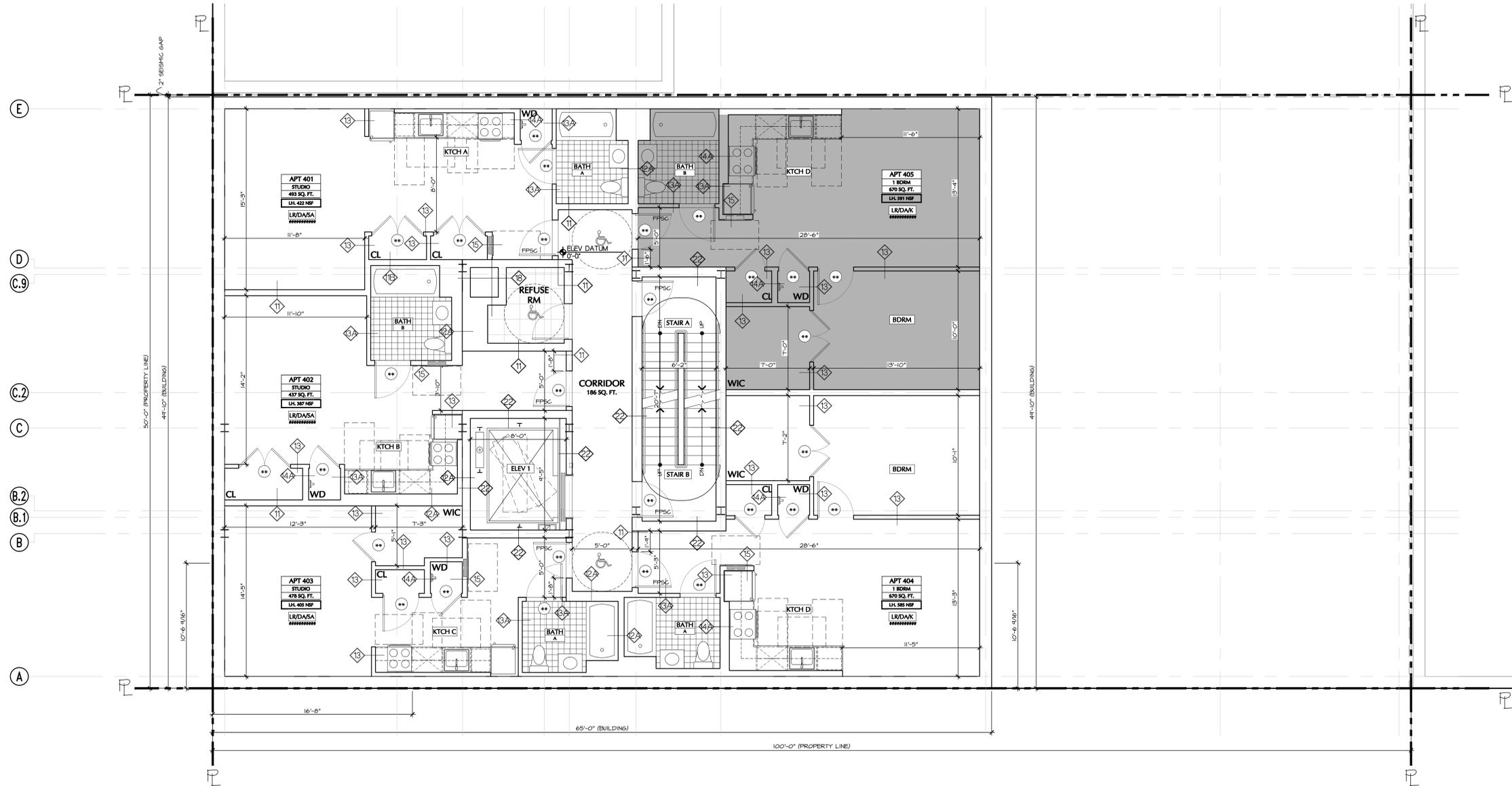


LIGHT AND AIR REQUIREMENTS FOR HABITABLE ROOMS (SF)								
UNIT	401		402		403		404	
ROOM	LA/DA/SA	LA/DA/SA	LA/DA/SA	LR	BR	LR	BR	
AREA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
LIGHT REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
LIGHT PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
AIR REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
AIR PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

NOTE: BC1203.4.1.2.1 - EXCEPTION #1: 2.5% OPERABLE REQUIRED BUT NO LESS THAN 5.5 SF

B LIGHT & AIR CALCULATIONS

NTS



144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

A 4TH FLOOR PLAN - T.O.S. ##'-##" (##.##)

1/4"=1'-0"



MATERIALS LEGEND:

[Pattern]	CMU
[Pattern]	CONCRETE
[Pattern]	BRICK (SEE ELEVATIONS)
[Pattern]	PRECAST (SEE ELEVATIONS)
[Pattern]	SLAB STEP (T.O.S.) INDICATOR
[Pattern]	SLOPED SLAB TRANSITION

LEGEND:

[Pattern]	APT 202 STUDIO 431 SQ. FT.	INDICATES AREA MEASURED FROM CENTER OF DEMISING WALL TO EXTERIOR FACE OF EXTERIOR WALL
[Pattern]	I.H. 426 NSF	INDICATES AREA MEASURED TO INSIDE FACE OF DEMISING WALL AS PER HPD REQUIREMENTS

INCLUSIONARY HOUSING UNITS

INDICATES INCLUSIONARY HOUSING UNITS

I.H. 410 NSF

LIST OF INCLUSIONARY UNITS	
APT 102	410 NSF
APT 201	417 NSF
APT 305	591 NSF
APT 404	585 NSF
APT 502	775 NSF

UFAS MI - DENOTES UFAS UNITS FOR MOBILITY IMPAIRED.

UFAS HVI - DENOTES UFAS UNITS FOR HEARING AND VISUALLY IMPAIRED.

LIST OF UFAS UNITS - MI		LIST OF UFAS UNITS - HVI	
APT 201	491 SF	APT 305	670 SF
APT 301	491 SF		

NOTES

- ALL DIMENSIONS FINISH TO FINISH
- REFER TO A-### & A-### FOR STAIR DIMENSIONS AND DETAILS
- BUILDING TO BE IN FULL COMPLIANCE WITH NY'S ENERGY CODE
- FOR KITCHEN AND BATHROOM DETAILS AND DIMENSIONS SEE A-### & A-###
- FIRESTOP AND FIRESEAL ALL PENETRATIONS THROUGH RATED WALLS AND RATED FLOORS/SLABS
- ALL CORRIDOR WALLS TO BE MIN. 2HR RATED
- GAS RISERS IN DEMISING WALLS TO BE SEPARATED BY A 2 HR RATED INDEPENDENT ENCLOSURE. GAS RISERS MAY NOT BE LOCATED IN CONCEALED SPACES WITHIN RATED WALLS BETWEEN APARTMENTS AND APARTMENTS, AND APARTMENTS AND CORRIDORS

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
4TH FLOOR PLAN

SEAL AND SIGNATURE

DATE: _____
PROJECT NO: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO: _____

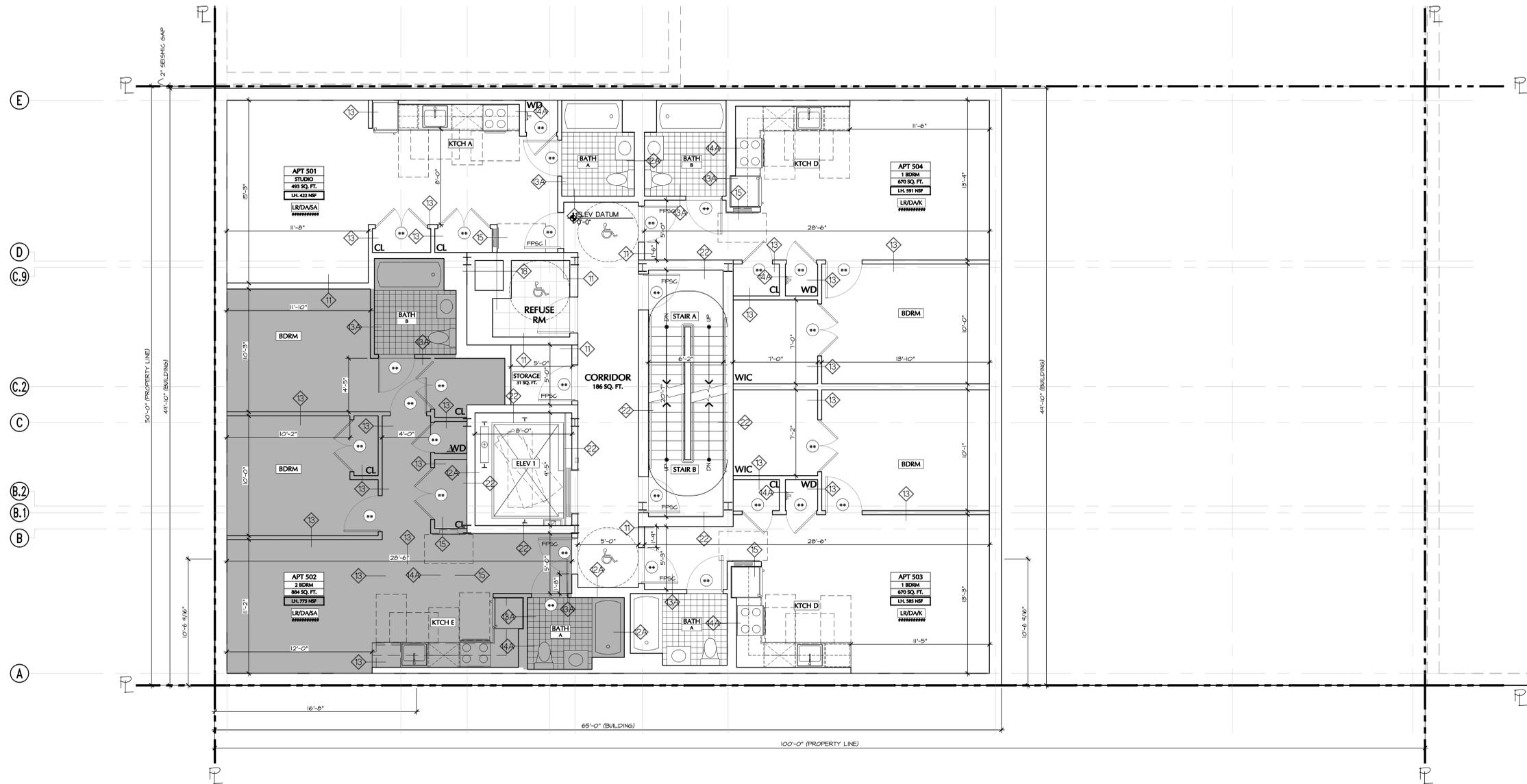
A-105.00
CAD FILE NO: _____ XX OF XX

LIGHT AND AIR REQUIREMENTS FOR HABITABLE ROOMS (SF)								
UNIT	501		502		503		504	
ROOM	LA/DA/SA	LR	BR	BR	LR	BR	LR	BR
AREA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIGHT REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIGHT PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOTE: BC1203.4.1.2.1 - EXCEPTION #1: 2.5% OPERABLE REQUIRED BUT NO LESS THAN 5.5 SF

B LIGHT & AIR CALCULATIONS

NTS



144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

A 5TH FLOOR PLAN - T.O.S. ##'-##" (##.##)

1/4"=1'-0"



MATERIALS LEGEND:

[Pattern]	CMU
[Pattern]	CONCRETE
[Pattern]	BRICK (SEE ELEVATIONS)
[Pattern]	PRECAST (SEE ELEVATIONS)
[Pattern]	SLAB STEP (T.O.S.) INDICATOR
[Pattern]	SLOPED SLAB TRANSITION

LEGEND:

[Symbol]	APT 202 STUDIO 431 SQ. FT.	INDICATES AREA MEASURED FROM CENTER OF DEMISING WALL TO EXTERIOR FACE OF EXTERIOR WALL
[Symbol]	I.H. 426 NSF	INDICATES AREA MEASURED TO INSIDE FACE OF DEMISING WALL AS PER HPD REQUIREMENTS

INCLUSIONARY HOUSING UNITS

[Symbol] INDICATES INCLUSIONARY HOUSING UNITS

I.H. 410 NSF

LIST OF INCLUSIONARY UNITS	
APT 102	410 NSF
APT 201	417 NSF
APT 305	591 NSF
APT 404	585 NSF
APT 502	775 NSF

UFAS MI - DENOTES UFAS UNITS FOR MOBILITY IMPAIRED.

UFAS HVI - DENOTES UFAS UNITS FOR HEARING AND VISUALLY IMPAIRED.

LIST OF UFAS UNITS - MI		LIST OF UFAS UNITS - HVI	
APT 201	491 SF	APT 305	670 SF
APT 301	491 SF		

NOTES

- ALL DIMENSIONS FINISH TO FINISH
- REFER TO A-### & A-### FOR STAIR DIMENSIONS AND DETAILS
- BUILDING TO BE IN FULL COMPLIANCE WITH NY'S ENERGY CODE
- FOR KITCHEN AND BATHROOM DETAILS AND DIMENSIONS SEE A-### & A-###
- FIRESTOP AND FIRESEAL ALL PENETRATIONS THROUGH RATED WALLS AND RATED FLOORS/SLABS
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PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
5TH FLOOR PLAN

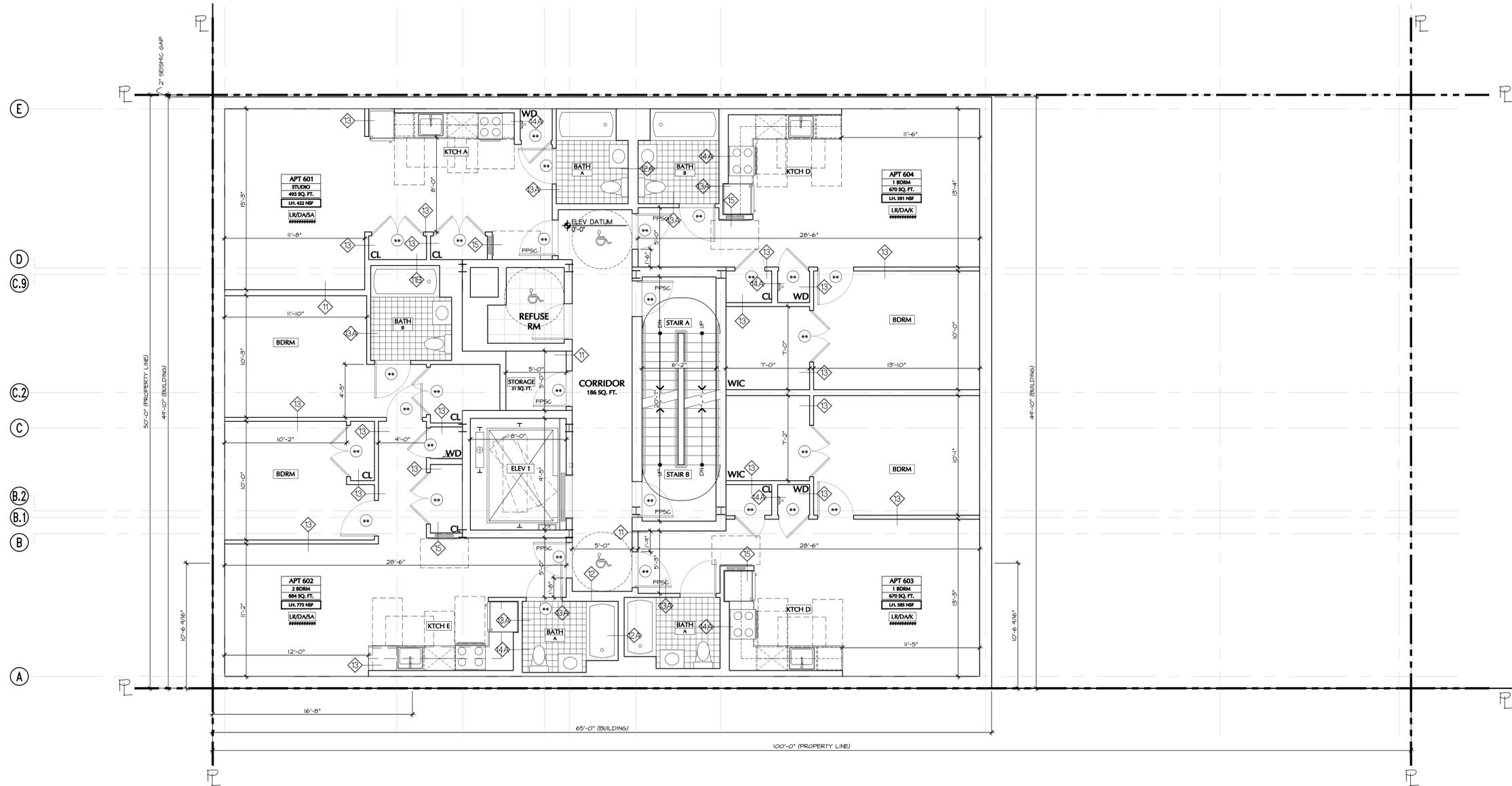
SEAL AND SIGNATURE	DATE
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	DRAWING BY:
	CHK BY:
	DWG NO:
	A-106.00
	CAD FILE NO: XX OF XX

LIGHT AND AIR REQUIREMENTS FOR HABITABLE ROOMS (SF)								
UNIT	601		602		603		604	
ROOM	LA/DA/SA	LR	BR	BR	LR	BR	LR	BR
AREA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIGHT REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIGHT PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR REQ'D (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR PROVIDED (SF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOTE: BC1203.4.1.2.1 - EXCEPTION #1: 2.5% OPERABLE REQUIRED BUT NO LESS THAN 5.5 SF

B LIGHT & AIR CALCULATIONS

NTS



144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

A 6TH FLOOR PLAN - T.O.S. ##'-##" (##.##)

1/4"=1'-0"



MATERIALS LEGEND:

[Pattern]	CMU
[Pattern]	CONCRETE
[Pattern]	BRICK (SEE ELEVATIONS)
[Pattern]	PRECAST (SEE ELEVATIONS)
[Pattern]	SLAB STEP (T.O.S.) INDICATOR
[Pattern]	SLOPED SLAB TRANSITION

LEGEND:

[Symbol]	APT 202 STUDIO 431 SQ. FT.	INDICATES AREA MEASURED FROM CENTER OF DEMISING WALL TO EXTERIOR FACE OF EXTERIOR WALL
[Symbol]	I.H. 426 NSF	INDICATES AREA MEASURED TO INSIDE FACE OF DEMISING WALL AS PER HPD REQUIREMENTS

INCLUSIONARY HOUSING UNITS

[Symbol] INDICATES INCLUSIONARY HOUSING UNITS

I.H. 410 NSF

LIST OF INCLUSIONARY UNITS	
APT 102	410 NSF
APT 201	417 NSF
APT 305	591 NSF
APT 404	585 NSF
APT 502	775 NSF

UFAS MI - DENOTES UFAS UNITS FOR MOBILITY IMPAIRED.

UFAS HVI - DENOTES UFAS UNITS FOR HEARING AND VISUALLY IMPAIRED.

LIST OF UFAS UNITS - MI		LIST OF UFAS UNITS - HVI	
APT 201	491 SF	APT 305	670 SF
APT 301	491 SF		

NOTES

- ALL DIMENSIONS FINISH TO FINISH
- REFER TO A-### & A-### FOR STAIR DIMENSIONS AND DETAILS
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PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
6TH FLOOR PLAN

SEAL AND SIGNATURE _____ DATE: _____
PROJECT NO: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO: _____

A-107.00
CAD FILE NO: _____ XX OF XX

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE
DESIGN DEVELOPMENT

SCALE
AS NOTED

KEY PLAN

PROJECT

144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING

ROOF PLAN

SEAL AND SIGNATURE

DATE

PROJECT NO: 1683.00

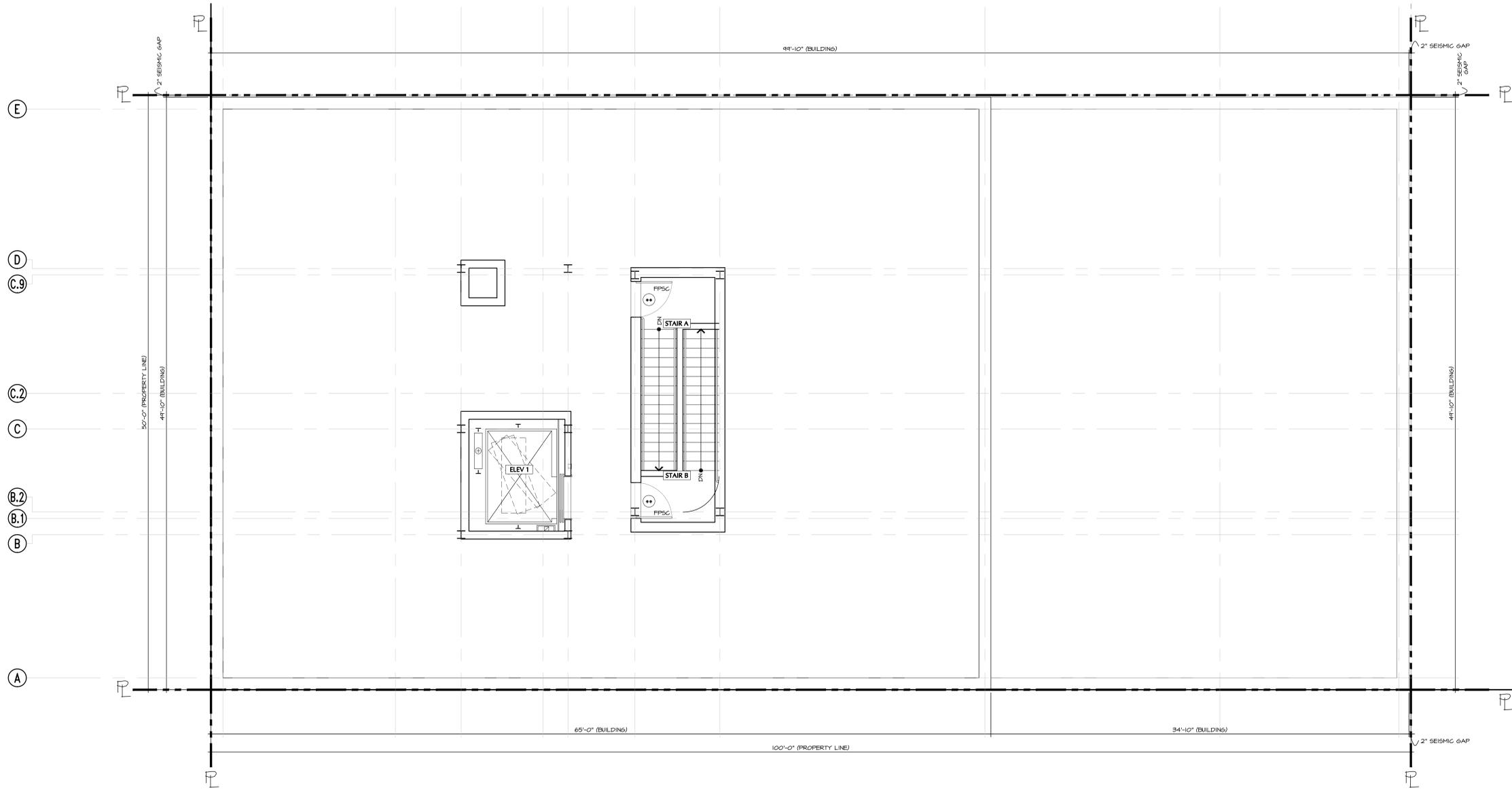
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CHK BY:

DWG NO:

A-108.00

CAD FILE NO: XX OF XX



A ROOF PLAN - T.O.S. ##'-##" (##.##)

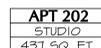
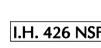
1/4"=1'-0"



MATERIALS LEGEND:

-  CMU
-  CONCRETE
-  BRICK (SEE ELEVATIONS)
-  PRECAST (SEE ELEVATIONS)
-  SLAB STEP (T.O.S.) INDICATOR
-  SLOPED SLAB TRANSITION

LEGEND:

-  **APT 202**
STUDIO
437 SQ. FT.
 -  **I.H. 426 NSF**
- INDICATES AREA MEASURED FROM CENTER OF DEMISING WALL TO EXTERIOR FACE OF EXTERIOR WALL
- INDICATES AREA MEASURED TO INSIDE FACE OF DEMISING WALL AS PER HPD REQUIREMENTS

INCLUSIONARY HOUSING UNITS

-  INDICATES INCLUSIONARY HOUSING UNITS
 - I.H. 410 NSF**
- | LIST OF INCLUSIONARY UNITS | |
|----------------------------|---------|
| APT 102 | 410 NSF |
| APT 203 | 405 NSF |
| APT 305 | 591 NSF |
| APT 404 | 585 NSF |
| APT 502 | 775 NSF |

UFAS MI - DENOTES UFAS UNITS FOR MOBILITY IMPAIRED.

UFAS HVI - DENOTES UFAS UNITS FOR HEARING AND VISUALLY IMPAIRED.

LIST OF UFAS UNITS - MI		LIST OF UFAS UNITS - HVI	
APT 302	698 SF	APT 302	698 SF
APT 303	548 SF	APT 303	548 SF
APT 404	698 SF	APT 404	698 SF
APT 405	412 SF	APT 405	412 SF
APT 406	548 SF	APT 406	548 SF

NOTES

- ALL DIMENSIONS FINISH TO FINISH
- REFER TO A-### & A-### FOR STAIR DIMENSIONS AND DETAILS
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- FOR KITCHEN AND BATHROOM DETAILS AND DIMENSIONS SEE A-### & A-###
- FIRESTOP AND FIRESEAL ALL PENETRATIONS THROUGH RATED WALLS AND RATED FLOORS/SLABS
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144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE
DESIGN DEVELOPMENT

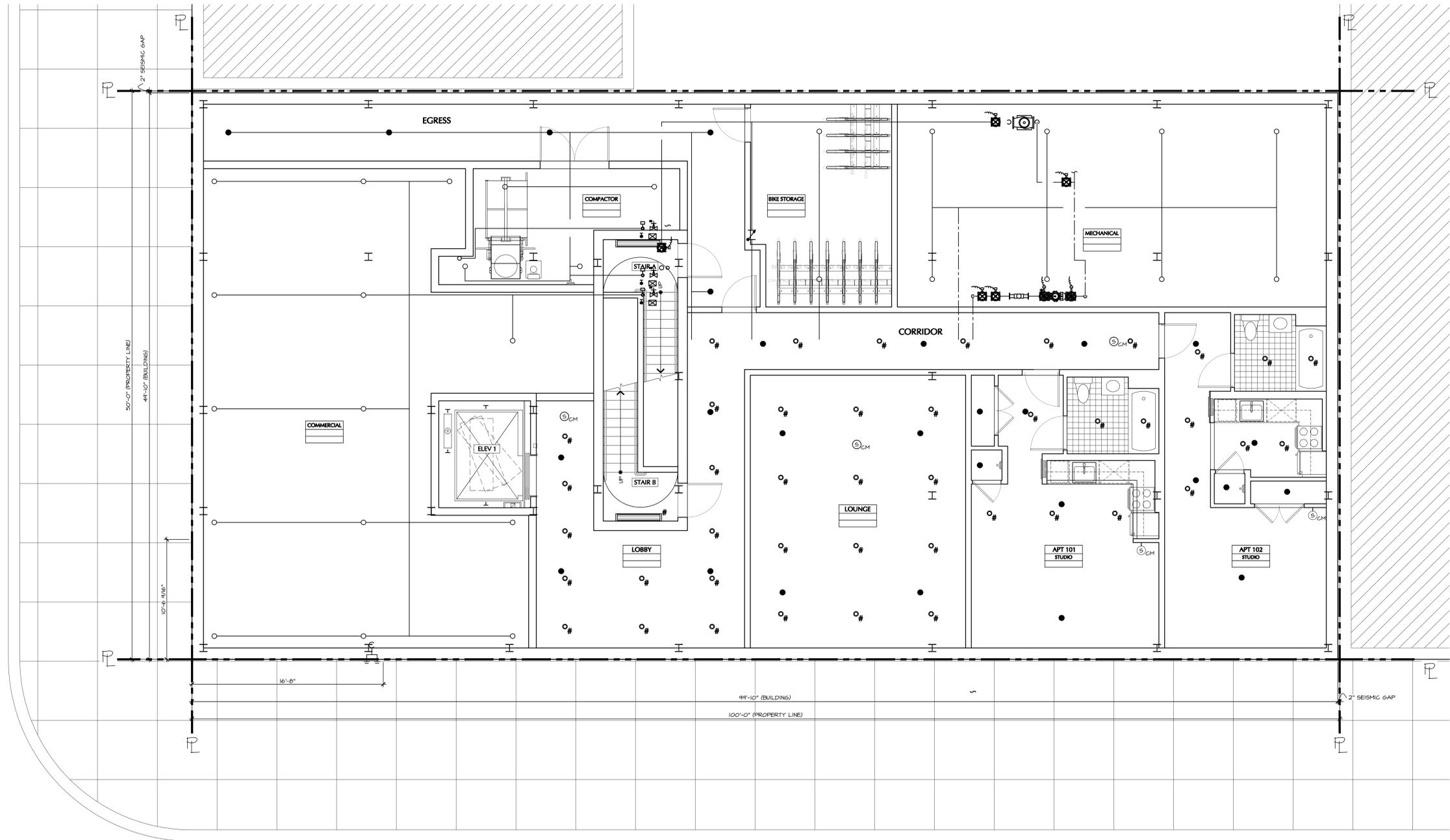
SCALE
AS NOTED

KEY PLAN

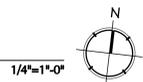
PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

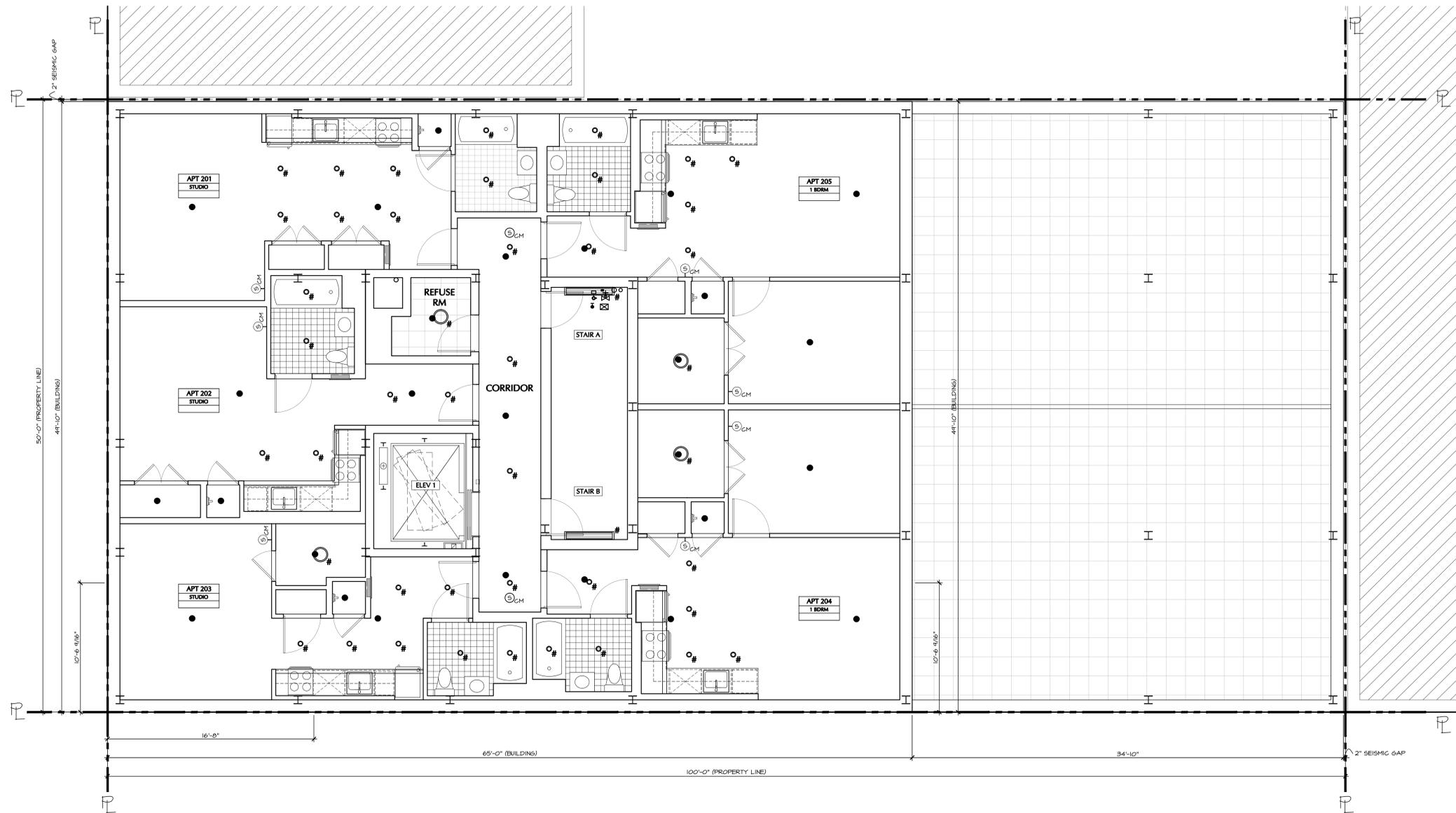
DRAWING
1ST FLOOR REFLECTED CEILING PLAN

SEAL AND SIGNATURE
DATE: _____
PROJECT NO: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO: _____
A-132.00
CAD FILE NO: _____ XX OF XX



A 1ST FLOOR REFLECTIVE CEILING PLAN





A 2ND FLOOR REFLECTIVE CEILING PLAN

1/4"=1'-0"
N

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

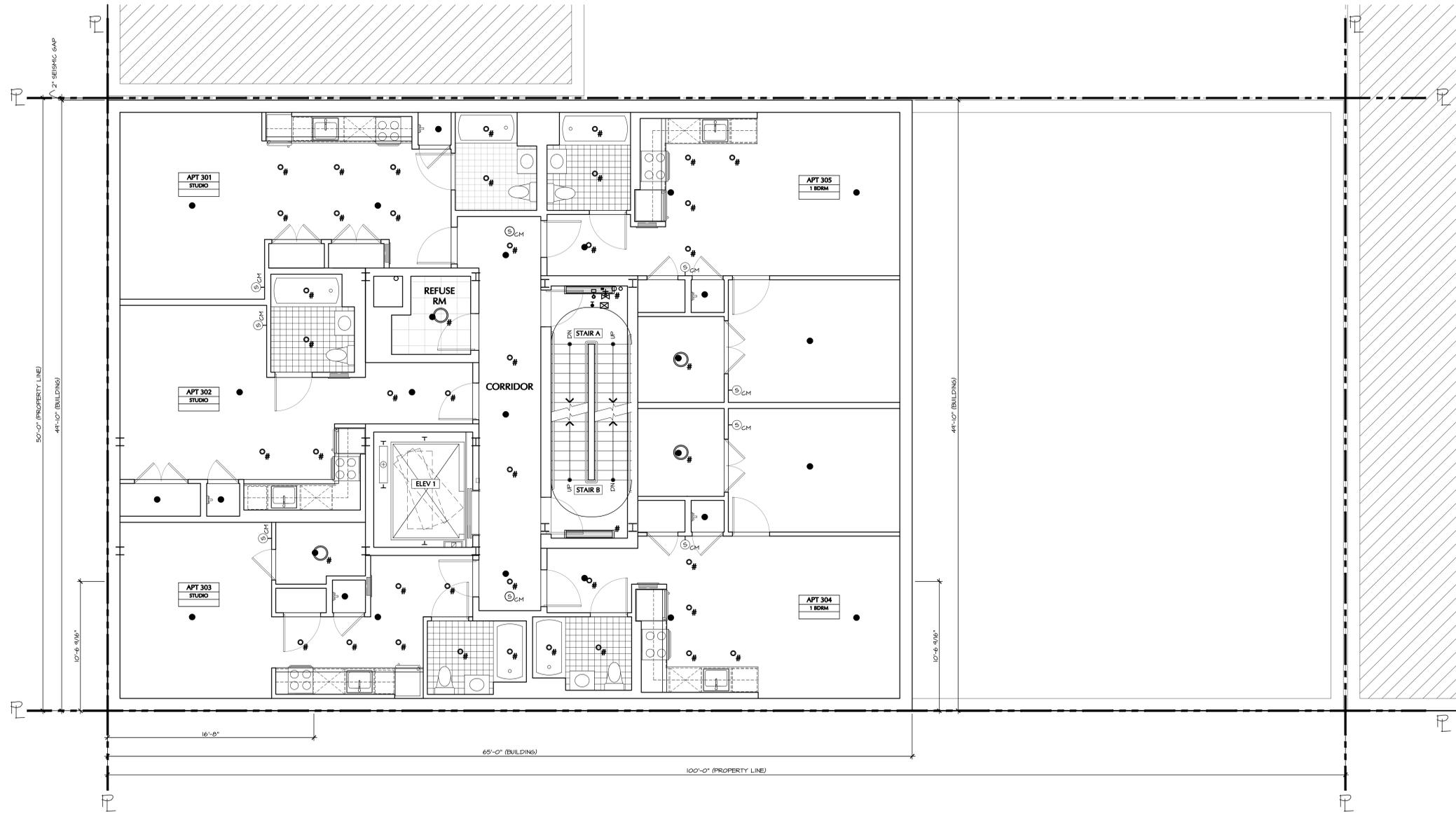
ISSUE
DESIGN DEVELOPMENT

SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
2ND FLOOR REFLECTED CEILING PLAN

SEAL AND SIGNATURE
DATE: _____
PROJECT NO: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO: _____
A-133.00
CAD FILE NO: _____ XX OF XX



144 - 146 WEST STREET
 BROOKLYN, NY 11222
 ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
 LOT: 1/2
 JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE

DESIGN DEVELOPMENT

SCALE

AS NOTED

KEY PLAN

PROJECT

144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING

3RD FLOOR REFLECTED CEILING PLAN

SEAL AND SIGNATURE

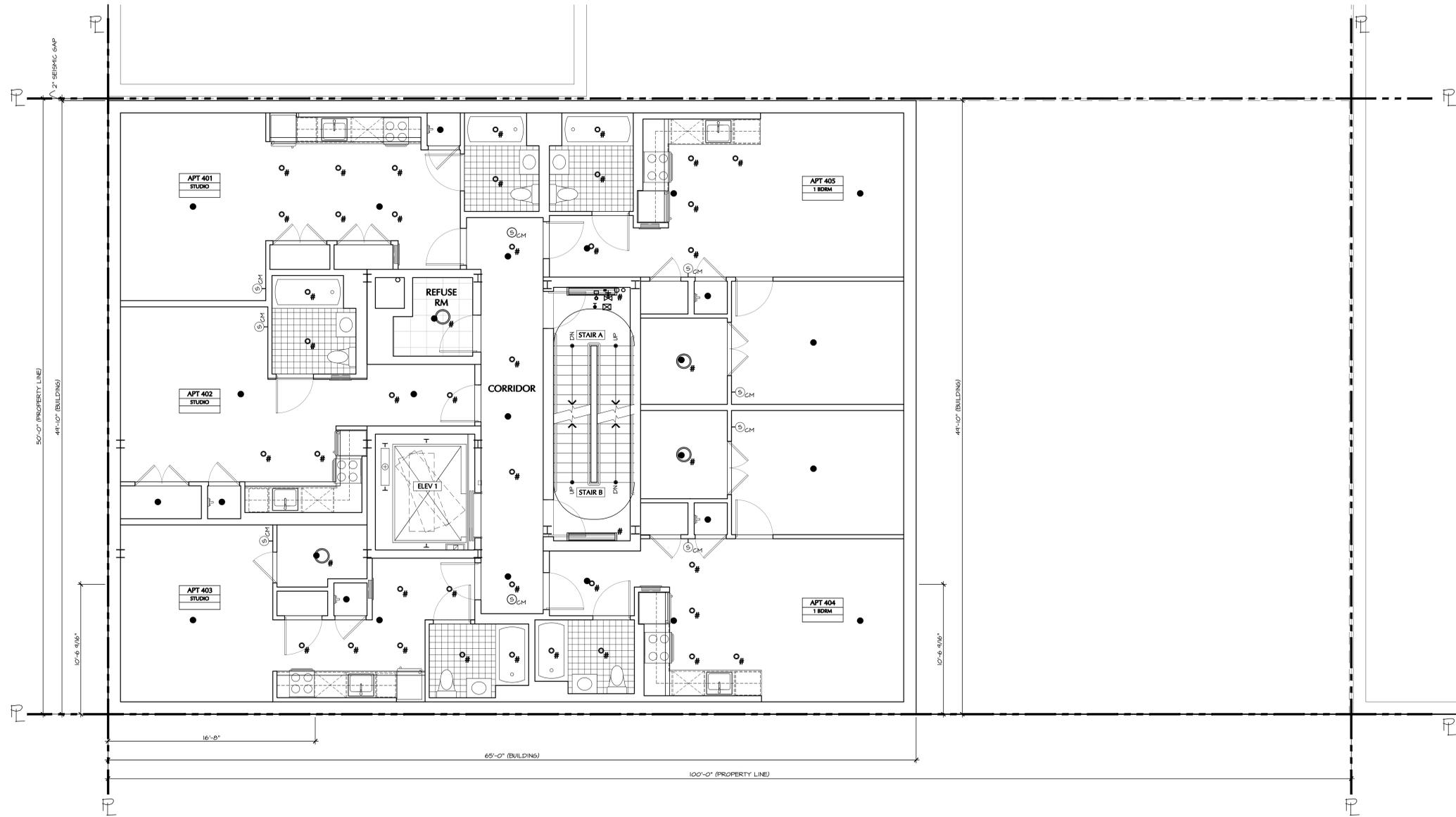
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 DRAWING BY: _____
 CHK BY: _____
 DWG NO: _____

A-134.00
 CAD FILE NO: _____ XX OF XX

A 3RD FLOOR REFLECTIVE CEILING PLAN

1/4"=1'-0"





A 4TH FLOOR REFLECTIVE CEILING PLAN

1/4"=1'-0"
N

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE
DESIGN DEVELOPMENT

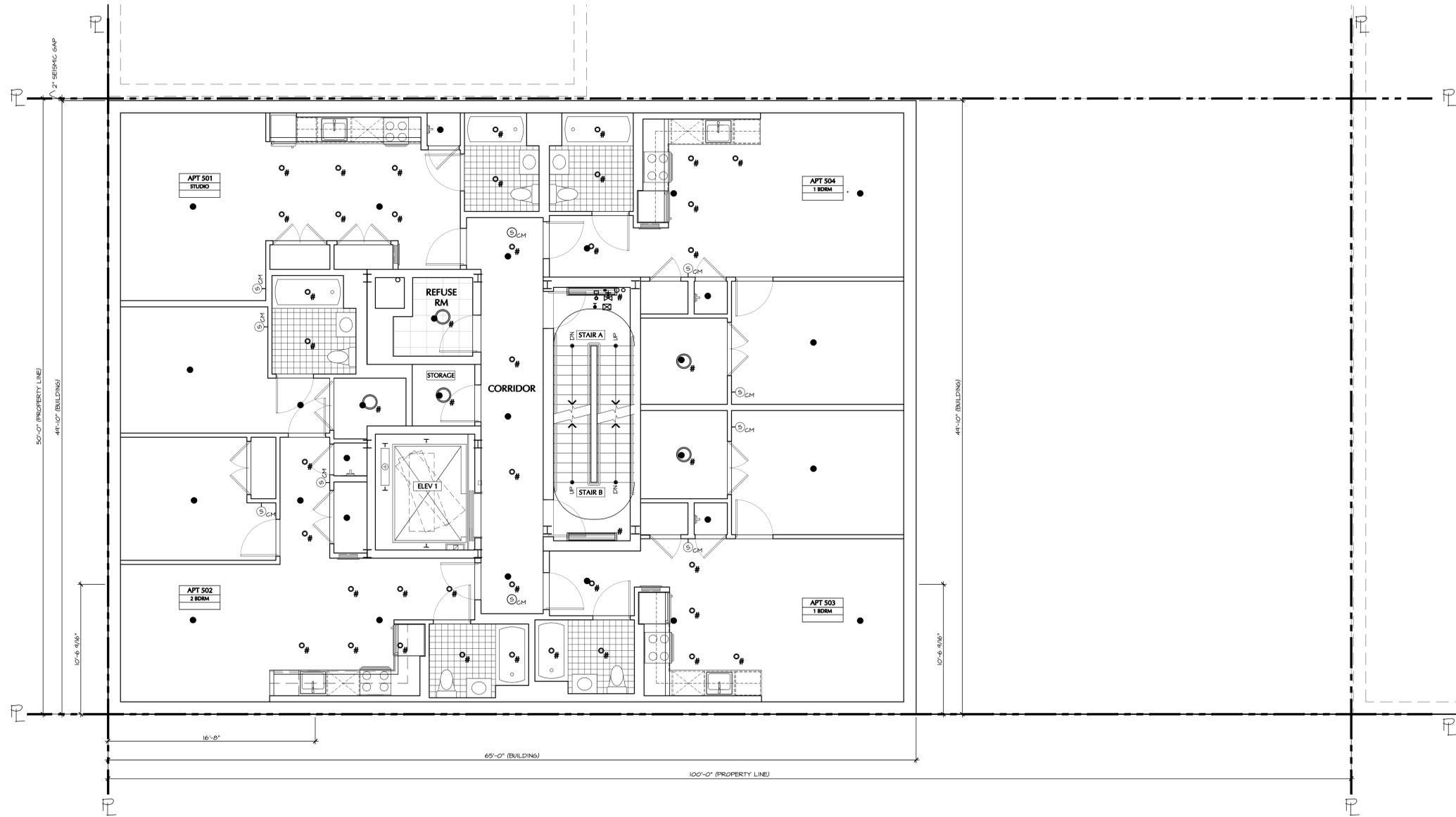
SCALE
AS NOTED

KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
4TH FLOOR REFLECTED CEILING PLAN

SEAL AND SIGNATURE _____ DATE: _____
PROJECT NO: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO: _____
A-135.00
CAD FILE NO: _____ XX OF XX



A 5TH FLOOR REFLECTIVE CEILING PLAN

1/4"=1'-0"

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER _____

STRUCTURAL ENGINEER _____

MECHANICAL ENGINEER _____

OWNER _____

ISSUE
DESIGN DEVELOPMENT

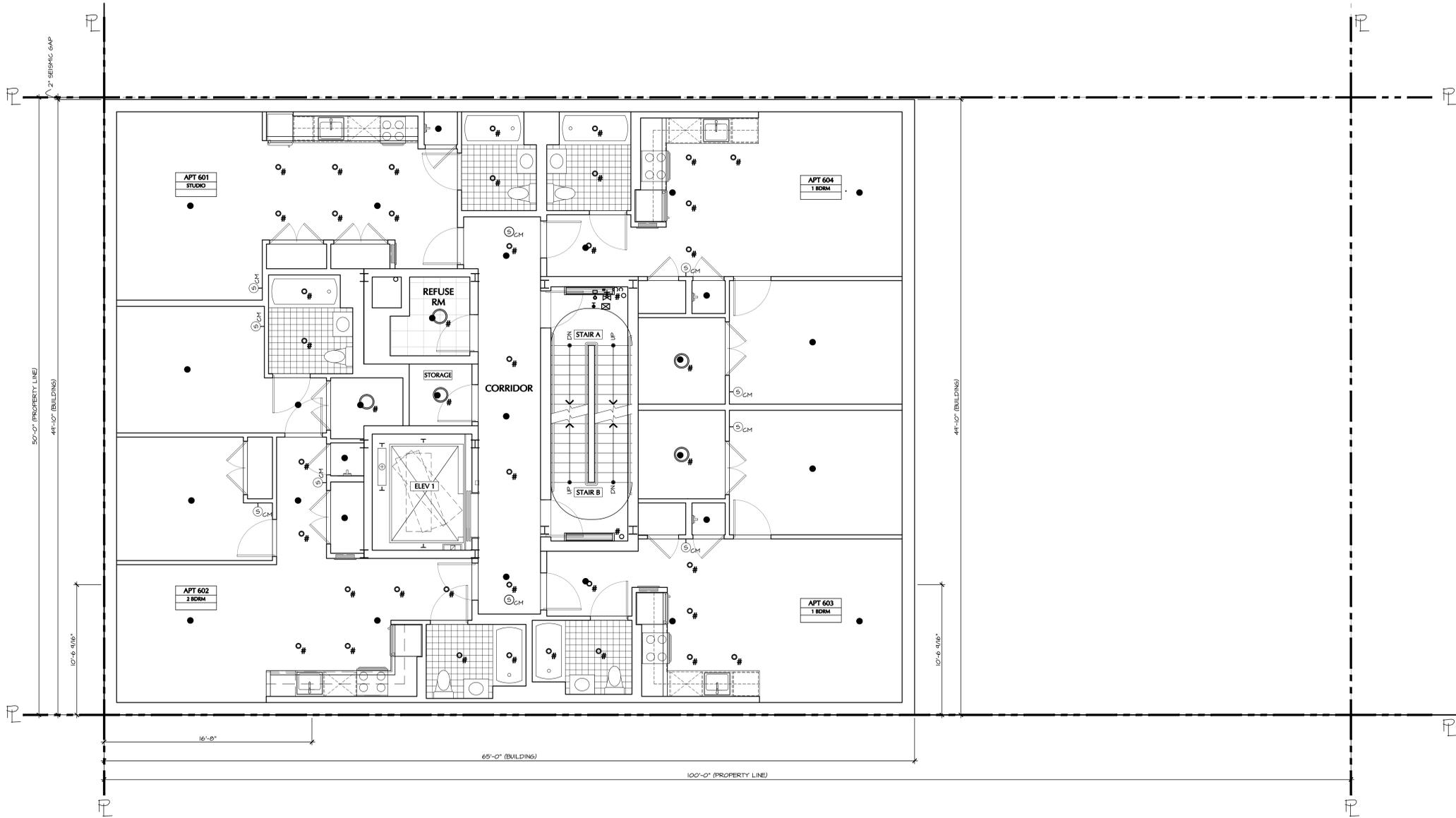
SCALE
AS NOTED

KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
5TH FLOOR REFLECTED CEILING PLAN

SEAL AND SIGNATURE _____ DATE: _____
PROJECT NO: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO: _____
A-136.00
CAD FILE NO: _____ XX OF XX



A 6TH FLOOR REFLECTIVE CEILING PLAN

1/4"=1'-0"
N

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

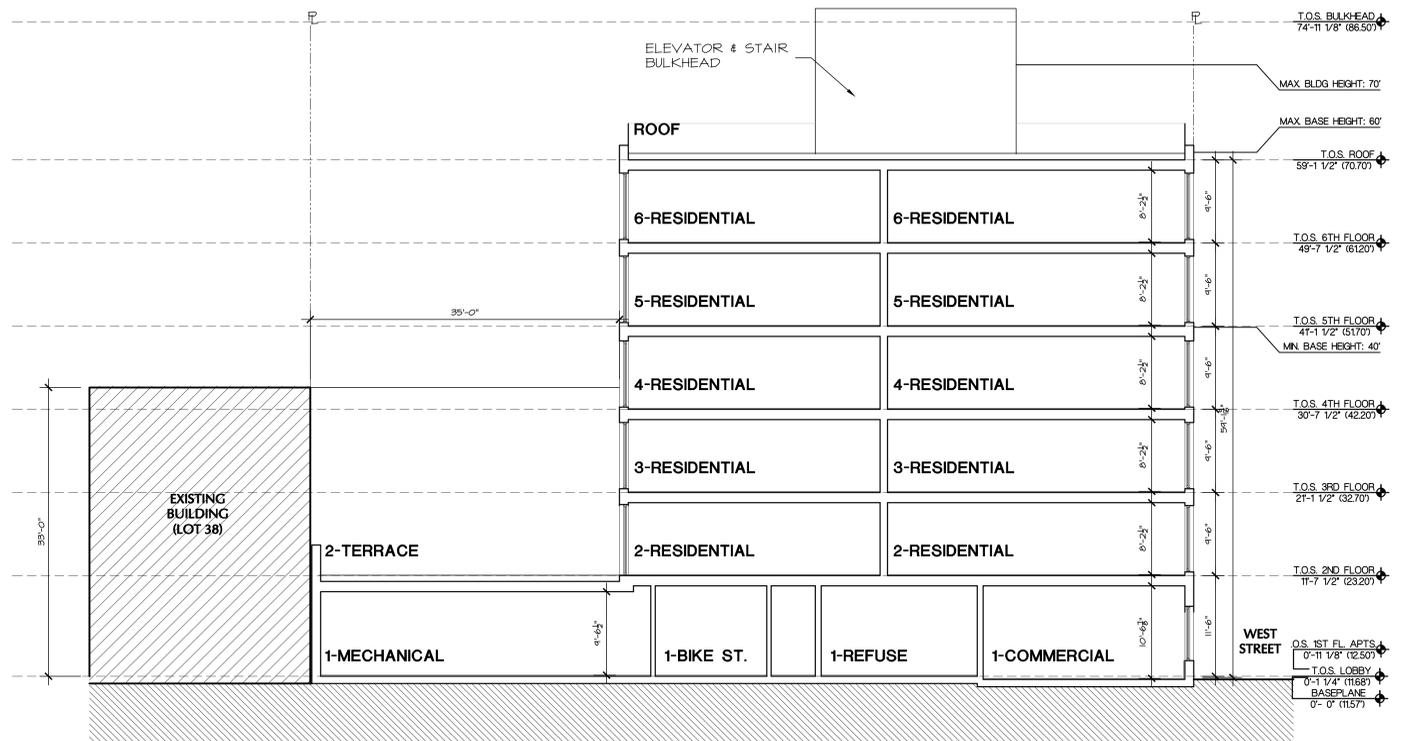
ISSUE
DESIGN DEVELOPMENT

SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

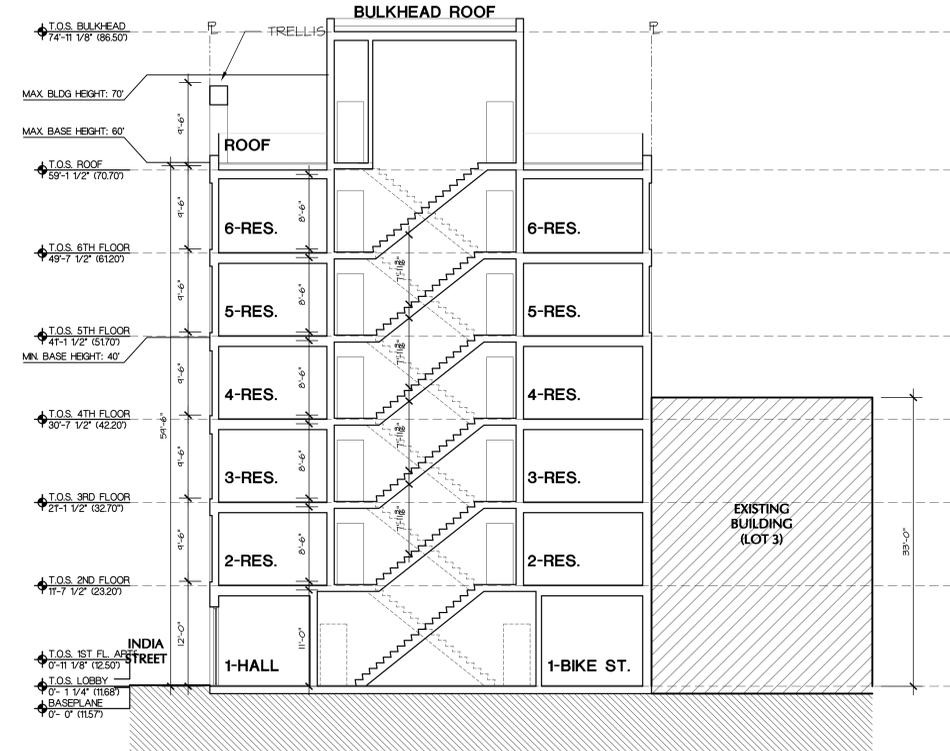
DRAWING
6TH FLOOR REFLECTED CEILING PLAN

SEAL AND SIGNATURE
DATE: _____
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CHK BY: _____
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A-137.00
CAD FILE NO: _____ XX OF XX



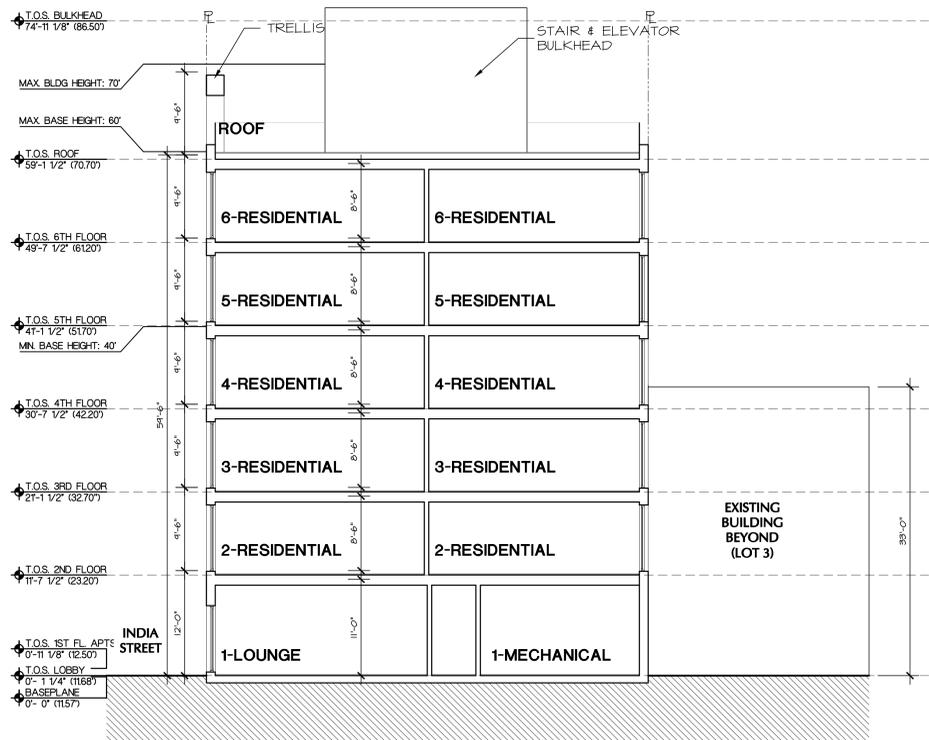
D SECTION
NORTH TO SOUTH

1/8"=1'0"



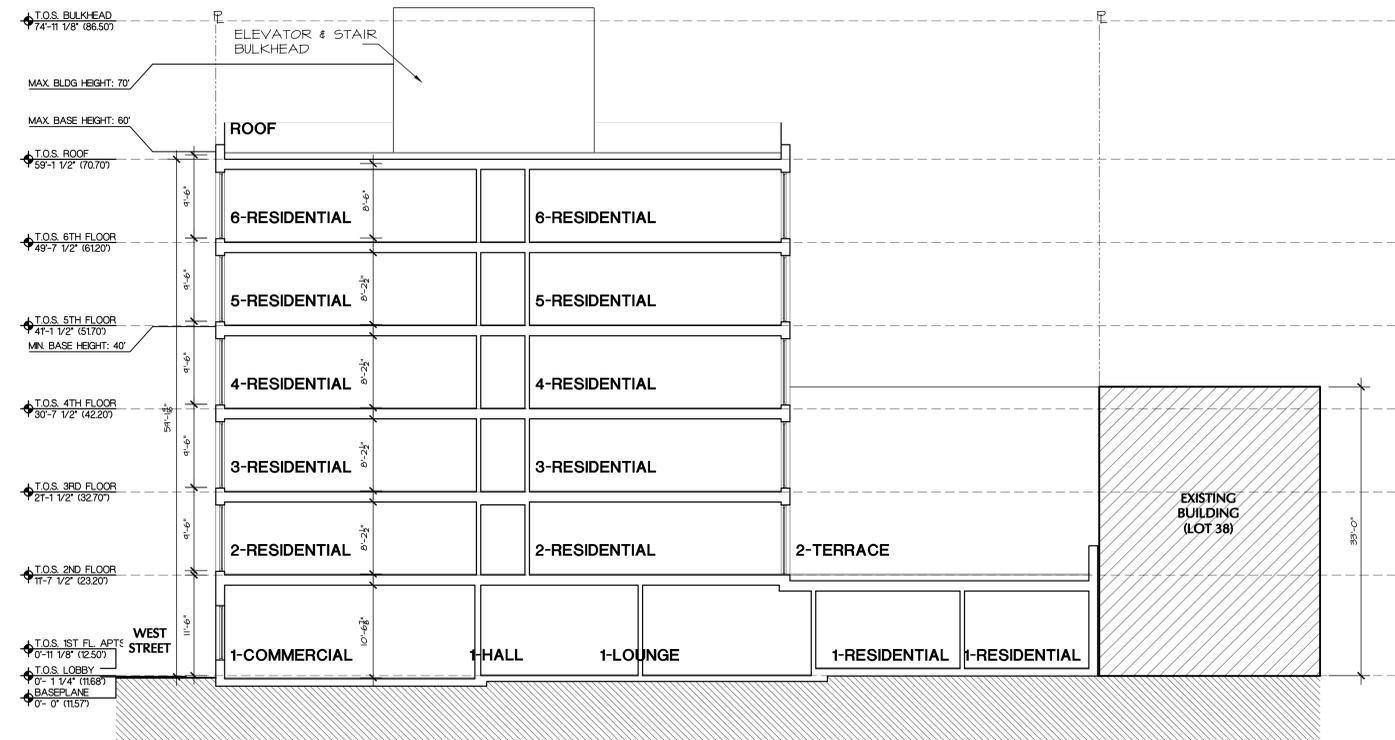
C SECTION
EAST TO WEST

1/8"=1'0"



B SECTION
EAST TO WEST

1/8"=1'0"



A SECTION
EAST TO WEST

1/8"=1'0"

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1/2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE

DESIGN DEVELOPMENT

SCALE

AS NOTED

KEY PLAN

PROJECT

144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING

BUILDING SECTIONS

SEAL AND SIGNATURE

DATE:

PROJECT NO: 1683.00

DRAWING BY:

CHK BY:

DWG NO:

A-201.00

CAD FILE NO: XX OF XX

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
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PROJECT

144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING

BUILDING SECTIONS

SEAL AND SIGNATURE

DATE

PROJECT NO: 1683.00

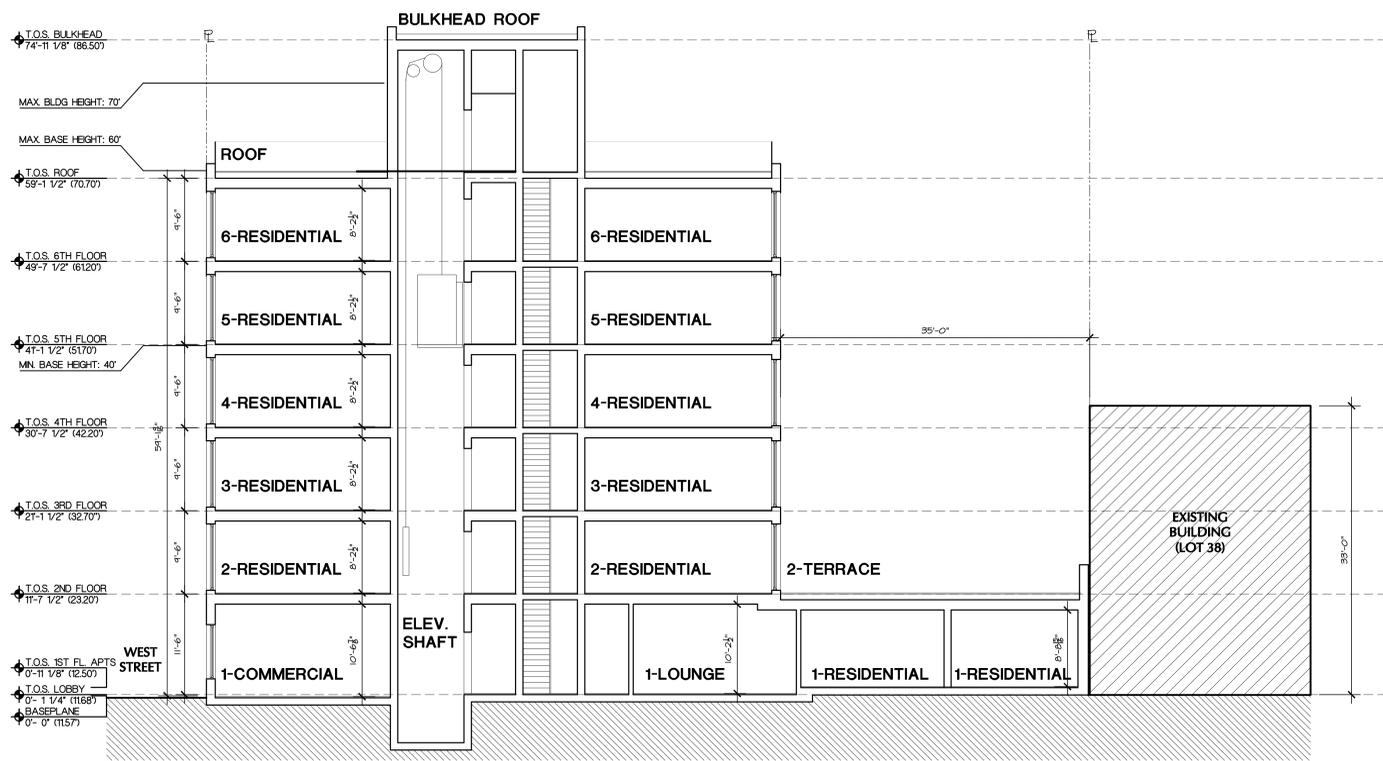
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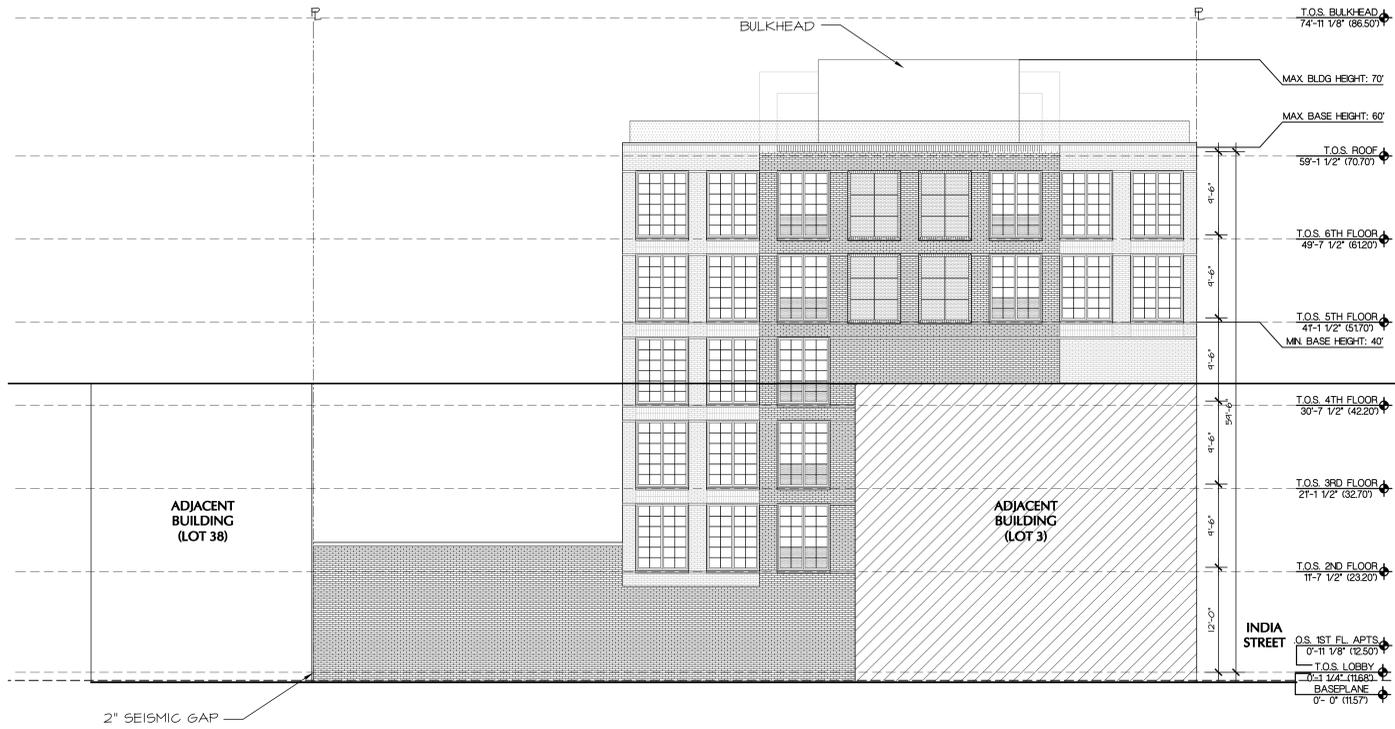
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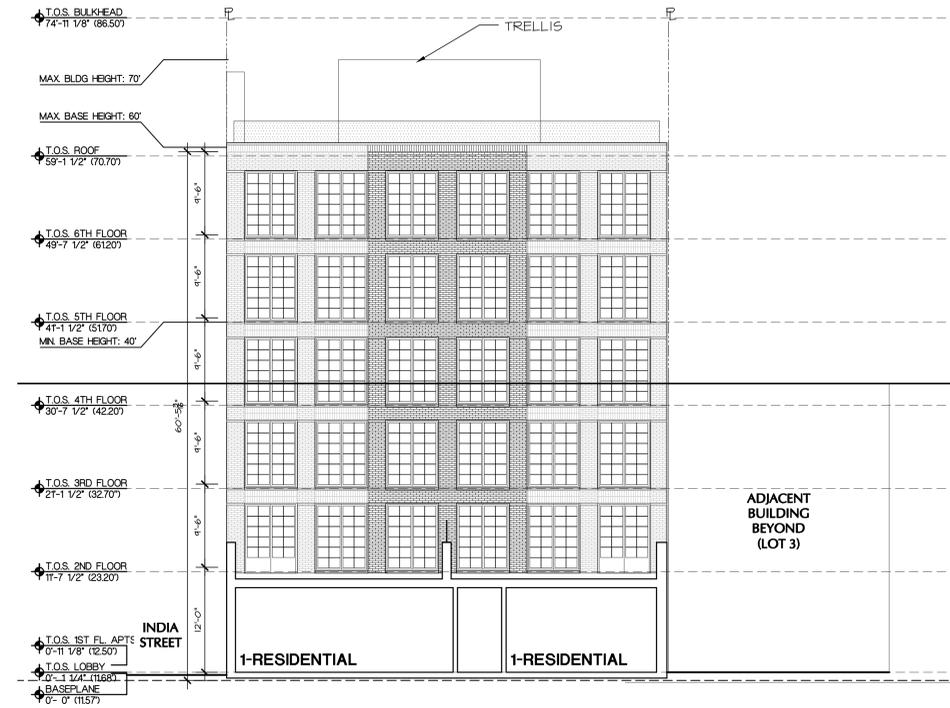
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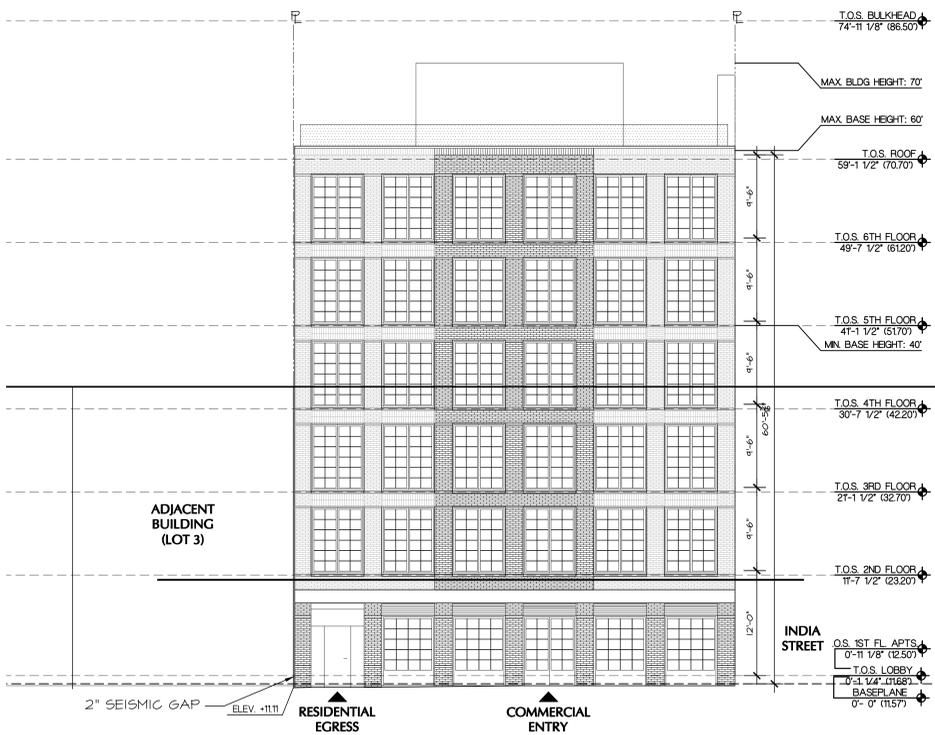
D ELEVATION NORTH

1/8"=1'0"



C ELEVATION EAST

1/8"=1'0"



B ELEVATION WEST

1/8"=1'0"



A ELEVATION SOUTH

1/8"=1'0"

144 - 146 WEST STREET
BROOKLYN, NY 11222
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DEVELOPER

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DESIGN DEVELOPMENT

SCALE
AS NOTED

KEY PLAN

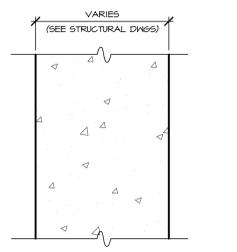
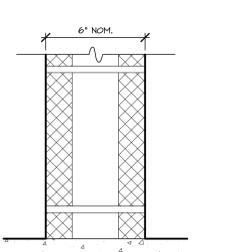
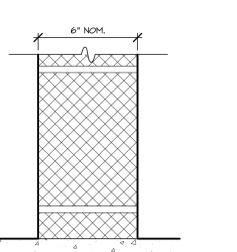
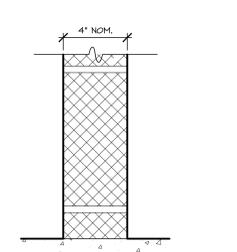
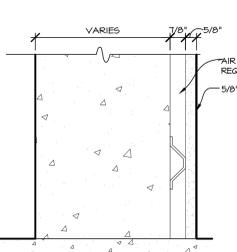
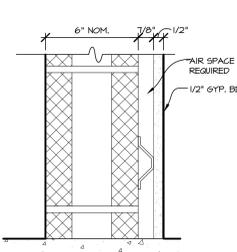
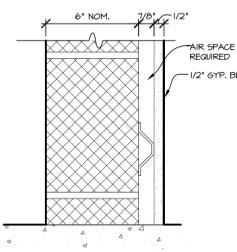
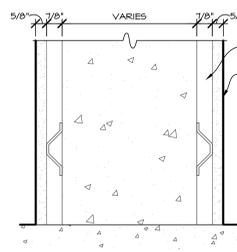
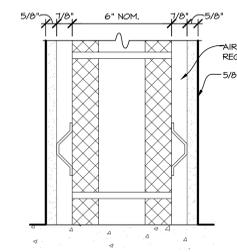
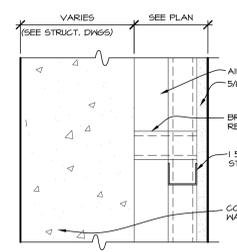
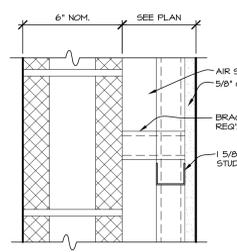
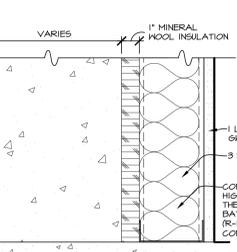
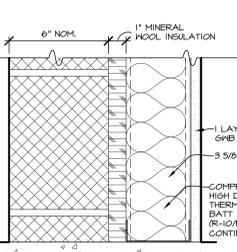
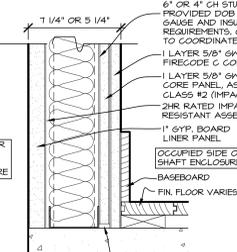
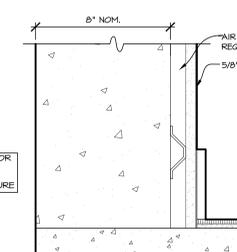
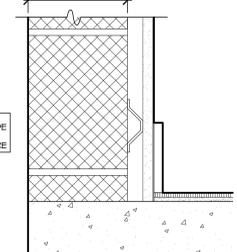
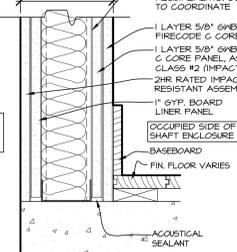
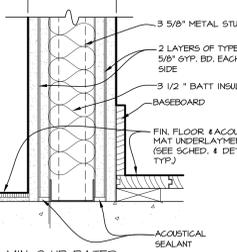
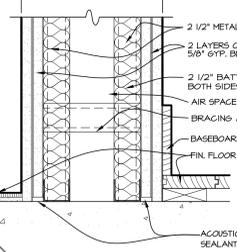
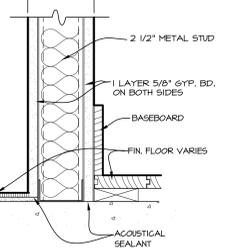
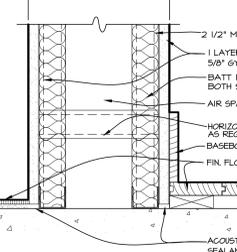
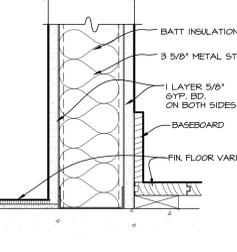
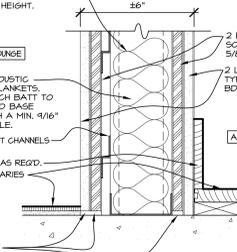
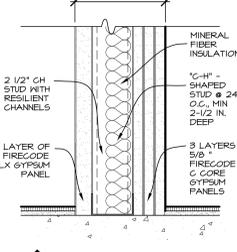
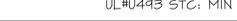
PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
BUILDING ELEVATIONS

SEAL AND SIGNATURE

DATE: _____
PROJECT NO.: 1683.00
DRAWING BY: _____
CHK BY: _____
DWG NO: _____

A-301.00
CAD FILE NO: _____ XX OF XX

<p>NOTES: 1. GC TO VERIFY STUD SPACING, GAUGE, AND BRACING TO SUPPORT KITCHEN CABINETS AND ALL WALL HANG FIXTURES. 2. PROVIDE BRACING AT ALL CHASE WALLS AS PER UL SYSTEM REQUIREMENTS. 3. PROVIDE BRACING FOR ALL ONE-SIDED WALLS AND WALLS HIGHER THAN 10 FEET AND/OR AS PER UL SYSTEM REQUIREMENTS. 4. ALL GYPSUM BOARD, BATTS, AND BLANKETS TO BEAR UL CLASSIFICATION MARK. SOUND TRANSMISSION NOTES: 1. ALL PARTITIONS/FLOORINGS AND ASSEMBLIES BETWEEN DWELLING UNITS, DWELLING UNITS & STAIRS, MECH. ROOMS, BOILER ROOMS, ELEVATORS, OR OTHER SHAFTS SHALL HAVE MIN. STC RATING OF 50 AND IIC OF 50. 2. ALL PARTITIONS TO BE TREATED TO MAINTAIN REQUIRED ACOUSTIC/FIRE RATING REQUIREMENTS. 3. AT REFUSE CHUTE, CHUTE SUPPORT AND BRACING SHALL BE FREE OF DIRECT CONTACT WITH FLOOR AND SHAFT ENCLOSURE AND SHALL BE RESILIENTLY SUPPORTED AT EACH STRUCTURAL SUPPORT LOCATION. ISOLATORS TO BE PROVIDED AS PER NYC CODE REQUIREMENTS. 4. ALL FLOORING/CEILING ASSEMBLIES SHALL HAVE MIN STC RATING OF 50 AND IIC RATING OF 50. PROVIDE ACOUSTIC MAT AND UNDERLAYMENT AS REQUIRED TO MEET MIN RATINGS. 5. PROVIDE BLOCKING AS REQUIRED FOR WALL MOUNTED CABINETS AND BATHROOM ACCESSORIES.</p>	<p>NOTE: STRUCTURAL CONCRETE VARIES. SEE STRUCTURAL DRAWINGS FOR DIMENSIONS.</p>  <p>1 MIN. 2 HR RATED 1A MIN. 3 HR RATED</p>	<p>NOTE: CMU VARIES. SEE STRUCTURAL DRAWINGS FOR DIMENSIONS, REINFORCING, AND GROUTING (TYP).</p>  <p>1B MIN. 2 HR RATED</p>	<p>NOTE: CMU VARIES. SEE STRUCTURAL DRAWINGS FOR DIMENSIONS, REINFORCING, AND GROUTING (TYP).</p>  <p>1C MIN. 3 HR RATED</p>	<p>NOTE: CMU VARIES. SEE STRUCTURAL DRAWINGS FOR DIMENSIONS, REINFORCING, AND GROUTING (TYP).</p>  <p>1D MIN. 2 HR RATED</p>	 <p>2 WITH FINISH ON ONE SIDE (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	 <p>2A WITH FINISH ON ONE SIDE MIN. 2 HR RATED</p>
 <p>2B WITH FINISH ON ONE SIDE MIN. 3 HR RATED</p>	<p>CONCRETE PARTITION</p>  <p>3 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>CMU PARTITION (MIN. 2 HR RATED) UL# U906</p>  <p>3A WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>CMU PARTITION (MIN. 3 HR RATED) UL# U906</p>  <p>4 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>4A * WITH PLUMBING WITH WATERPROOFED BOARD ON NET SIDE</p>	<p>CMU PARTITION (MIN. 2 HR RATED) UL# U906</p>  <p>4B WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>4C * WITH PLUMBING WITH WATERPROOFED BOARD ON NET SIDE</p>	<p>CONCRETE PARTITION (MIN. 2 HR RATED)</p>  <p>6 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>6A HOLD/MILDBEN RESISTANT WALL BOARD AT CELLAR LOCATIONS</p>	<p>CMU PARTITION (MIN. 2 HR RATED) UL# U906</p>  <p>6B WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>6C HOLD/MILDBEN RESISTANT WALL BOARD AT CELLAR LOCATIONS</p>
<p>CMU PARTITION (MIN. 3 HR RATED)</p>  <p>7 WITH FINISH ON ONE SIDE</p>	<p>CONCRETE PARTITION (MIN. 2 HR RATED)</p>  <p>8 WITH FINISH ON ONE SIDE</p>	<p>CMU PARTITION (MIN. 2 HR RATED) UL# U906</p>  <p>9 WITH FINISH ON ONE SIDE</p>	<p>CONCRETE PARTITION (MIN. 2 HR RATED)</p>  <p>10 WITH FINISH ON ONE SIDE</p>	<p>CMU PARTITION (MIN. 2 HR RATED) UL# U906</p>  <p>11 MIN. 2 HR RATED</p> <p>11A MIN. 1 HR RATED</p> <p>11B * WITH WATERPROOFED BOARD ON THE NET SIDE</p>	<p>PARTITION BTWN CONDITIONED & UNCONDITIONED SPACE (MIN. 3 HR RATED)</p>  <p>12 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>12A * WITH PLUMBING * WITH WATERPROOFED BOARD ON THE NET SIDE</p>	<p>PARTITION BTWN CONDITIONED & UNCONDITIONED SPACE (MIN. 3 HR RATED)</p>  <p>13 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>13A * WITH WATERPROOFED BOARD ON THE NET SIDE (KITCHEN & BATHROOM)</p>
<p>IMPACT RESISTANT PARTITION @ ELEVATOR (MIN. 2 HR RATED) UL# U415 STC: MIN 50 TYP.</p>  <p>14 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>14A * WITH PLUMBING (WIDTH VARIES) * 6\" data-bbox="30 920 110 940"/> </p>	<p>PARTITION @ REFUSE / ELEVATOR (MIN. 2 HR RATED)</p>  <p>15 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>* WITH WATERPROOFED BOARD ON THE NET SIDE (KITCHEN & BATHROOM)</p>	<p>PARTITION @ REFUSE CHUTE (MIN. 3 HR RATED)</p>  <p>16 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>PARTITION @ STAIR (MIN. 2 HR RATED) UL# U415</p>  <p>17 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p> <p>* WITH WATERPROOFED BOARD ON THE NET SIDE (KITCHEN & BATHROOM) * TILE MANSICOT AT REFUSE ROOM ON RESIDENTIAL FLOOR.</p>	<p>2 HR. RATED PARTITION UL#U419 STC: MIN 50 TYP.; 35 @ ENTRY DOORS</p>  <p>18 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>2 HR. RATED PARTITION UL#U493 STC: MIN 50 TYP.</p>  <p>19 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>INTERIOR PARTITION UL#U419 (NO INSULATION AT CLOSETS)</p>  <p>20 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>
<p>INTERIOR PARTITION UL#U443 STC: MIN 50 TYP.</p>  <p>21 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>INTERIOR PARTITION @ ELECTRICAL PANEL UL#U419</p>  <p>22 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>2 HR. RATED PARTITION W/ SOUNDBREAK UL# U419 OR U455 STC: MIN 62 TYP.</p>  <p>23 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>	<p>PARTITION AT COMPACTOR ROOM MIN 3HR RATED UL# U263 - DESIGN U.415 STC-50 MIN</p>  <p>24 WITH FINISH ON BOTH SIDES (NOT AT WALLS W/ ELECTRICAL OUTLETS)</p>			

144 - 146 WEST STREET
 BROOKLYN, NY 11222
 ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

DEVELOPER
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 MECHANICAL ENGINEER
 OWNER

ISSUE
 DESIGN DEVELOPMENT

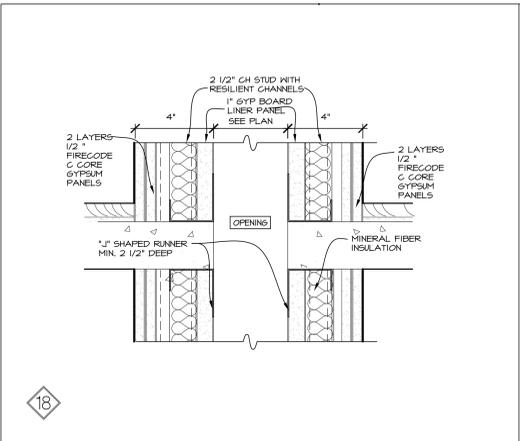
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 AS NOTED

KEY PLAN

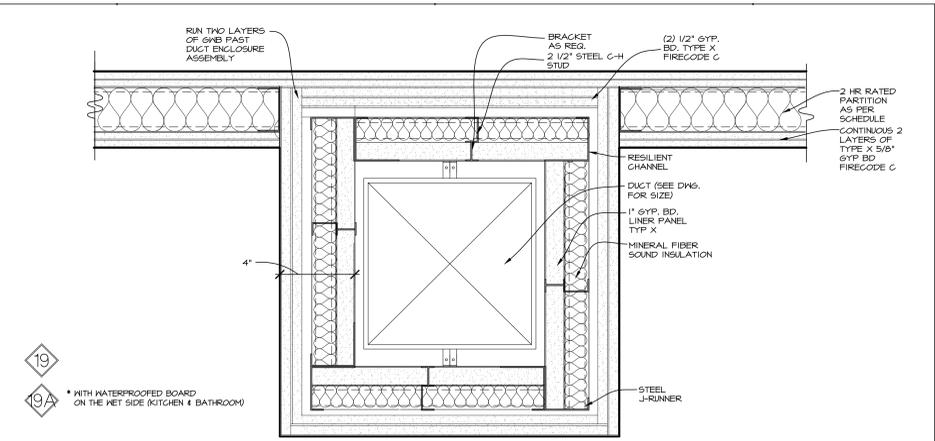
PROJECT
 144 - 146 WEST STREET
 BROOKLYN, NY 11222

DRAWING
 PARTITION TYPES

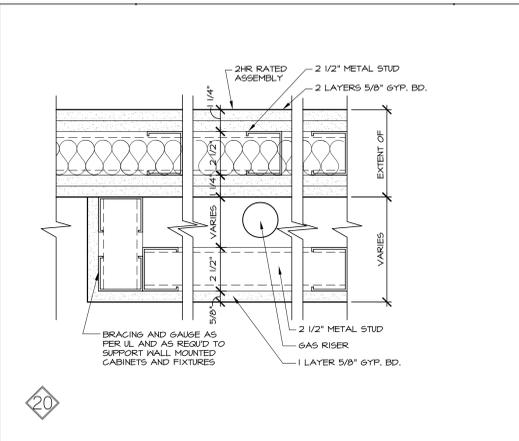
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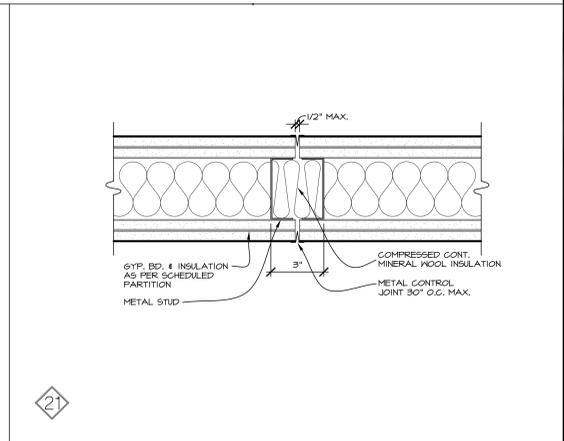
SHAFT WALL
 (MIN. 2 HR RATED) UL# U415 SYSTEM F STC: MIN 50 TYP.



2 HR RATED SHAFT PLAN DETAIL
 IIC/UL# U415 SYSTEM F STC: 50 MIN.

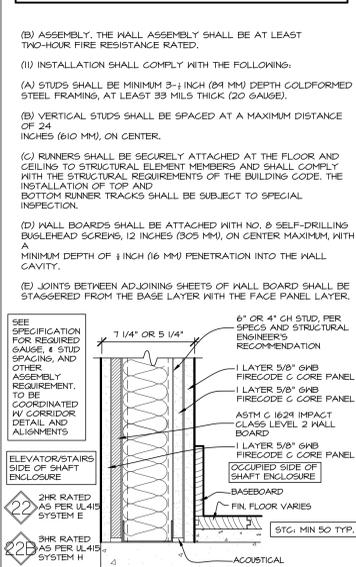
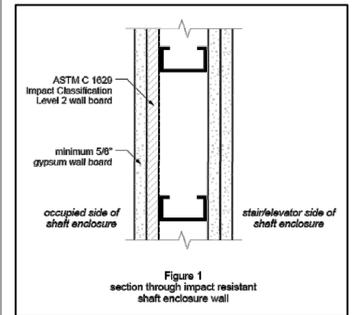


RECESSED GAS RISER @ 2 HR RATED PARTITION
 UL# 419 STC: MIN 50 TYP.



VERTICAL CONTROL JOINT
 (MIN. 2 HR RATED) UL# 419

CHAPTER 400 SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY
 403-01 IMPACT RESISTANT STAIR AND ELEVATOR SHAFT ENCLOSURES
 (A) SCOPE. THIS RULE PROVIDES THE CONSTRUCTION REQUIREMENTS FOR IMPACT RESISTANT WALL ENCLOSURES OF EXIT STAIR AND ELEVATOR SHAFTS IN HIGH-RISE BUILDINGS.
 (B) DEFINITIONS. FOR THE PURPOSES OF THIS SECTION, ALL TERMS USED HEREIN SHALL HAVE THE SAME MEANINGS AS SET FORTH IN THE BUILDING CODE.
 (C) REFERENCES. SEE SECTIONS 403.4.2 (IMPACT RESISTANT ELEVATOR SHAFTS) AND 403.5 (IMPACT RESISTANT STAIR ENCLOSURES) OF THE BUILDING CODE.
 (D) CONSTRUCTION REQUIREMENTS. A COMPLIANT WALL ASSEMBLY SHALL PROVIDE AN IMPACT RESISTANCE EQUIVALENT TO OR EXCEEDING THE PERFORMANCE OF A WALL ASSEMBLY DESCRIBED IN PARAGRAPH (1), (2), OR (3) BELOW:
 (1) PRESCRIPTIVE STUD AND WALL BOARD ASSEMBLY. AN IMPACT RESISTANT SHAFT ENCLOSURE CONSTRUCTED AS A STUD AND WALL BOARD ASSEMBLY SHALL SATISFY THE FOLLOWING REQUIREMENTS:
 (i) MATERIALS AND ASSEMBLIES SHALL COMPLY WITH THE FOLLOWING:
 (A) MATERIALS. IMPACT RESISTANT WALL BOARD SHEATHED ON THE IMPACT FACE OF THE STAIR OR ELEVATOR ENCLOSURE WALL ASSEMBLY SHALL BE TESTED BY AN APPROVED TESTING AGENCY. THE IMPACT FACE SHALL BE CONSIDERED THE OUTER SURFACE OF THE STAIR OR ELEVATOR ENCLOSURE, ON ALL OCCUPIED SIDES OF THE BUILDING, AND SHALL BE COMPRISED OF TWO (2) LAYERS OF WALL BOARDS.
 (B) THE WALL BOARD USED AS THE BASE LAYER ON THE IMPACT FACE OF THE ENCLOSURE SHALL BE LISTED BY AN APPROVED AGENCY TO ASTM C1624-06, STANDARD CLASSIFICATION FOR ABUSE-RESISTANT NONDECORATED INTERIOR GYPSUM PANEL PRODUCTS AND FIBERREINFORCED CEMENT PANELS, IMPACT CLASSIFICATION LEVEL 2, AND THE WALL BOARD USED AS THE FINISH LAYER SHALL BE A MINIMUM 1/2 INCH (16 MM) GYPSUM WALL BOARD (SEE FIGURE 1).
 (ii) INSTALLATION SHALL COMPLY WITH THE FOLLOWING:
 (A) STUDS SHALL BE MINIMUM 3-1/2 INCH (89 MM) DEPTH COLD-FORMED STEEL FRAMING, AT LEAST 39 MILS THICK (20 GAUGE).
 (B) VERTICAL STUDS SHALL BE SPACED AT A MAXIMUM DISTANCE OF 24 INCHES (610 MM), ON CENTER.
 (C) RUNNERS SHALL BE SECURELY ATTACHED AT THE FLOOR AND CEILING TO STRUCTURAL ELEMENT MEMBERS AND SHALL COMPLY WITH THE STRUCTURAL REQUIREMENTS OF THE BUILDING CODE. THE INSTALLATION OF TOP AND BOTTOM RUNNER TRACKS SHALL BE SUBJECT TO SPECIAL INSPECTION.
 (D) WALL BOARDS SHALL BE ATTACHED WITH NO. 8 SELF-DRILLING BULK-HEAD SCREWS, 12 INCHES (305 MM), ON CENTER MAXIMUM, WITH A MINIMUM DEPTH OF 1/2 INCH (16 MM) PENETRATION INTO THE WALL CAVITY.
 (E) JOINTS BETWEEN ADJOINING SHEETS OF WALL BOARD SHALL BE STAGGERED FROM THE BASE LAYER WITH THE FACE PANEL LAYER.



IMPACT RESISTANT 2 HR RATED PARTITION AS DIRECTED BY BUILDING CODE
 UL# U415

144 - 146 WEST STREET
 BROOKLYN, NY 11222
 ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
 LOT: 1,2
 JOB: #1683.00

DEVELOPER _____
 STRUCTURAL ENGINEER _____
 MECHANICAL ENGINEER _____
 OWNER _____

ISSUE
 DESIGN DEVELOPMENT

SCALE
 AS NOTED

KEY PLAN

PROJECT
 144 - 146 WEST STREET
 BROOKLYN, NY 11222

DRAWING
 PARTITION TYPES

SEAL AND SIGNATURE _____ DATE _____
 PROJECT NO: 1683.00
 DRAWING BY: _____
 CHK BY: _____
 DWG NO: _____

A-621.00
 CAD FILE NO: _____ # OF XX

Project Information
 Energy Code: 2014 New York Energy Conser. Constr. Code (by application of 90.1 (2010) Standard)
 Project Title: 144-146 West Street
 Location: Kings County, New York
 Climate Zone: 4a
 Project Type: New Construction
 Vertical Glazing / Wall Area: 36%

Construction Site: 144-146 West Street
 Owner/Agent: David E. Gross
 Designer/Contractor: GF55 Architects
 19W 21st St.
 New York, NY 10010

Building Area	Floor Area
1-Multifamily - Residential	21170

Envelope Assemblies	Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor
Building roof: Insulation Entirely Above Deck, (Bldg. Use 1 - Multifamily)	1st Fl. Slab on grade: Slab-On-Grade-Unheated, Vertical 1 ft., (Bldg. Use 1 - Multifamily) (c)	3239	---	20.0	0.048	0.048
	Use 1 - Multifamily) (c)	300	---	10.0	0.580	0.550
NORTH	North facade: Other Steel Framed Wall, (Bldg. Use 1 - Multifamily) (b)	3528	---	---	0.047	0.064
	Windows North: Metal Frame with Thermal Break-Operable, Perf. Specs.: Product ID NA, SHGC 0.40, (Bldg. Use 1 - Multifamily) (c)	861	---	---	0.500	0.550
	Lobby Storefront: Metal Frame-Operable, Perf. Specs.: Product ID NA, SHGC 0.40, (Bldg. Use 1 - Multifamily) (c)	134	---	---	0.500	0.550
	Lot line wall w/adj bldg.: Other Steel Framed Wall, (Bldg. Use 1 - Multifamily) (b)	1319	---	---	0.054	0.064
EAST	East facade: Other Steel Framed Wall, (Bldg. Use 1 - Multifamily) (b)	2089	---	---	0.047	0.064
	Windows East: Metal Frame with Thermal Break-Operable, Perf. Specs.: Product ID NA, SHGC 0.40, (Bldg. Use 1 - Multifamily) (c)	1391	---	---	0.500	0.550
	Lot line wall w/adj bldg.: Other Steel Framed Wall, (Bldg. Use 1 - Multifamily) (b)	584	---	---	0.054	0.064
	Use 1 - Multifamily) (b)	1674	---	---	0.500	0.550
SOUTH	South facade: Other Steel Framed Wall, (Bldg. Use 1 - Multifamily) (b)	4666	---	---	0.047	0.064
	Windows South: Metal Frame with Thermal Break-Operable, Perf. Specs.: Product ID NA, SHGC 0.40, (Bldg. Use 1 - Multifamily) (c)	1674	---	---	0.500	0.550
WEST	Use 1 - Multifamily) (b)	1674	---	---	0.500	0.550
	Use 1 - Multifamily) (c)	1674	---	---	0.500	0.550

Project Title: 144-146 West Street
 Data filename: F:\jobs\1683.00 - 144 West Street\1-Information\Comcheck files\Comcheck DD set-ASHRAE90-1 Page 1 of 10
 Report date: 09/09/15

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor
West facade: Other Steel Framed Wall, (Bldg. Use 1 - Multifamily) (b)	3319	---	---	0.047	0.064
Windows West: Metal Frame-Operable, Perf. Specs.: Product ID NA, SHGC 0.40, (Bldg. Use 1 - Multifamily) (c)	1669	---	---	0.500	0.550

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.
 (b) Other components require supporting documentation for proposed U-factors.
 (c) Fenestration product performance must be certified in accordance with NFRC and requires supporting documentation.
 (d) Slab-On-Grade proposed and budget U-factors shown in table are F-factors.

Envelope PASSES: Design 2% better than code

Envelope Compliance Statement
 Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 90.1 (2010) Standard requirements in COMcheck Version 4.0.1 and to comply with the mandatory requirements listed in the Inspection Checklist.

David E. Gross, AIA
 Name - Title Signature Date

Project Title: 144-146 West Street
 Data filename: F:\jobs\1683.00 - 144 West Street\1-Information\Comcheck files\Comcheck DD set-ASHRAE90-1 Page 2 of 10
 Report date: 09/09/15

TABLE II - PROGRESS INSPECTIONS FOR ENERGY CODE COMPLIANCE - COMMERCIAL BUILDINGS

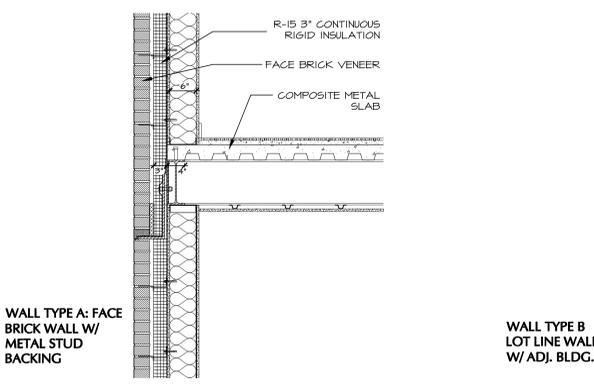
Inspection/Test	Periodic (minimum)	Reference Standard (See ECC Chapter C3; or Other Criteria)	ECC or Other Citation
IIA Envelope Inspections			
IIA1 Protection of exposed foundation	As required during foundation work and prior to backfill	Approved construction documents	C303.2.1; ASHRAE 90.1 - 5.8.1.7
IIA2 Insulation placement and R-values	As required to verify continuous enclosure while walls, ceilings and floors are open	Approved construction documents	C303.1, C303.1.1, C303.1.2, C401.1, C402.2; ASHRAE 90.1 - 5.5, 5.6 or 11; 5.8.1
IIA3 Fenestration U-factor and product ratings	As required during installation	Approved construction documents; NFRC 100, ASHRAE 90.1 - 5.5, 5.6 or 11; 5.8.2	C303.1, C303.1.3, C402.3; ASHRAE 90.1 - 5.5, 5.6 or 11; 5.8.2
IIA4 Fenestration air leakage	As required during installation; prior to final construction inspection	NFRC 400, AAMA WDMA, CSA 1017.5.2/A440 ASTM E283; ANSI/DASMA 105	C402.4.3; ASHRAE 90.1 - 5.4.3.2

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.

Inspection/Test	Periodic (minimum)	Reference Standard (See ECC Chapter C3; or Other Criteria)	ECC or Other Citation
IIA5 Fenestration areas: Dimensions of windows, doors and skylights shall be verified by visual inspection	Prior to final construction inspection	Approved construction documents	C402.3; ASHRAE 90.1 - 5.5.4.2, 5.6 or 11
IIA6 Air sealing and insulation - visual inspection: 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.	As required during construction	Approved construction documents; ASTM E2178, ASTM E2337, ASTM E1677, ASTM E719, ASTM E283	C402.4; ASHRAE 90.1 - 5.4.3.1
IIA7 Projection factors: Where the energy analysis utilized a projection factor, the projection dimensions, air overhang, overhang or permanently attached shading devices shall be verified for conformance with approved plans for visual inspection.	Prior to final construction inspection	Approved construction documents, including energy analysis	C402.3; ASHRAE 90.1 - 5.5.4.2 or 11
IIA8 Flashing deck waterproofing: Waterproofing of flashing decks shall be visually verified.	Prior to final construction inspection	Approved construction documents	C402.3.9; ASHRAE 90.1 - 5.4.3.3
IIA9 Vestibules: Secured entrance vestibules shall be visually inspected for proper operation.	Prior to final construction inspection	Approved construction documents	C402.4.7; ASHRAE 90.1 - 5.4.3.4

PROFESSIONAL ENERGY COMPLIANCE STATEMENT
 TO THE BEST OF MY KNOWLEDGE BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS ARE IN COMPLIANCE WITH THE NEW YORK CITY ENERGY CONSERVATION CODE, CHAPTER C4

D ENVELOPE COMPLIANCE CERTIFICATE



Weighted wall assembly U factor derated for differentiation in thermal properties at slab edge.	Height (in)	U-factor	UA
Max. floor to floor height 10'-0" (8'-9" stud wall, 10" metal beam, 3" conc. composite deck slab)	105	0.045	4.725
Base wall U factor	10	0.067	0.670
Beam assembly U factor	3	0.062	0.186
Slab assembly U factor	3	0.062	0.186
Total	118	0.045	5.581

Weighted U factor (total UA/total height) **0.047**

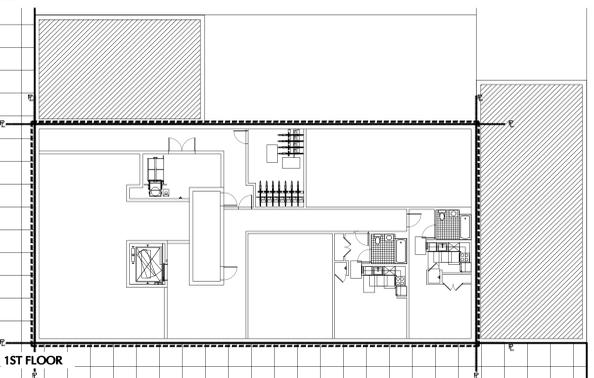
Base wall U factor calculations	R-value	U-factor
R-15 - 3" continuous rigid insulation	15	0.067
6" insulated metal stud wall, R-19 cavity insulation 16" o.c. in 6" cavity (table A9.2B as per A3.3)*	7.1	0.141
Total	22.1	0.045

Beam assembly U factor calculations	R-value	U-factor
R-15 - 3" continuous rigid insulation	15	0.067
Total	15	0.067

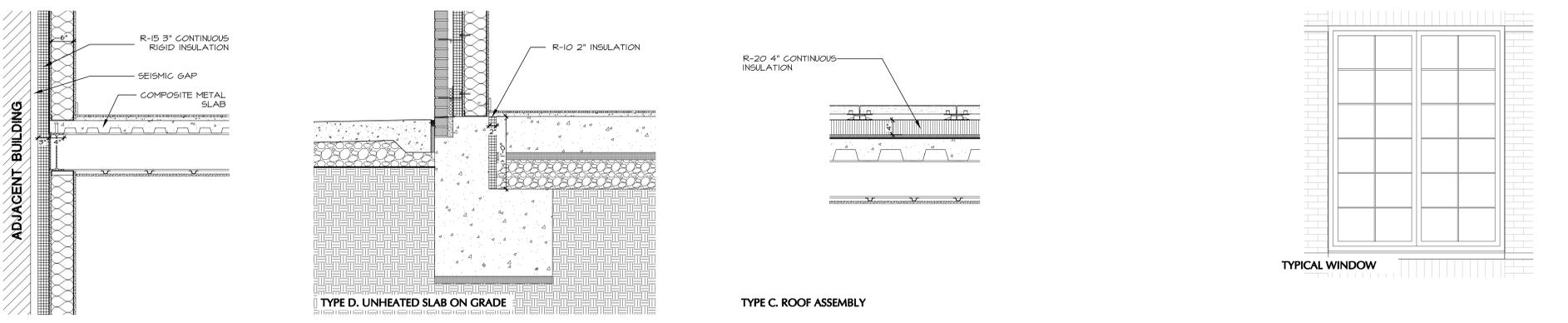
Slab assembly U factor calculations	R-value	U-factor
R-15 - 3" continuous rigid insulation	15	0.067
Concrete @ uninsulated slab (4"), Normal weight (table A3.18)*	1.1	0.091
Total	16.1	0.062

(* ASHRAE 90.1-2010 Appendix A

B TYPICAL ASSEMBLIES



C PROGRESS INSPECTIONS FOR NYCECC COMPLIANCE COMMERCIAL BUILDINGS



Weighted wall assembly U factor derated for differentiation in thermal properties at slab edge.	Height (in)	U-factor	UA
Max. floor to floor height 10'-0" (8'-8" stud wall, 10" metal beam, 4" conc. @ composite deck slab)	105	0.051	5.355
Base wall U factor	10	0.080	0.8
Beam assembly U factor	3	0.074	0.222
Slab assembly U factor	3	0.074	0.222
Total	118	0.051	6.377

Weighted U factor (total UA/total height) **0.054**

Base wall U factor calculations	R-value	U-factor
R-12.5 - 3" continuous semi rigid insulation	12.5	0.080
6" insulated metal stud wall, R-19 cavity insulation 16" o.c. in 6" cavity (table A9.2B as per A3.3)*	7.1	0.141
Total	19.6	0.051

Beam assembly U factor calculations	R-value	U-factor
R-12.5 - 3" continuous semi rigid insulation	12.5	0.080
Total	12.5	0.080

Slab assembly U factor calculations	R-value	U-factor
R-12.5 - 3" continuous semi rigid insulation	12.5	0.080
Concrete @ uninsulated slab (4"), Normal weight (table A3.18)*	1.1	0.091
Total	13.6	0.074

(* ASHRAE 90.1-2010 Appendix A

Weighted U factor (total UA/total height)	R-value	U-factor
Rated R-20 4" continuous insulation alone (table A2.2)*	20	0.048
Total	20	0.048

(* ASHRAE 90.1-2010 Appendix A

Weighted U factor (total UA/total height)	R-value	F-factor
10" concrete unheated slab on grade with 2" vertical insulation (1") (table A6.3)	10	0.58

(* ASHRAE 90.1-2010 Appendix A

U-factor	SHGC
U=0.50	SHGC=0.40

U-factor	SHGC
U=0.50	SHGC=0.40

A THERMAL ENVELOPE DIAGRAM



144 - 146 WEST STREET
 BROOKLYN, NY 11222
 ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

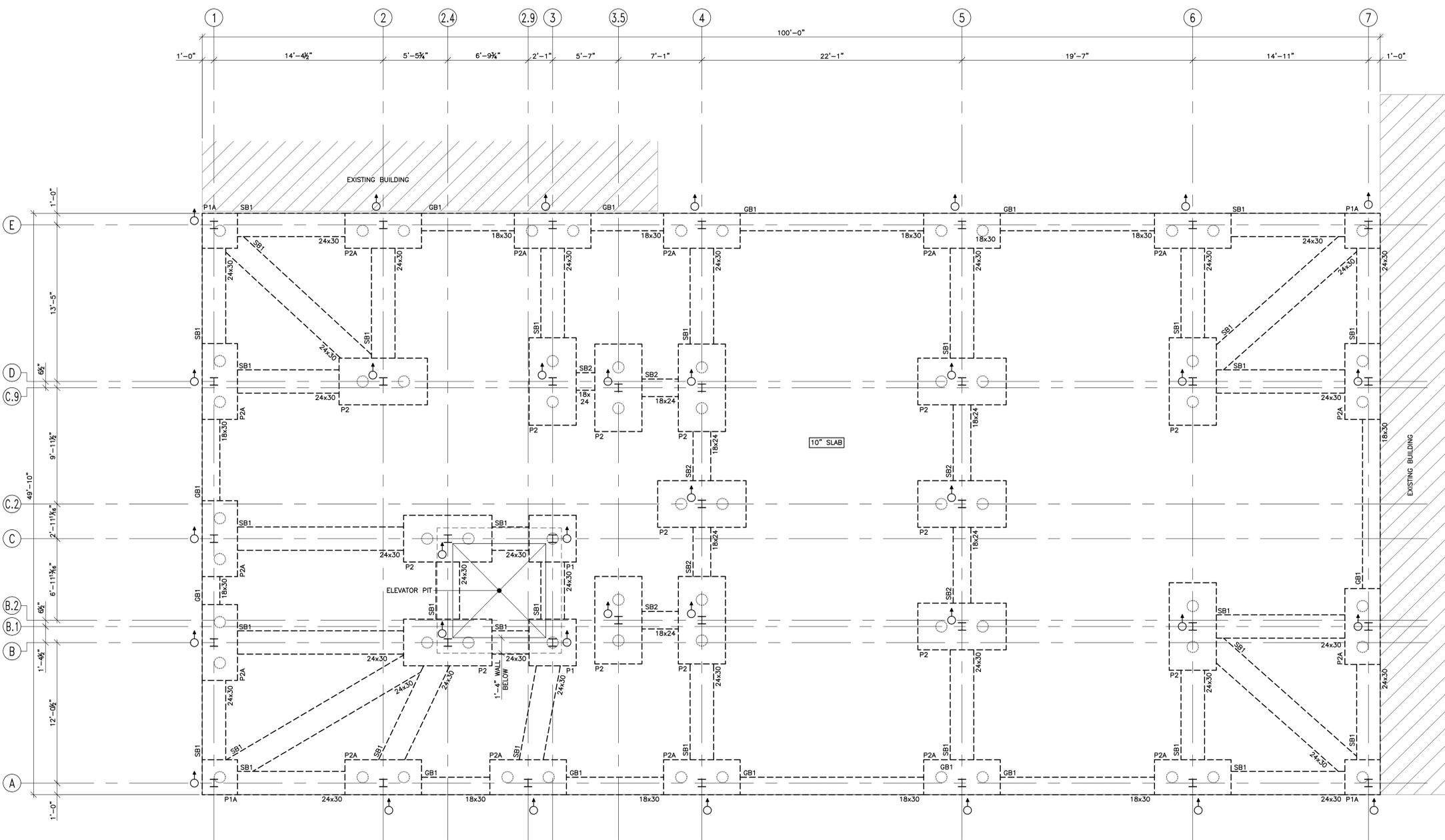
BLOCK: #2531
 LOT: 1/2
 JOB: #1683.00

DEVELOPER
 STRUCTURAL ENGINEER
 MECHANICAL ENGINEER
 OWNER
 ISSUE
 DESIGN DEVELOPMENT
 SCALE
 AS NOTED
 KEY PLAN

PROJECT
 144 - 146 WEST STREET
 BROOKLYN, NY 11222

DRAWING
 THERMAL ENVELOPE COMPLIANCE

SEAL AND SIGNATURE
 DATE:
 PROJECT NO.: 1683.00
 DRAWING BY:
 CHK BY:
 DWG NO.:
 EN-011.00
 CAD FILE NO.: OF XX



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

- PLAN NOTES:**
- FOR GENERAL NOTES AND DESIGN CRITERIA, REFER TO DRAWING S-001.
 - WORK THIS DRAWING WITH DRAWINGS S-100 THRU S-104.
 - REFERENCE ELEVATION = 0'-0" (FIRST FLOOR EL. 67.20') UNLESS OTHERWISE NOTED (U.O.N.).
 - GROUND FLOOR STRUCTURAL SLAB TO BE 10" DEEP NORMAL WEIGHT CONCRETE (4000 PSI AT 28 DAYS), REINFORCED WITH CONTINUOUS #5 @ 12" O.C. EACH WAY, TOP & BOTTOM U.O.N. ON PLAN.
 - SEE FO-200 SERIES DRAWINGS FOR TYPICAL FOUNDATION DETAILS.
 - SEE S-500 SERIES DRAWINGS FOR STEEL COLUMN SCHEDULE.
 - SEE S-600 SERIES DRAWINGS FOR TYPICAL CONCRETE DETAILS.
 - SEE S-610 SERIES DRAWINGS FOR TYPICAL STEEL DETAILS.
 - SEE S-620 SERIES DRAWINGS FOR TYPICAL LIGHT GAUGE FRAMING DETAILS.
 - COORDINATE WITH ARCHITECTURAL DRAWINGS.
 - DENOTES COLUMN STARTING AT THIS LEVEL.

BEAM SCHEDULE						
MARK	SIZE	BOTTOM REBAR	TOP REBAR	STIRRUPS		COMMENTS
				SIZE	SPACING	
SB1	24x30	6-#9	6-#9	#4	①2"	2-#5 HORIZONTAL EACH FACE
SB2	18x24	5-#7	5-#7	#4	①2"	
GB1	18x30	5-#8	5-#8	#4	①2"	2-#5 HORIZONTAL EACH FACE

- PRIOR TO START OF STRUCTURAL WORK:**
- CONTRACTOR SHALL CHECK FOR LATEST PROJECT BULLETINS AND ADDENDA.
 - CONTRACTOR SHALL CONFIRM THAT ALL SUBCONTRACTORS ARE USING THE LATEST STRUCTURAL DRAWINGS.
 - CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS RELATED TO NEW WORK AND PROVIDE FIELD DIMENSIONS.
 - CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL, PRIOR TO MATERIAL ORDERING AND FABRICATION.

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

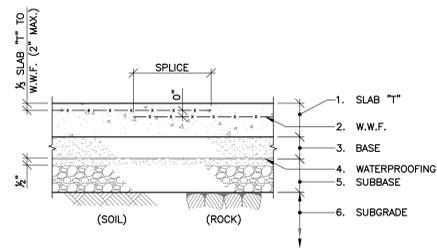
BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER _____
STRUCTURAL ENGINEER _____
MECHANICAL ENGINEER _____
OWNER _____
ISSUE _____
DESIGN DEVELOPMENT _____
SCALE _____
AS NOTED _____
KEY PLAN _____

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
FOUNDATION PLAN

SEAL AND SIGNATURE _____ DATE: 09/11/2015
PROJECT NO: 1683.00
DRAWING BY: JDC
CHK BY: JS
DWG NO: _____
FO-100.00
CAD FILE NO: _____ OF XX



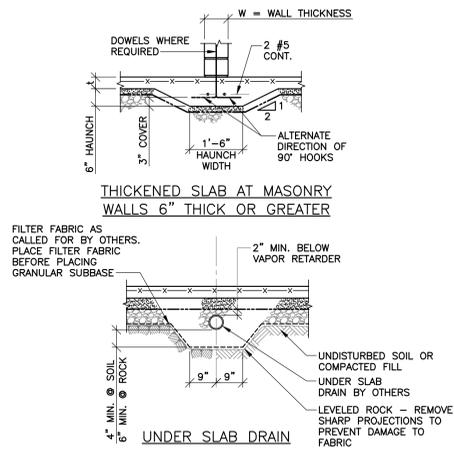
TYPICAL DETAIL – SLAB ON GROUND

NOTES:

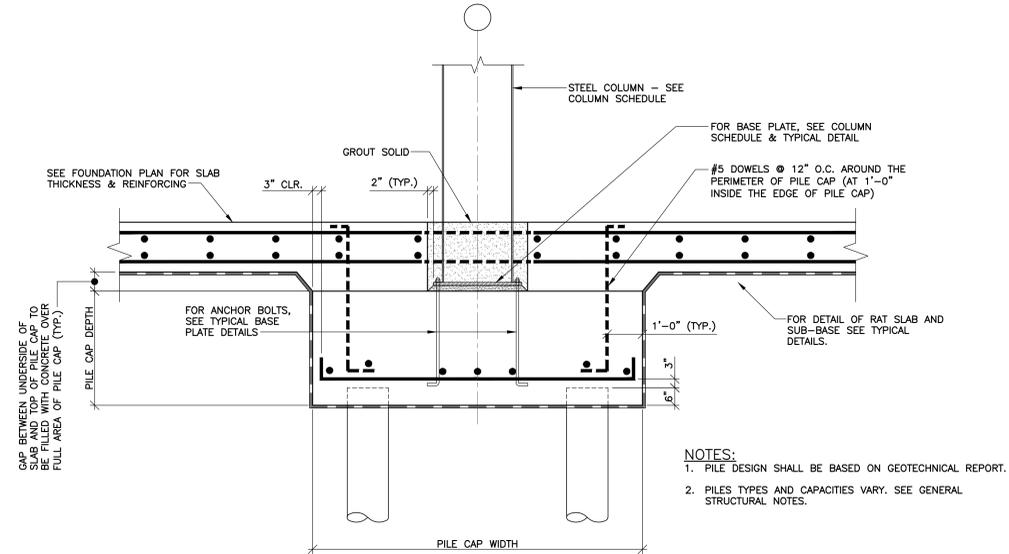
1. SLAB THICKNESS 't' = 5" UNLESS OTHERWISE NOTED ON PLANS.
2. W.W.F. REINFORCEMENT: SEE TABLE.
3. BASE = 3" LAYER OF PROCESSED AGGREGATE, SIZE NO. 10 PER ASTM D448. (SAND OF UNIFORM PARTICLE SIZE OR CONCRETE FINE AGGREGATE IS NOT ACCEPTABLE).
4. WATERPROOFING MEMBRANE: 10 MILS THICK POLYETHYLENE.
5. SUBBASE: 6" LAYER OVER SOIL, 5" MIN. OVER ROCK SUBGRADE, COMPACTABLE GRANULAR FILL, COVER ROUGH FILL WITH 1/2" OF BASE AGGREGATE AND COMPACT IT ONTO SUBBASE.
6. SUBGRADE: COMPACTED FILL, BACKFILL OR UNDISTURBED SOIL, OR LEVELED ROCK SURFACE.

SLAB 't'	SLAB REINFORCEMENT (UNLESS OTHERWISE NOTED) W.W.F.
5"	6 x 6 – W2.9 x W2.9
6"-7"	6 x 6 – W2.9 x W2.9
8"-9"	6 x 6 – W4.0 x W4.0
10" OR MORE	REBAR PER DRAWINGS

1 TYPICAL DETAIL – SLAB ON GROUND
FO-201 SCALE: N.T.S.



2 SLAB ON GROUND DETAILS
FO-201 SCALE: 1/2"=1'-0"

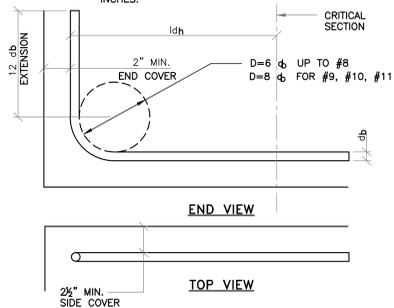


3 TYPICAL PRESSURE SLAB TO PILE CAP CONNECTION DETAIL (FOR STEEL COLUMN)
FO-201 SCALE: 1/2"=1'-0"

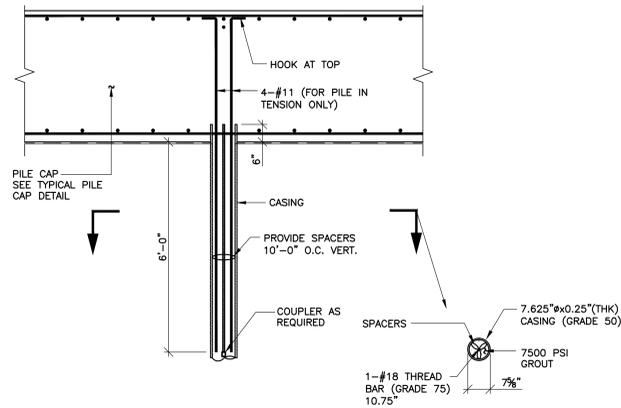
TABLE #2
TENSION DEVELOPMENT LENGTHS FOR STANDARD END HOOKS (ldh)
(LENGTHS IN INCHES)

BAR SIZE	CONCRETE STRENGTH (PSI)		
	3,000	4,000	5,000
#3	9	7	7
#4	11	10	9
#5	14	12	11
#6	17	15	13
#7	19	17	15
#8	22	19	17
#9	25	22	19
#10	28	24	22
#11	31	27	24
#14	37	32	29
#18	50	43	39

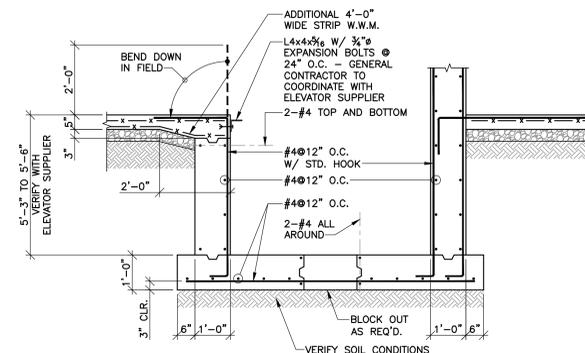
- NOTES:**
1. TABLE 2 CONFORMS TO ACI-318-2002 (AND 2005). TABULATED VALUES ARE BASED UPON ACI 12.5.2, ASSUMING GRADE 60 REINFORCEMENT AND NORMAL WEIGHT CONCRETE.
 2. PER ACI 12.5.3, FOR #11 AND SMALLER BARS, IF COVER TO BAR IS 2 1/2" INCHES OR MORE, AND FOR 90 DEGREE HOOK WITH COVER ON BAR EXTENSION BEYOND HOOK NOT LESS THAN 2 INCHES, A MODIFICATION FACTOR OF 0.7 MAY BE APPLIED. MINIMUM ldh SHALL NOT BE LESS THAN 8db NOR 6 INCHES.



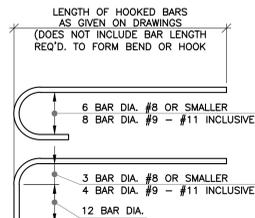
4 TABLE FOR TENSION DEVELOPMENT LENGTHS FOR STANDARD END HOOKS (ldh)
FO-201 SCALE: 3/4"=1'-0"



5 TYPICAL DRILLED MINI PILE DETAIL
FO-201 SCALE: 1/2"=1'-0"



6 SECTION THRU ELEVATOR PIT
FO-201 SCALE: 1/2"=1'-0"

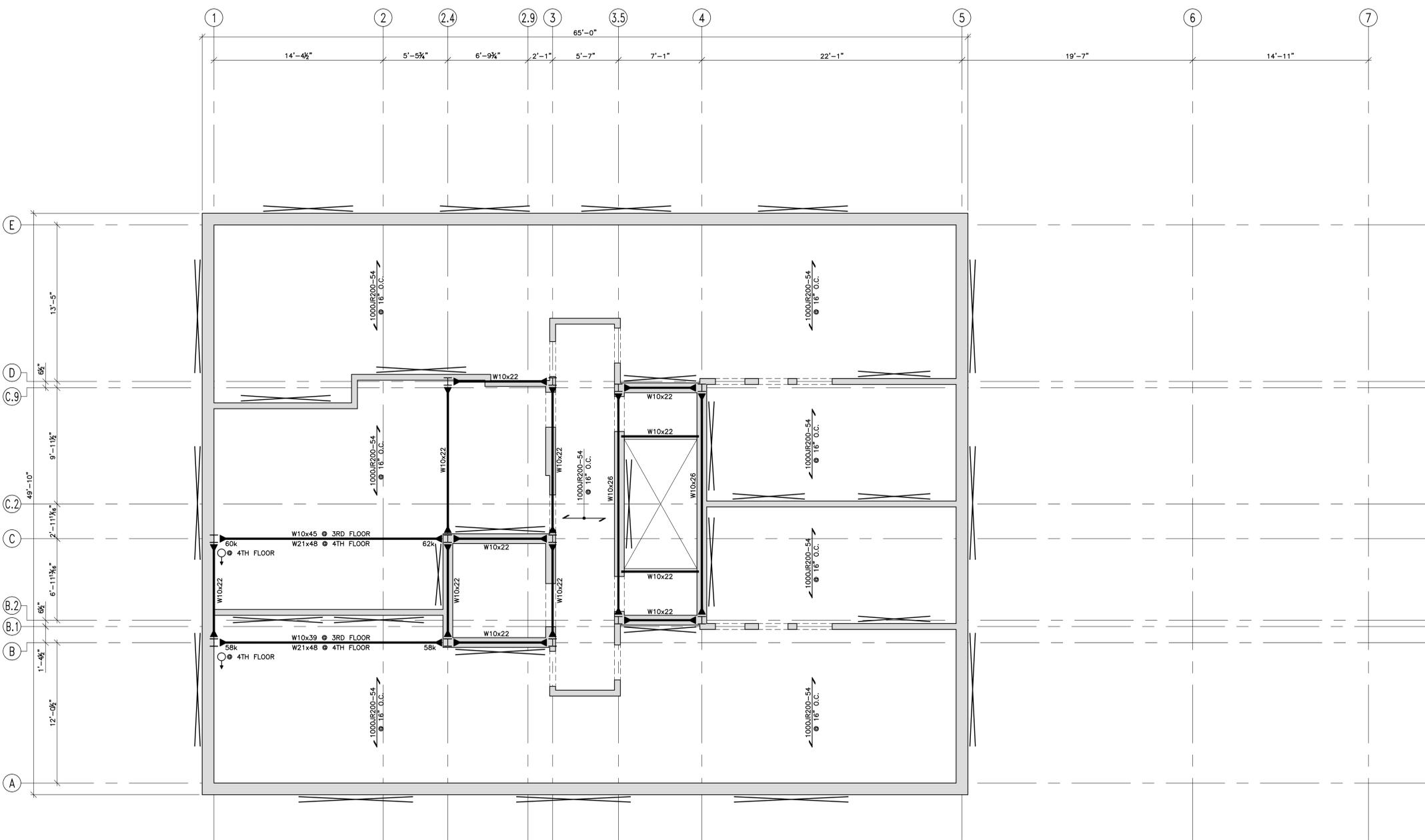


7 TYPICAL HOOK DETAILS
FO-201 SCALE: 3/4"=1'-0"

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET BROOKLYN, NY 11222
DRAWING
FOUNDATION TYPICAL DETAILS 2

SEAL AND SIGNATURE	DATE: 09/11/2015
	PROJECT NO.: 1683.00
	DRAWING BY: PDC
	CHK BY: KS
	DWG NO:
	FO-201.00
	CAD FILE NO: OF XX



3RD & 4TH FLOOR FRAMING PLAN
SCALE: 1/4"=1'-0"

- NOTES:**
- FOR GENERAL NOTES AND DESIGN CRITERIA, REFER TO DRAWING S-001.
 - WORK THIS DRAWING WITH DRAWINGS S-100 THRU S-104 AND S-600 THRU S-602.
 - TOP OF STEEL ELEVATION = (EL.) UNLESS OTHERWISE NOTED.
3RD FLOOR = EL.
4TH FLOOR = EL.
 - SEE S-500 SERIES DRAWINGS FOR COLUMN SCHEDULE.
 - SEE S-600 SERIES DRAWINGS FOR TYPICAL CONCRETE DETAILS.
 - SEE S-610 SERIES DRAWINGS FOR TYPICAL STEEL DETAILS.
 - SEE S-620 SERIES DRAWINGS FOR TYPICAL LIGHT GAUGE FRAMING DETAILS.
 - ← → INDICATES DIRECTION OF JOIST SPAN. DIRECTION OF 1/2" x 22 GA. GALV. METAL ROOF DECK TO BE PERPENDICULAR TO JOIST SPAN DIRECTION.
 - |— INDICATES LATERAL MOMENT FRAME.
 - ○ DENOTES COLUMN GOING UP OR DOWN.
 - ALL COLUMNS SHALL BE BRACED IN BOTH DIRECTIONS AT FLOOR LEVEL BY EITHER STEEL BEAMS OR METAL STUD FLOOR/WALL FRAMING.
 - TYPICAL BEARING WALL CONSTRUCTION TO BE 6/12 STUDS AT 16" O.C. FOR 6" WALLS UNLESS OTHERWISE NOTED (U.O.N.).
 - COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL & MEP DRAWINGS.
 - PROVIDE ADDITIONAL FILLER STUDS AS REQUIRED TO MAINTAIN 2" MAXIMUM SPACE BETWEEN FACE-OF-METAL STUD TO FACE-OF-BRICK.
 - (H2-#) INDICATES BUILT-UP HEADER AT ROUGH DOOR & WINDOW OPENINGS.
H2-2: (2) 10SW16 BOX HEADER
H2-3: (2) 10SW14 BOX HEADER
 - X-BRACING - DENOTES STRAP BRACING SEE DRAWING S-XXX

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET BROOKLYN, NY 11222
DRAWING
3RD & 4TH FLOOR FRAMING PLAN

SEAL AND SIGNATURE	DATE: 09/11/2015
	PROJECT NO: 1683.00
	DRAWING BY: PDC
	CHEK BY: IS
	DWG NO: S-103.00
CAD FILE NO:	OF XX

- PRIOR TO START OF STRUCTURAL WORK:**
- CONTRACTOR SHALL CHECK FOR LATEST PROJECT BULLETINS AND ADDENDA.
 - CONTRACTOR SHALL CONFIRM THAT ALL SUBCONTRACTORS ARE USING THE LATEST STRUCTURAL DRAWINGS.
 - CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS RELATED TO NEW WORK AND PROVIDE FIELD DIMENSIONS.
 - CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO MATERIAL ORDERING AND FABRICATION.

**09-11-2015
COORDINATION SET**

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE
DESIGN DEVELOPMENT

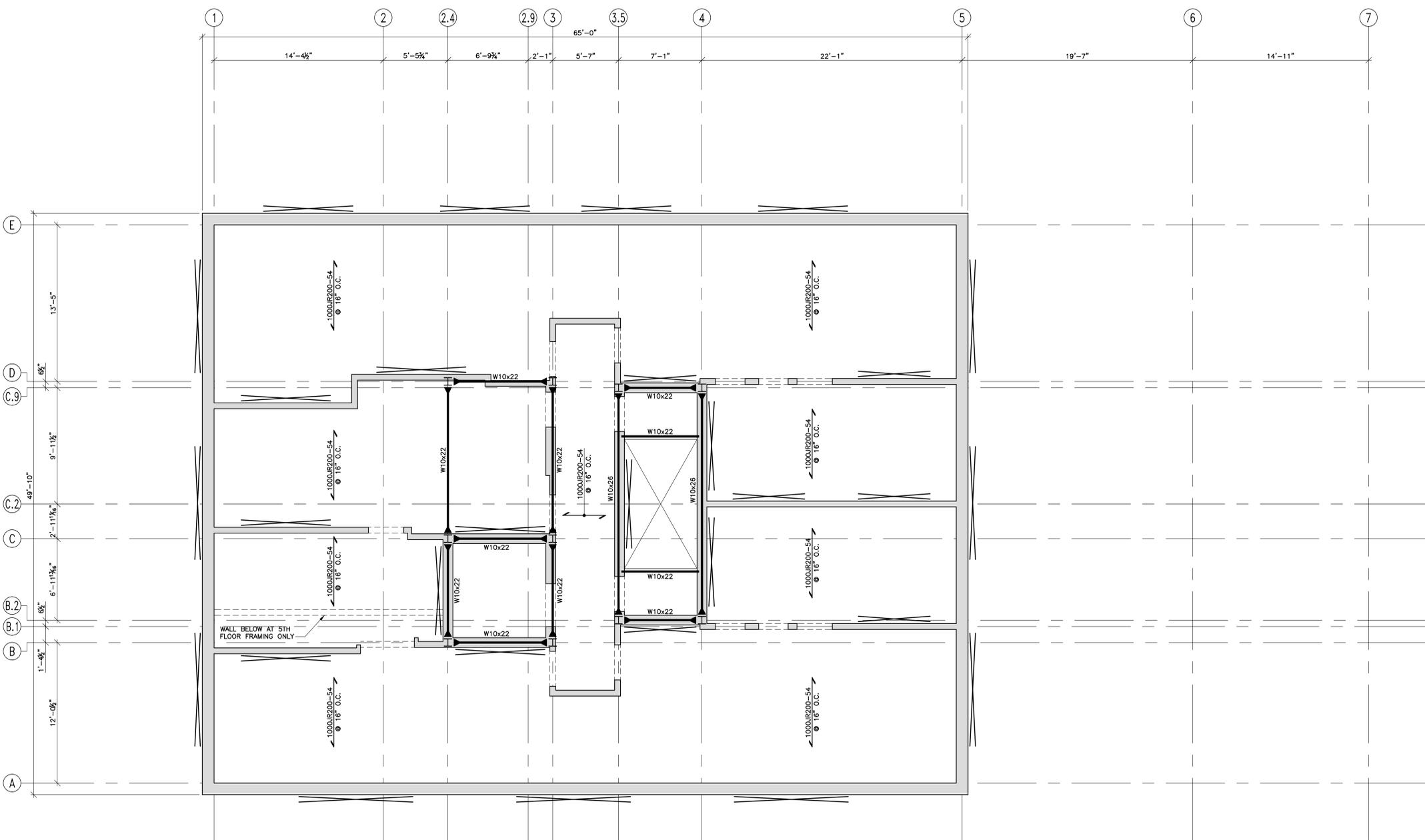
SCALE
AS NOTED

KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
5TH & 6TH FLOOR FRAMING PLAN

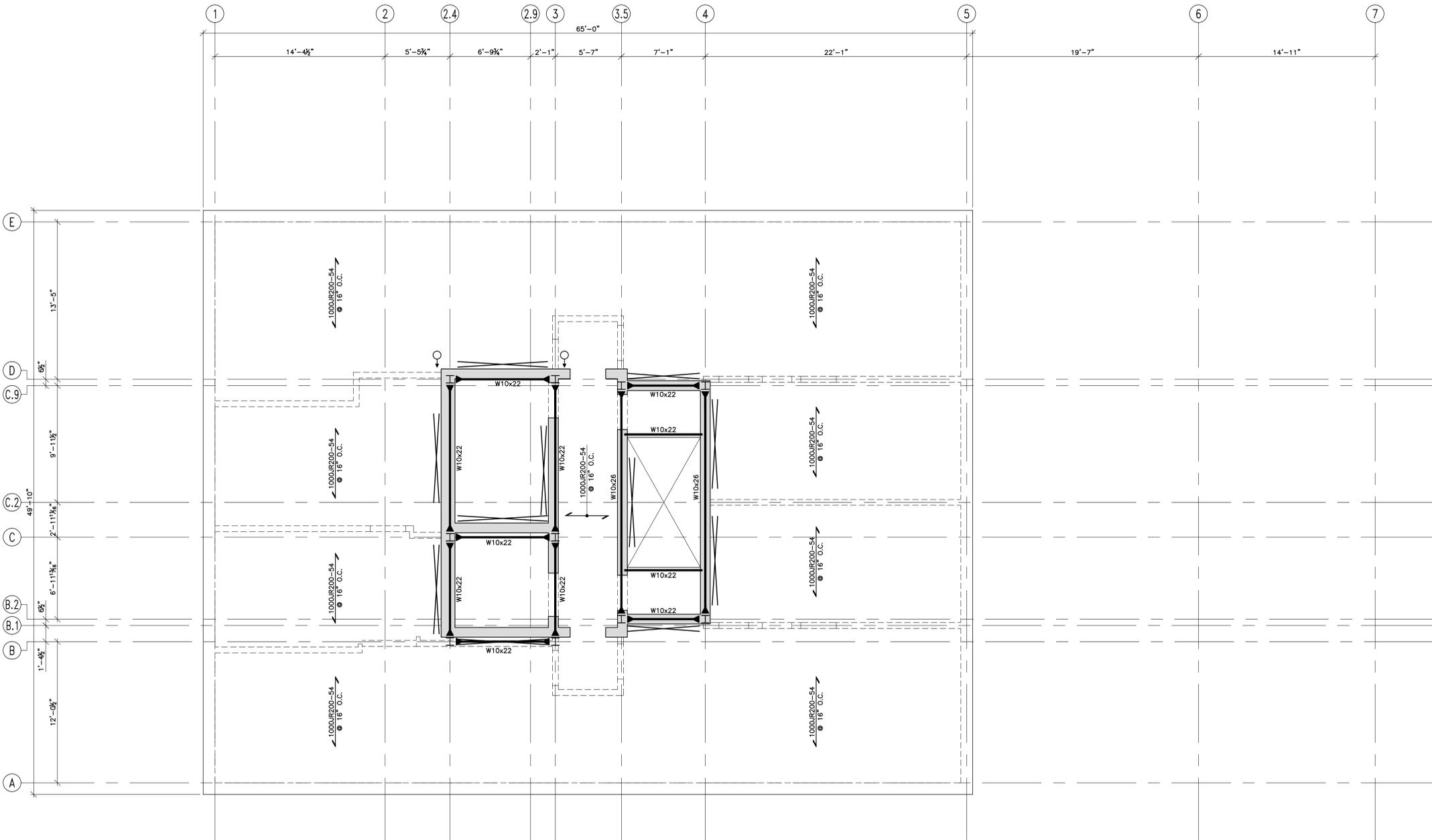
SEAL AND SIGNATURE _____ DATE: 09/11/2015
PROJECT NO.: 1683.00
DRAWING BY: PDC
CHK BY: IS
DWG NO.:
S-104.00
CAD FILE NO.: _____ OF XX



5TH & 6TH FLOOR FRAMING PLANS
SCALE: 1/4"=1'-0"

- NOTES:**
- FOR GENERAL NOTES AND DESIGN CRITERIA, REFER TO DRAWING S-001.
 - WORK THIS DRAWING WITH DRAWINGS S-100 THRU S-104 AND S-600 THRU S-602.
 - TOP OF STEEL ELEVATION = (EL.) UNLESS OTHERWISE NOTED.
5TH FLOOR = EL.
6TH FLOOR = EL.
 - SEE S-500 SERIES DRAWINGS FOR COLUMN SCHEDULE.
 - SEE S-600 SERIES DRAWINGS FOR TYPICAL CONCRETE DETAILS.
 - SEE S-610 SERIES DRAWINGS FOR TYPICAL STEEL DETAILS.
 - SEE S-620 SERIES DRAWINGS FOR TYPICAL LIGHT GAUGE FRAMING DETAILS.
 - INDICATES DIRECTION OF JOIST SPAN. DIRECTION OF $\frac{1}{2}'' \times 32$ GA. CALV. METAL ROOF DECK TO BE PERPENDICULAR TO JOIST SPAN DIRECTION.
 - INDICATES LATERAL MOMENT FRAME.
 - DENOTES COLUMN GOING UP OR DOWN.
 - ALL COLUMNS SHALL BE BRACED IN BOTH DIRECTIONS AT FLOOR LEVEL BY EITHER STEEL BEAMS OR METAL STUD FLOOR/WALL FRAMING.
 - TYPICAL BEARING WALL CONSTRUCTION TO BE 6/12 STUDS AT 16" O.C. FOR 6" WALLS UNLESS OTHERWISE NOTED (U.O.N.).
 - COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL & MEP DRAWINGS.
 - PROVIDE ADDITIONAL FILLER STUDS AS REQUIRED TO MAINTAIN 2" MAXIMUM SPACE BETWEEN FACE-OF-METAL STUD TO FACE-OF-BRICK.
 - (H2-#) INDICATES BUILT-UP HEADER AT ROUGH DOOR & WINDOW OPENINGS.
H2-2: (2) 10SW16 BOX HEADER
H2-3: (2) 10SW14 BOX HEADER
 - X-BRACING - DENOTES STRAP BRACING. SEE DRAWING S-XXX.

- PRIOR TO START OF STRUCTURAL WORK:**
- CONTRACTOR SHALL CHECK FOR LATEST PROJECT BULLETINS AND ADDENDA.
 - CONTRACTOR SHALL CONFIRM THAT ALL SUBCONTRACTORS ARE USING THE LATEST STRUCTURAL DRAWINGS.
 - CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS RELATED TO NEW WORK AND PROVIDE FIELD DIMENSIONS.
 - CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO MATERIAL ORDERING AND FABRICATION.



ROOF FRAMING PLAN
SCALE: 1/4"=1'-0"

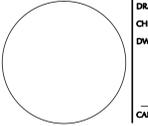
- NOTES:**
- FOR GENERAL NOTES AND DESIGN CRITERIA, REFER TO DRAWING S-001.
 - WORK THIS DRAWING WITH DRAWINGS S-100 THRU S-104 AND S-600 THRU S-602.
 - TOP OF STEEL ELEVATION = (EL. 69'-10") UNLESS OTHERWISE NOTED.
 - SEE S-500 SERIES DRAWINGS FOR COLUMN SCHEDULE.
 - SEE S-600 SERIES DRAWINGS FOR TYPICAL CONCRETE DETAILS.
 - SEE S-610 SERIES DRAWINGS FOR TYPICAL STEEL DETAILS.
 - SEE S-620 SERIES DRAWINGS FOR TYPICAL LIGHT GAUGE FRAMING DETAILS.
 - ↔ INDICATES DIRECTION OF JOIST SPAN. DIRECTION OF 1/2" x 22 GA. GALV. METAL ROOF DECK TO BE PERPENDICULAR TO JOIST SPAN DIRECTION.
 - ◀▶ INDICATES LATERAL MOMENT FRAME.
 - DENOTES COLUMN GOING UP OR DOWN.
 - ALL COLUMNS SHALL BE BRACED IN BOTH DIRECTIONS AT FLOOR LEVEL BY EITHER STEEL BEAMS OR METAL STUD FLOOR/WALL FRAMING.
 - TYPICAL BEARING WALL CONSTRUCTION TO BE 6J12 STUDS AT 16" O.C. FOR 6" WALLS UNLESS OTHERWISE NOTED (U.O.N.).
 - COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL & MEP DRAWINGS.
 - PROVIDE ADDITIONAL FILLER STUDS AS REQUIRED TO MAINTAIN 2" MAXIMUM SPACE BETWEEN FACE-OF-METAL STUD TO FACE-OF-BRICK.
 - (H2-#) INDICATES BUILT-UP HEADER AT ROUGH DOOR & WINDOW OPENINGS.
H2-2: (2) 10SW16 BOX HEADER
H2-3: (2) 10SW14 BOX HEADER
 - X-BRACING - DENOTES STRAP BRACING. SEE DRAWING S-XXX.

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET BROOKLYN, NY 11222
DRAWING
ROOF FRAMING PLAN

SEAL AND SIGNATURE	DATE: 09/11/2015
	PROJECT NO.: 1683.00
	DRAWING BY: PDC
	CHEK BY: IS
	DWG NO.: S-107.00
CAD FILE NO.	OF XX

- PRIOR TO START OF STRUCTURAL WORK:**
- CONTRACTOR SHALL CHECK FOR LATEST PROJECT BULLETINS AND ADDENDA.
 - CONTRACTOR SHALL CONFIRM THAT ALL SUBCONTRACTORS ARE USING THE LATEST STRUCTURAL DRAWINGS.
 - CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS RELATED TO NEW WORK AND PROVIDE FIELD DIMENSIONS.
 - CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL, PRIOR TO MATERIAL ORDERING AND FABRICATION.

**09-11-2015
COORDINATION SET**

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE

DESIGN DEVELOPMENT

SCALE

AS NOTED

KEY PLAN

PROJECT

144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING

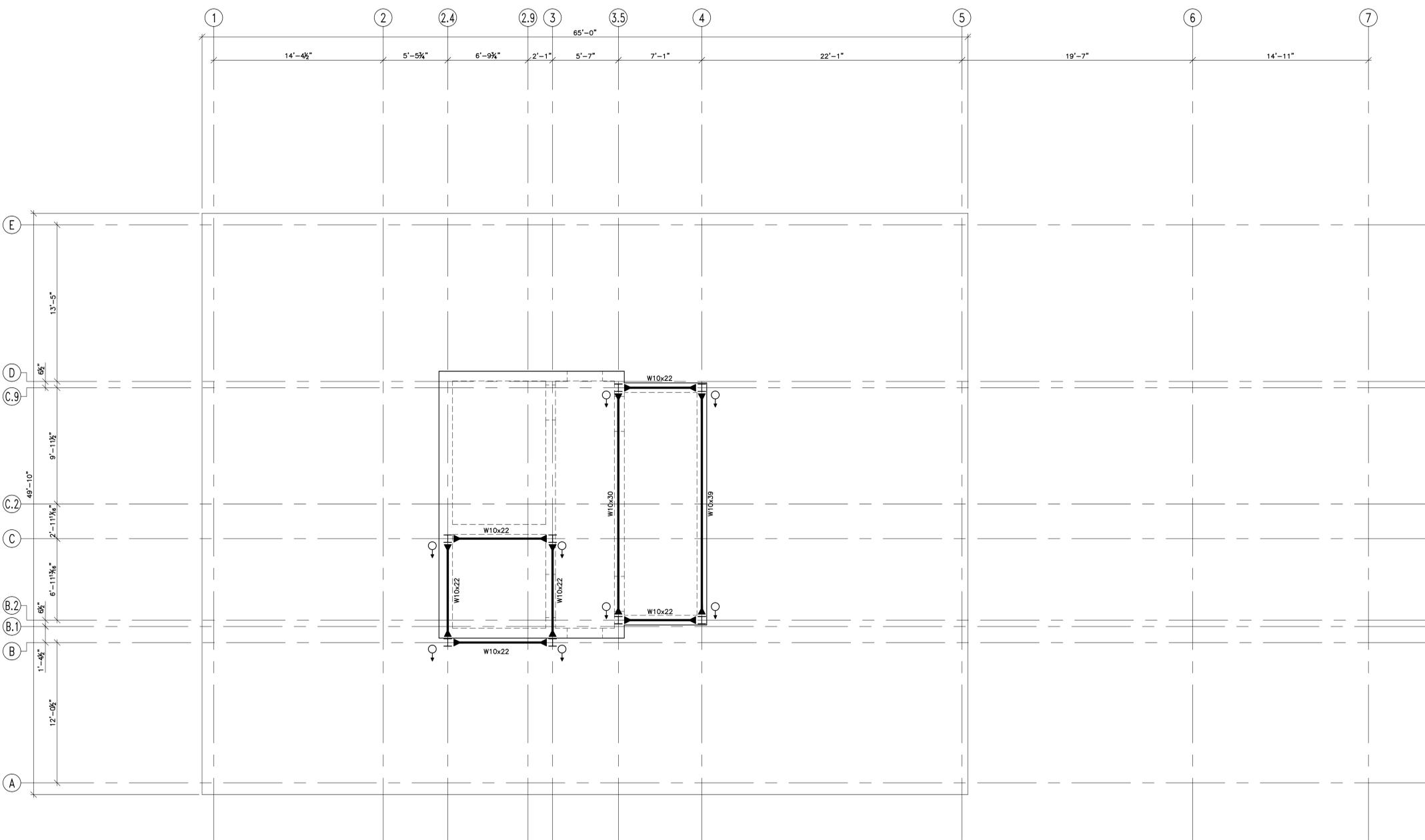
BULKHEAD FRAMING PLAN

SEAL AND SIGNATURE

DATE: 09/11/2015
PROJECT NO.: 1683.00
DRAWING BY: JDC
CHK BY: JS
DWG NO.:
S-108.00
CAD FILE NO.: OF XX

PRIOR TO START OF STRUCTURAL WORK:

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BULKHEAD FRAMING PLAN
SCALE: 1/4"=1'-0"

- NOTES:**
- FOR GENERAL NOTES AND DESIGN CRITERIA, REFER TO DRAWING S-001.
 - WORK THIS DRAWING WITH DRAWINGS S-100 THRU S-104 AND S-600 THRU S-602.
 - TOP OF STEEL ELEVATION = (EL.) UNLESS OTHERWISE NOTED.
 - SEE S-500 SERIES DRAWINGS FOR COLUMN SCHEDULE.
 - SEE S-600 SERIES DRAWINGS FOR TYPICAL CONCRETE DETAILS.
 - SEE S-610 SERIES DRAWINGS FOR TYPICAL STEEL DETAILS.
 - SEE S-620 SERIES DRAWINGS FOR TYPICAL LIGHT GAUGE FRAMING DETAILS.
 - INDICATES DIRECTION OF JOIST SPAN. DIRECTION OF 1 1/2" x 22 GA. GALV. METAL ROOF DECK TO BE PERPENDICULAR TO JOIST SPAN DIRECTION.
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 - X-BRACING - DENOTES STRAP BRACING. SEE DRAWING S-XXX.

**09-11-2015
COORDINATION SET**

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222
DRAWING
COLUMN SCHEDULE

SEAL AND SIGNATURE
DATE: 09/11/2015
PROJECT NO.: 1683.00
DRAWING BY: PDC
CHK BY: JS
DWG NO.:
S-500.00
CAD FILE NO.: OF XX

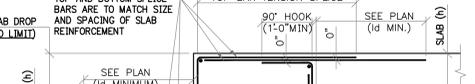
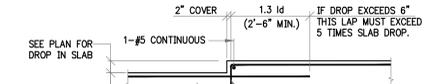
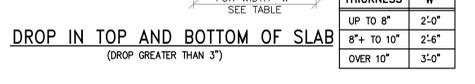
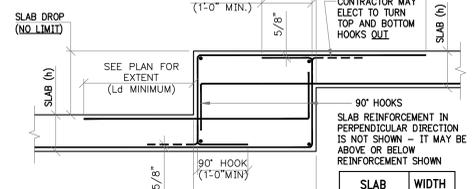
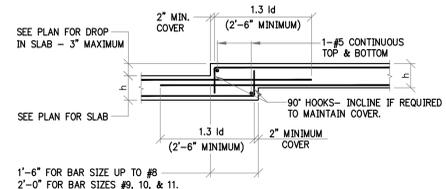
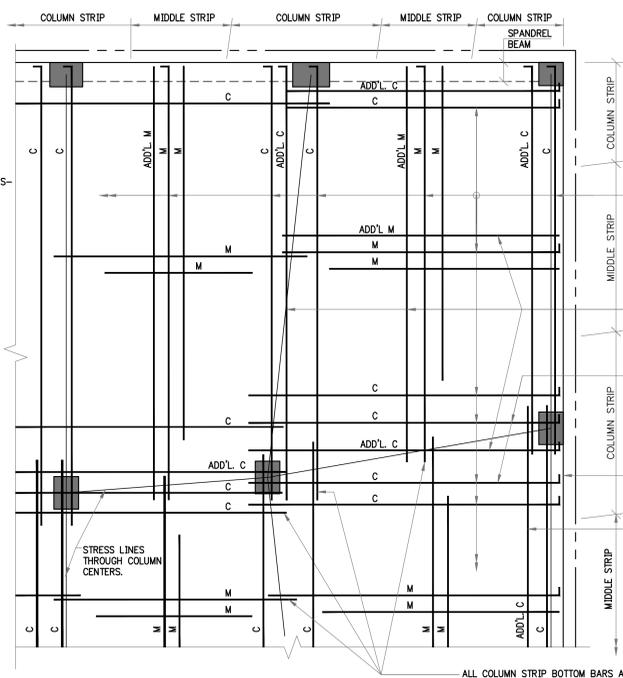
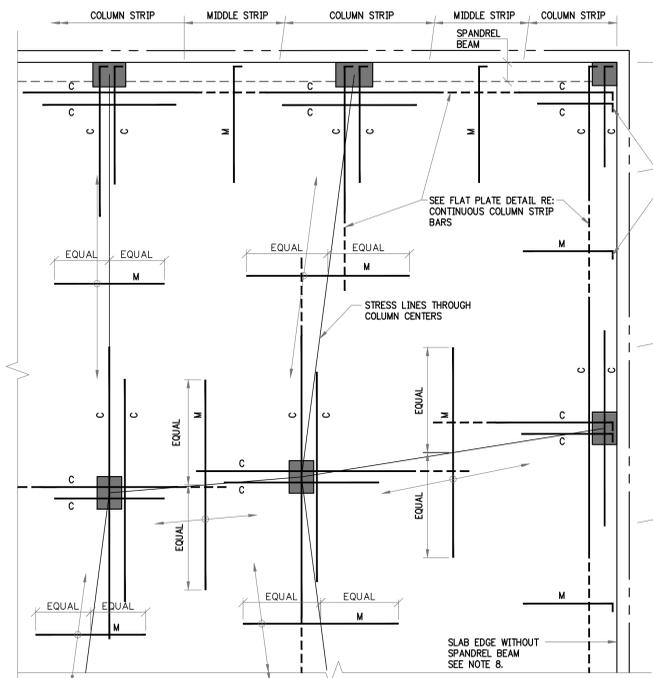
COLUMN SCHEDULE

FLOOR	COLUMN NO.																																				
	1	2	2.9	A			B			B.1		B.2		C			C.2		C.9		D			E													
BULKHEAD																																					
ROOF																																					
6TH FLOOR																																					
5TH FLOOR																																					
4TH FLOOR																																					
3RD FLOOR																																					
2ND FLOOR																																					
GROUND FLOOR																																					
BASE PLATE TYPE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									
PIER / BUTTRESS																																					
SERVICE LOADS (KIPS)	70	90	95	130	110	40	20	100	90	55	135	55	40	80	120	120	100	60	90	120	80	120	100	120	100	140	60	40	85	115	110	130	120	40	20		
T-THICKNESS																																					
PIER / BUTTRESS																																					
BASE PLATE TYPE																																					
FLOOR																																					
COLUMN NO.	1	2	2.9	A			B			B.1		B.2		C			C.2		C.9		D			E													

LEGEND:
 BOTTOM OF COLUMN (B) WALL BUTTRESS
 COLUMN SPLICE (P) FOOTING PIER
 INDICATES COLUMN BEING PICKED UP

NOTES:
1. ALL LOADS SHOWN ARE SERVICE LOADS.
2. ALL SPLICES SHALL BE 4'-0" ABOVE FINISHED FLOOR U.O.N.
3. FOR TYPICAL STEEL DETAILS SEE DRAWING S-600 SERIES.
4. PIER & BUTTRESS SIZES SHOWN ARE EAST/WEST x NORTH/SOUTH.
5. +SL IN SCHEDULE INDICATES SHEAR LUGS BENEATH COLUMN BASE PLATES (WxLxT)

BASE PLATE TYPE ANCHOR BOLT SCHEDULE		
TYPE	ANCHOR BOLTS	REMARKS
1.	4 - 1 1/2"	EMBEDDED ANCHORS



NOTES FOR TOP REINFORCEMENT

- 'C' DENOTES COLUMN STRIP BARS (LONG AND SHORT BARS ARE ALTERNATED), 'M' DENOTES MIDDLE STRIP BARS.
- FOR SIZE, SPACING, NUMBER, ETC. OF REINFORCING BARS, SEE FRAMING PLANS.
- WHERE COLUMN STRIP BAR LENGTHS ARE SHOWN ON FRAMING PLANS THEY ARE FOR LONGER BARS, WHICH ARE TO BE ALTERNATED WITH SHORTER BARS. SEE TYPICAL FLAT PLATE DETAIL.
- COLUMN STRIP BARS ARE TO BE CENTERED OVER COLUMNS UNLESS OTHERWISE INDICATED ON PLANS.
- MIDDLE STRIP BARS ARE TO BE CENTERED OVER STRESS LINES UNLESS OTHERWISE INDICATED ON PLANS.
- MIDDLE STRIP BARS ARE TO BE SPACED AS SHOWN ON PLANS. FIRST BAR IS TO BE LOCATED A DISTANCE FROM LAST COLUMN STRIP BAR NOT TO EXCEED MIDDLE STRIP BAR SPACING.
- COLUMN STRIP BARS PARALLEL TO SPANDREL BEAMS ARE TO HAVE FIRST BAR LOCATED AT ONE-HALF SCHEDULED SPACING FROM INSIDE FACE OF BEAM, SIX INCHES MAXIMUM.
- AT SLAB EDGES WITHOUT SPANDREL BEAMS, SEE TYPICAL DETAIL FOR ADDITIONAL CONTINUOUS EDGE BARS AND FOR COLUMN STRIP BAR PLACEMENT PARALLEL TO SLAB EDGE. PROVIDE 90 DEGREE HOOK AT EVERY DISCONTINUOUS TOP BAR, COLUMN AND MIDDLE STRIPS, AT EDGE OF SLAB, WITH OR WITHOUT SPANDREL BEAMS (2" CLEAR COVER TO HOOK).

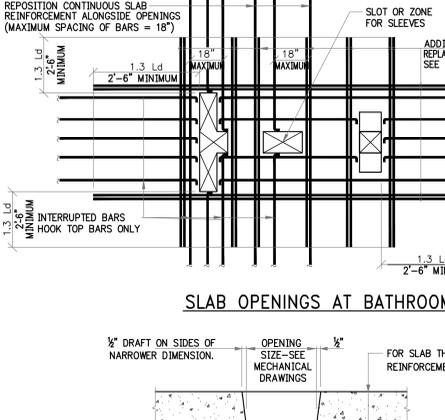
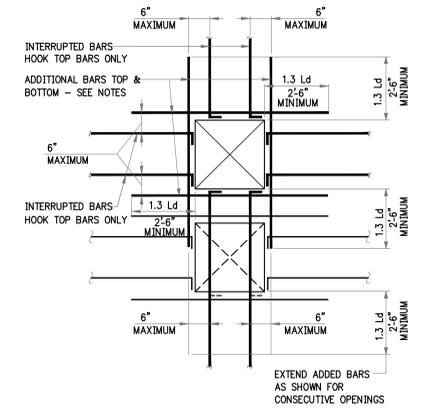
NOTES FOR BOTTOM REINFORCEMENT

- 'C' DENOTES A COLUMN STRIP BAR, PART OF MAIN GRID. 'ADD'L C' DENOTES COLUMN STRIP BARS ADDITIONAL TO MAIN GRID BARS. 'M' DENOTES A MIDDLE STRIP BAR, PART OF MAIN GRID. 'ADD'L M' DENOTES MIDDLE STRIP BARS ADDITIONAL TO MAIN GRID BARS. IN COLUMN STRIPS GROUP ABOUT STRESS LINE, IN MIDDLE STRIPS DISTRIBUTE THROUGHOUT STRIP.
- ALL COLUMN STRIP BOTTOM BARS ARE TO BE HOOKED 90° AT EDGES OF SLAB OR AT SLAB OPENINGS, OR AT OTHER DISCONTINUITIES.
- MIDDLE STRIP BOTTOM BARS ARE TO EXTEND TO EDGE OF SLAB WHERE 50% OF BARS ARE TO BE HOOKED.
- IN EDGE STRIP WITHOUT SPANDREL BEAMS START ADDITIONAL BARS TWO INCHES FROM CONTINUOUS EDGE BARS - SEE TYPICAL DETAIL AT EDGE OF SLAB.

BAR LENGTH EXTENSIONS REQUIRED AT EPOXY COATED REINFORCEMENT (WHERE SPECIFIED ON PLANS)

- TO REINFORCING BAR LENGTHS SHOWN ON PLAN OR AS DETERMINED FROM TYPICAL DETAILS, ADD AN ADDITIONAL LENGTH AT EACH END (EXCEPT AT HOOKED BARS) EQUAL TO 50% OF 'Ld', BAR DEVELOPMENT LENGTH FOR SLABS. SEE TABLE.
- DEVELOPMENT LENGTHS 'Ld' AND LAP SPlice LENGTHS SHOWN ARE TO BE INCREASED BY 50% OVER VALUES FOR UNCOATED BARS.

1 FLAT SLAB REINFORCEMENT DETAILS
SCALE: 3/4"=1'-0"



3 ADDED REINFORCEMENT AT OPENINGS IN FLOOR SLAB
SCALE: 3/4"=1'-0"

SLAB OPENINGS AT BATHROOM

NOTES:

- ADDITIONAL BARS EQUAL IN AREA TO AREA OF REINFORCEMENT INTERRUPTED BY OPENING(S) SHALL BE PLACED ALONGSIDE OPENING(S), ONE HALF ON EACH SIDE (#5 MINIMUM DIAMETER), TOP AND BOTTOM.
- ADD 1-#5 TOP AND BOTTOM EACH SIDE OF OPENING, ADDITIONAL TO REPLACEMENT BARS.
- WHERE OPENINGS ARE NEAR OR AGAINST EXTERIOR BEAMS OR COLUMNS AND ADDED REINFORCEMENT CAN NOT BE EXTENDED AS SHOWN, HOOK EXTERIOR END.
- AT OPENINGS SMALLER THAN THE SLAB THICKNESS (10" MAXIMUM), NO ADDITIONAL REINFORCEMENT IS REQUIRED, PLACE NORMAL REINFORCEMENT ALONGSIDE OPENING.
- Ld = TENSION DEVELOPMENT LENGTH, SEE TABLES.

NOTES:

- FOR LOCATIONS AND DIMENSIONS OF PLUMBING OPENINGS SEE MECHANICAL AND/OR ARCHITECTURAL DRAWINGS.
- FILL ALL OPENINGS WITH CONCRETE AFTER PIPING HAS BEEN INSTALLED.
- FOR SLAB REINFORCEMENT DETAILS ALONGSIDE OPENINGS SEE DETAIL OF "ADDED REINFORCEMENT AT OPENINGS IN FLOOR SLAB".
- MINIMUM REQUIREMENTS ARE SHOWN IN THESE DETAILS. SEE PLAN FOR ADDITIONAL REQUIREMENTS.

3 PLUMBING OPENING (SLOT) IN SLAB
SCALE: 3/4"=1'-0"

TABLE #4
COMPRESSION LAP SPICES (LENGTHS IN INCHES)

BAR SIZE	GRADE OF REINFORCEMENT		
	60 KSI (30 DIA.)	75 KSI (44 DIA.)	80 KSI (48 DIA.)
#3	12	17	18
#4	15	22	24
#5	19	28	30
#6	23	33	36
#7	27	39	42
#8	30	44	48
#9	34	50	54
#10	38	56	61
#11	43	62	68

NOTES:

- LAP SPICES ARE NOT PERMITTED, USE MECHANICAL CONNECTIONS OR WELDED SPICES FOR #14 AND #18, PER ACI 318 (12.14.3).
- LAP SPICES OF #14 AND #18 BARS TO #11 AND SMALLER BARS ARE PERMITTED PER ACI 318 (12.16.2).
- FOR BARS OF DIFFERENT SIZE, USE LARGER OF SPICE LENGTH OF SMALLER BAR (TABLE #3) OR DEVELOPMENT LENGTH OF LARGER BAR (FROM TABLE #4) PER ACI 318 (12.16.2).

TABLE #5
DEVELOPMENT LENGTHS FOR BARS IN COMPRESSION (LENGTHS IN INCHES)

BAR SIZE	fy = 60,000 PSI		fy = 75,000 PSI		fy = 80,000 PSI	
	CONC. f'c (N PSI)					
#3	12	12	12	12	12	12
#4	12	12	14	12	15	13
#5	14	12	17	15	18	15
#6	17	15	21	18	22	19
#7	19	17	24	21	26	22
#8	22	19	28	24	29	25
#9	25	22	31	27	33	28
#10	28	24	34	30	36	31
#11	31	27	38	33	40	34
#14	37	32	46	42	49	44
#18	50	43	61	54	65	56

5 TABLES FOR LAP SPICES AND DEVELOPMENT LENGTHS FOR BARS IN COMPRESSION
SCALE: NTS

TABLE #1:
TENSION LAP SPICE LENGTHS (CLASS B MINIMUM)

TABLE 1.A: 3/4" COVER TO OUTER LAYER BARS
OUTER LAYER LAP LENGTHS (IN INCHES)

f'c	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
#3	16	16	16	16	16	16	16	16
#4	21	20	20	20	20	20	20	20
#5	31	27	24	24	24	24	24	24
#6	43	37	33	30	29	29	29	29
#7	69	60	53	49	45	42	40	38
#8	85	74	66	60	56	52	49	47
#9	103	89	80	73	67	63	59	56
#10	121	105	94	86	79	74	70	66
#11	140	122	109	99	92	86	81	77

TABLE 1.C: 1 1/2" COVER TO OUTER LAYER BARS
OUTER LAYER LAP LENGTHS (IN INCHES)

f'c	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
#3	16	16	16	16	16	16	16	16
#4	20	20	20	20	20	20	20	20
#5	24	24	24	24	24	24	24	24
#6	29	29	29	29	29	29	29	29
#7	42	37	34	34	34	34	34	34
#8	53	46	41	39	39	39	39	39
#9	66	57	51	46	44	44	44	44
#10	79	68	61	56	51	49	49	49
#11	92	80	72	65	60	57	54	54

TABLE 1.B: 3/4" COVER TO OUTER LAYER BARS
INNER LAYER LAP LENGTHS (IN INCHES)

f'c	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
#3	16	16	16	16	16	16	16	16
#4	20	20	20	20	20	20	20	20
#5	24	24	24	24	24	24	24	24
#6	30	29	29	29	29	29	29	29
#7	48	42	38	34	34	34	34	34
#8	61	53	47	43	40	39	39	39
#9	75	65	58	53	49	46	44	44
#10	89	77	69	63	58	55	51	49
#11	104	90	81	74	68	64	60	57

TABLE 1.D: 1 1/2" COVER TO OUTER LAYER BARS
INNER LAYER LAP LENGTHS (IN INCHES)

f'c	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
#3	16	16	16	16	16	16	16	16
#4	20	20	20	20	20	20	20	20
#5	24	24	24	24	24	24	24	24
#6	29	29	29	29	29	29	29	29
#7	37	34	34	34	34	34	34	34
#8	43	39	39	39	39	39	39	39
#9	53	46	44	44	44	44	44	44
#10	64	55	49	49	49	49	49	49
#11	75	65	58	54	54	54	54	54



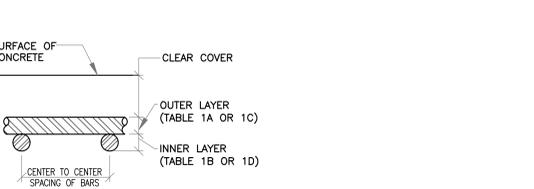
4 TABLES FOR LAP TENSION SPICE LENGTHS
SCALE: NTS

"Ld" SCHEDULE (INCH)

BAR SIZE	LAP CLASS	f'c = 4,000 psi		f'c = 5,000 psi	
		TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	A	11	12	11	12
#3	B	12	13	12	13
#4	A	14	14	14	14
#4	B	15	15	15	15
#5	A	19	19	19	19
#5	B	20	20	20	20
#6	A	25	25	25	25
#6	B	26	26	26	26
#7	A	31	31	31	31
#7	B	32	32	32	32
#8	A	37	37	37	37
#8	B	38	38	38	38
#9	A	43	43	43	43
#9	B	44	44	44	44
#10	A	49	49	49	49
#10	B	50	50	50	50
#11	A	55	55	55	55
#11	B	56	56	56	56

NOTES FOR TENSION LAP SPICES

- REINFORCEMENT IS UNCOATED, WITH Fy=60,000 PSI.
- CONCRETE IS NORMAL WEIGHT (144-150#/C.F.).
- FOR "TOP" BAR SPICE LENGTHS ("TOP" IS DEFINED BY ACI 318 AS HAVING MORE THAN 12 INCHES OF FRESH CONCRETE CAST BELOW THE BAR), TABULATED LENGTHS MUST BE MULTIPLIED BY 1.3.
- LENGTHS TABULATED MUST BE MULTIPLIED BY THE FOLLOWING MODIFICATION FACTORS:
 - LIGHTWEIGHT CONCRETE1.3
 - EPOXY-COATED BARS:
 - BARS WITH COVER < 3d, OR WITH CLEAR SPACING < 6d;1.5 FOR BOTTOM & VERTICAL BARS, 1.3 FOR "TOP" BARS *
 - ALL OTHER CONDITIONS1.2
- FOR EPOXY-COATED "TOP" BARS THE MAXIMUM FOR COMBINED FACTORS = 1.7
- WHERE TENSION DEVELOPMENT LENGTH (Ld) IS REQUIRED ON PLANS OR IN DETAILS, SEE TENSION DEVELOPMENT LENGTH TABLES.
- CLASS A LAP SPICE LENGTHS ARE EQUAL TO TENSION DEVELOPMENT LENGTHS. SEE TABLES FOR TENSION DEVELOPMENT LENGTHS (Ld). APPLY APPROPRIATE MODIFICATION FACTORS TO CLASS A SPICE LENGTHS.



5 TABLES FOR LAP TENSION SPICE LENGTHS
SCALE: NTS

STRUCTURAL ELEMENT

STRUCTURAL ELEMENT	CONCRETE COVER	CATEGORY ACCORDING TO SITE-TO-CR BAR SPACING			
		<3d	>3d <4d	>4d <6d	>6d
BEAMS, COLUMNS AND INNER LAYERS OF WALL SLABS	<4d	1	1	1	2
	>4d	1	3	5	6
ALL OTHER	<4d	1	1	2	2
	>4d	1	3	4	4
	>4d	1	3	5	6

NOTES:

- CATEGORIES 1 THROUGH 6 WHICH DEPEND ON THE TYPE OF STRUCTURAL ELEMENT, CONCRETE COVER AND THE CENTER-TO-CENTER SPACING OF THE BARS, ARE DEFINED BASED ON GRADE 60 REINFORCING BARS, CLASS A = 1.0 Ld AND CLASS B = 1.3 Ld (ACI 12.15.1) VALUES OF Ld
- TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.
- EDGE BARS WITH SIDE COVER LESS THAN 2.5d SHALL BE CATEGORY 5 THAN CATEGORY 6.
- FOR LIGHTWEIGHT AGGREGATE, MULTIPLY THE VALUE ABOVE BY 1.3.
- WHERE EPOXY COATED BARS ARE USED, MULTIPLY ALL LAP LENGTHS BY 1.5.
- FOR ALL COMPRESSION SPICES AND ANCHORAGE, "Ld" SHALL BE 2d > 8" FOR DOWELS AND 3d > 12" FOR LAP SPICES, WHERE, d = NOMINAL BAR DIAMETER

3 SLAB OPENING REINFORCEMENT DETAILS
SCALE: 3/4"=1'-0"

3 PLUMBING OPENING (SLOT) IN SLAB
SCALE: 3/4"=1'-0"

5 TABLES FOR LAP SPICES AND DEVELOPMENT LENGTHS FOR BARS IN COMPRESSION
SCALE: NTS

4 TABLES FOR LAP TENSION SPICE LENGTHS
SCALE: NTS

5 TABLES FOR LAP TENSION SPICE LENGTHS
SCALE: NTS

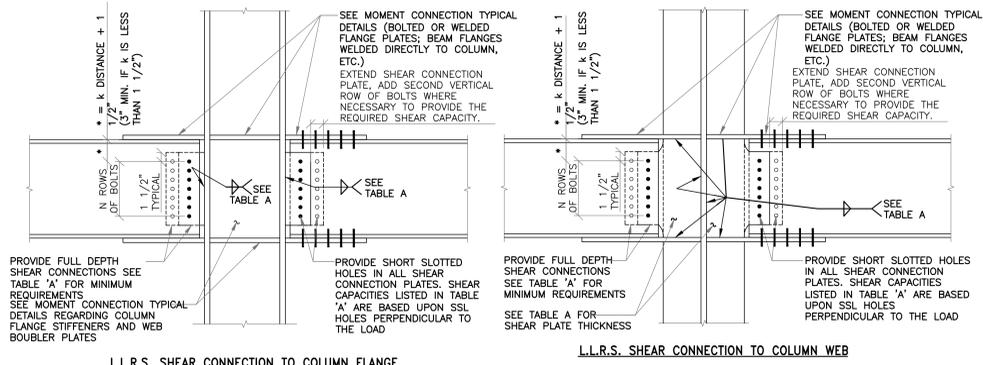
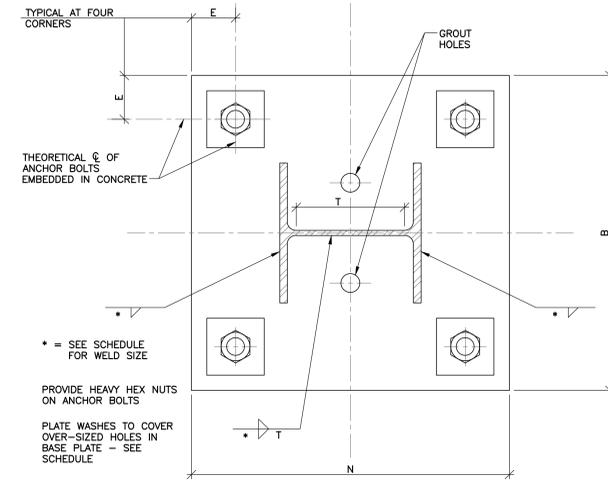


TABLE A
SHEAR CONNECTION REQUIREMENTS FOR TYPE "A" MOMENT CONNECTIONS

— PROVIDE FULL DEPTH SINGLE SHEAR PLATE.
— PROVIDE MINIMUM WELD SIZE TABULATED.
— BOLTS TO BE MINIMUM 7/8" DIAMETER, A325(SC).
— PROVIDE 1 1/2" DIAMETER A490(SC) BOLTS WHERE ACTUAL GIRDER SHEAR EXCEEDS TABULATED CAPACITY.

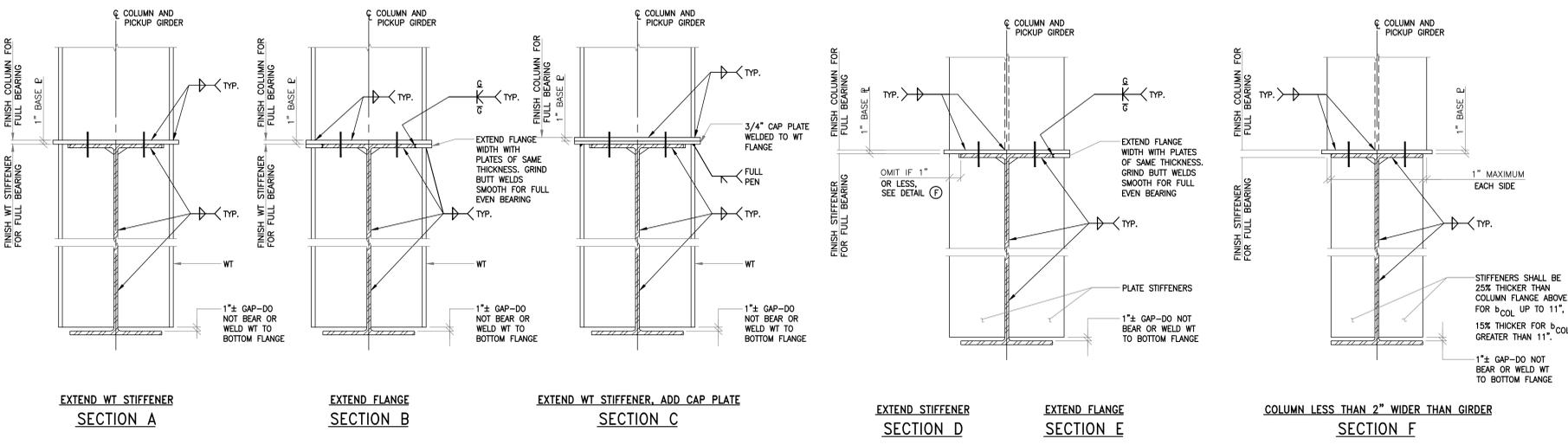
WIND GIRDER DEPTH	NUMBER OF HORIZONTAL ROWS OF BOLTS "N"	MINIMUM SHEAR PLATE THICKNESS		MINIMUM FILLET WELD SIZE (E70XX)	CONNECTION SHEAR CAPACITY (LRFD - KIPS) 7/8" A325
		F _y =50	F _y =36		
W12, W14	3	1/2	5/8	5/16	33
W16	4	1/2	5/8	5/16	44
W18	5	1/2	5/8	5/16	56
W21	6	1/2	5/8	5/16	67
W24	6	1/2	5/8	5/16	67
W27	7	1/2	5/8	5/16	78
W30	8	1/2	5/8	5/16	89
W33	9	1/2	5/8	5/16	100
W36	10	1/2	5/8	5/16	111
W40	11	1/2	5/8	5/16	122
W44	12	1/2	5/8	5/16	133

L.L.R.S. TYPE A SHEAR CONNECTIONS



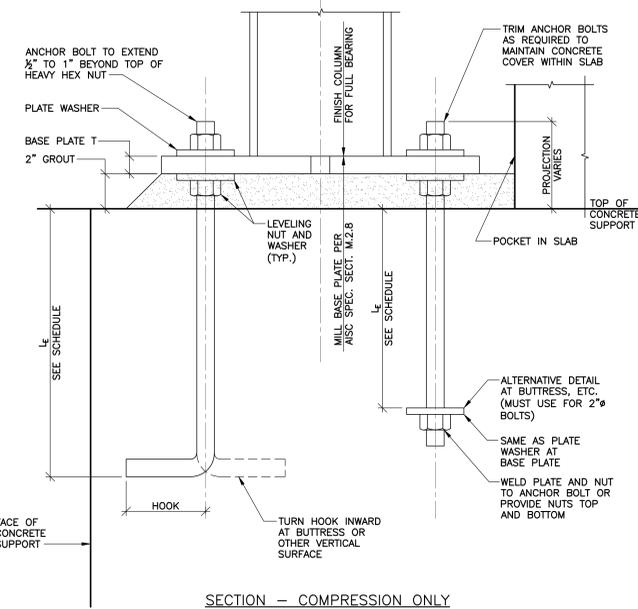
PLAN VIEW OF BASE PLATE AT COLUMN IN COMPRESSION ONLY

NOTE: DO NOT USE THIS DETAIL FOR COLUMNS SUBJECTED TO UPLIFT FORCES OR LARGE BENDING MOMENTS.



2 COLUMN OR POST PICK-UP, SECTIONS A, B & C

3 COLUMN OR POST PICK-UP, SECTIONS D, E & F



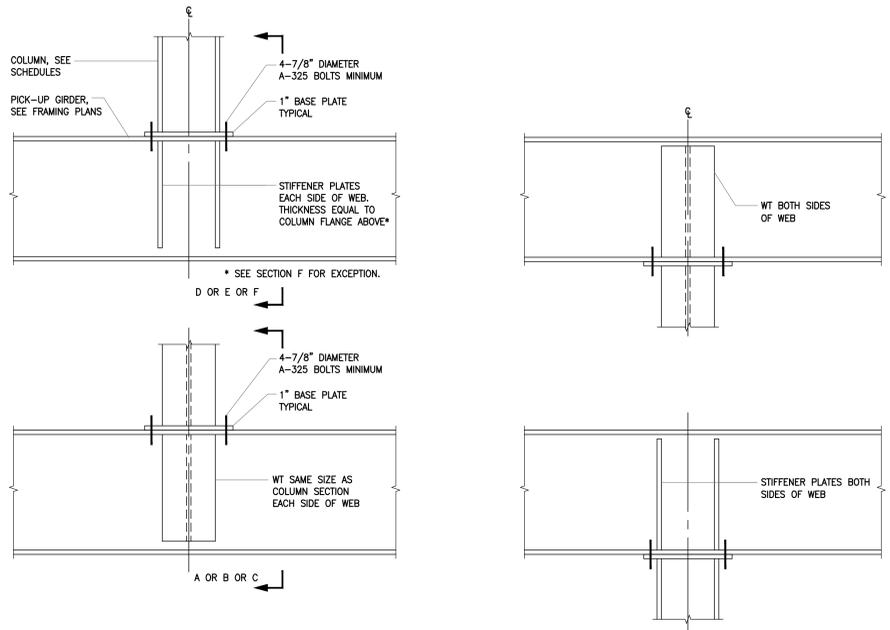
MINIMUM BASE PLATE/ANCHOR BOLT REQUIREMENTS (THIS SCHEDULE FOR COMPRESSION ONLY)

COLUMN SIZES	ALL W10 AND SMALLER SIZES, W12x58 AND LIGHTER W14x82 AND LIGHTER	W12x65 TO MAXIMUM W12 W14x90 TO W14x311	W14x342 TO W14x500	W14x550 TO MAXIMUM W14
* MINIMUM WELD SIZE - COLUMN TO BASE PLATE	5/8	5/8	3/8	1/2
MINIMUM ANCHOR BOLT REQUIREMENT	4 - 1" DIA.	4 - 1 1/4" DIA.	4 - 1 1/2" DIA.	4 - 2" DIA.
HOLE DIAMETER IN BASE PLATE	2"	2 1/4"	2 1/2"	3 1/4"
E = EDGE DISTANCE TO HOLES	2 1/2"	2 3/4"	2 3/4"	3 1/4"
LE = BOLT EMBEDMENT LENGTH	1'-6"	1'-9"	2'-2"	2'-9"
BOLT HOOK DIMENSION OR PLATE REQUIREMENT	5"	6"	8" OR NUT + PLATE	NUT + PLATE
PLATE WASHER	3/8x3 1/2x3 1/2 WITH 1 1/8 HOLE	1/2x3 3/4x3 3/4 WITH 1 3/8 HOLE	1/2x3 3/4x3 3/4 WITH 1 1/2 HOLE	3/4x4 1/2x4 1/2 WITH 2 1/8 HOLE
MINIMUM "N" FOR BOLT + WASHER	d COL. + 10"	d COL. + 11"	d COL. + 11 1/2"	d COL. + 13 1/2"
REMARKS				

NOTES FOR "COMPRESSION ONLY" BASE PLATE DETAILS

- THESE DETAILS ARE NOT TO BE USED WHERE COLUMNS ARE SUBJECTED TO TENSION/UPLIFT FORCES OR WHERE LARGE COLUMN BASE MOMENTS INDUCE TENSION IN ANCHOR BOLTS. FOR THOSE CASES SEE TENSION/MOMENT BASE DETAILS.
- ANCHOR BOLT MATERIAL SHALL BE ASTM F1554 (GRADE 36 U.O.N.).
- ANCHOR BOLT NUTS SHALL BE DRAWN DOWN TIGHT TO A "SNUG-TIGHTENED" CONDITION. ANCHOR BOLTS DO NOT REQUIRE PRE-TENSIONING.
- IF CONTRACTOR PROPOSES TO USE LEVELING PLATES, HE SHALL SUBMIT HIS PROPOSED METHOD AND DETAILS FOR ENGINEER'S REVIEW AND APPROVAL. THIS MAY RESULT IN A REQUIREMENT TO MILL THE BOTTOM SURFACE OF THE BASE PLATE.
- ANCHOR BOLT HOLES WHICH ARE FLAME-CUT IN BASE PLATES SHALL BE INSPECTED (AND CORRECTED AS NECESSARY) TO ASSURE PROPER CLEARANCES.
- SEE PROJECT SPECIFICATIONS AND GENERAL NOTES FOR MATERIALS AND STRENGTH REQUIREMENTS FOR HIGH-STRENGTH NON-SHRINK GROUT.

5 BASE PLATE DETAIL 1



COLUMN OR POST PICK-UP

BEAM CONTINUOUS OVER COLUMN

NOTE:
1. WT AND STIFFENER PLATES TO BE SAME GRADE OF STEEL AS COLUMN.
2. USE AT NEW AND EXISTING BEAM LOCATIONS.

NOTE:
ALL DETAILS OF WT AND STIFFENER PLATES ARE SAME AS FOR COLUMN PICK-UP, BUT INVERTED.

4 COLUMN OR POST PICK-UP, BEAM CONTINUOUS OVER COLUMN

5 BASE PLATE DETAIL 1

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE

DESIGN DEVELOPMENT

SCALE

AS NOTED

KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
STEEL TYPICAL DETAILS 2

SEAL AND SIGNATURE

DATE: 09/11/2015

PROJECT NO.: 1683.00

DRAWING BY: PDC

CHECK BY: KS

DWG NO.:

S-611.00

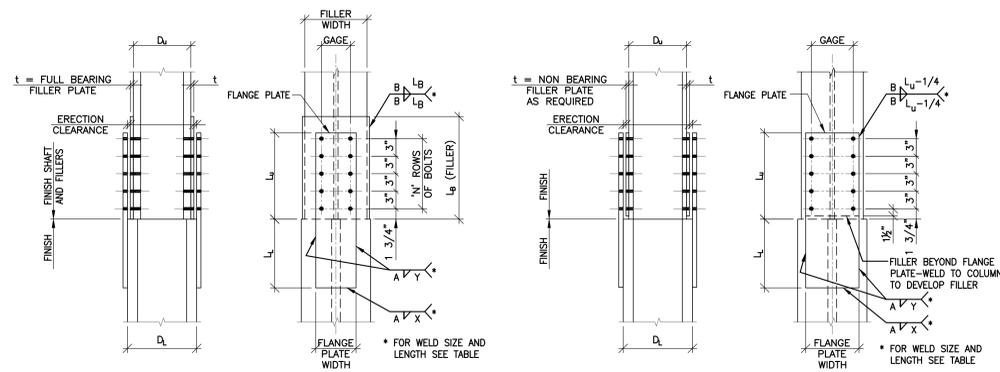
CAD FILE NO.: OF XX

**09-11-2015
COORDINATION SET**

**144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)**

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN
PROJECT
144 - 146 WEST STREET BROOKLYN, NY 11222
DRAWING
STEEL TYPICAL DETAILS 3
DATE: 09/11/2015
PROJECT NO.: 1683.00
DRAWING BY: PDC
CHECK BY: JS
DWG NO.: S-612.00
CAD FILE NO.: OF XX



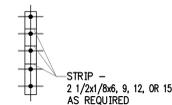
UPPER COLUMN DEPTH NOMINALLY TWO INCHES LESS THAN LOWER COLUMN DEPTH
(FILLERS DEVELOPED FOR BEARING)

UPPER AND LOWER COLUMNS SAME NOMINAL DEPTH
NOTE:
IF LOWER COLUMN DEPTH D_L IS LESS THAN UPPER COLUMN DEPTH D_U FILLER PLATES ARE TO BE USED AT LOWER COLUMN - INCREASE WELD SIZE BY THICKNESS OF FILLER PLATE.

1 COLUMN SPLICES UPPER AND LOWER COLUMNS OF SAME NOMINAL DEPTH
SCALE: 3/4"=1'-0"

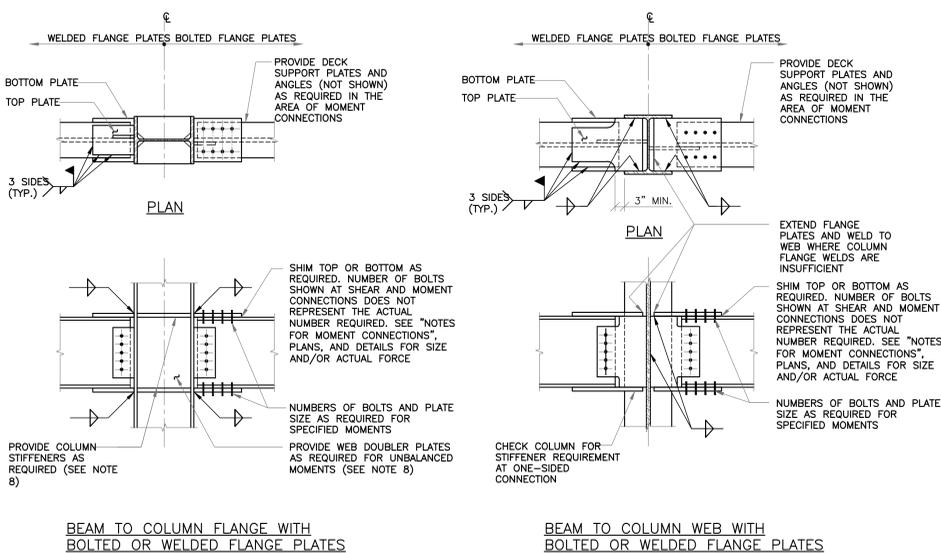
COLUMN FLANGE WIDTH	COLUMN FLANGE THICKNESS t_f	FLANGE PLATE MIN. 1 MIN. THICK	MINIMUM NUMBER OF ROWS OF 7/8" SLIP CRITICAL BOLTS 'N'	MINIMUM L_L (LOWER SHAFT)	MINIMUM SIZE OF FILLET WELDS
6 1/2	-	5 1/2	2	8	1/4
8+	-	6 1/2	2	10	1/4*
10+	-	8 1/2	2	10	1/4**
12+	$t_f < 1.50"$	8 5/8	3	12	5/16
12+	$t_f > 1.50"$	10 3/4	4	15	5/16
14+	-	10 1/2	3	12	5/16
15+	-	12 5/8	4	12	5/16
16+	$t_f < 2.50"$	12 3/4	4	12	5/16
16+	$t_f > 2.50"$	14 3/4	4	14	3/8
17+	-	14 1	5	16	3/8

* (WELD 'A') IF COLUMN FLANGE THICKNESS EXCEEDS 3/4", THE MINIMUM WELD SIZE SHALL BE INCREASED TO 5/16"
** (WELD 'B') IF EITHER THE UPPER COLUMN FLANGE OR THE FILLER PLATE THICKNESS EXCEEDS 3/4", THE MINIMUM WELD SIZE SHALL BE INCREASED TO 5/16"



DETAIL OF STRIP SHIMS

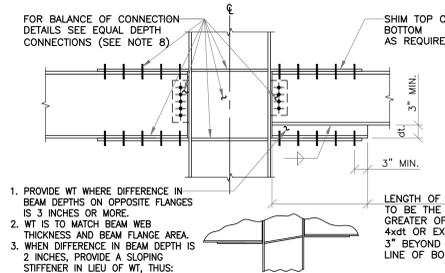
2 COLUMN SPLICE REQUIREMENTS AND FLANGE PLATE TABLE MINIMUM REQUIREMENTS
SCALE: N.T.S.



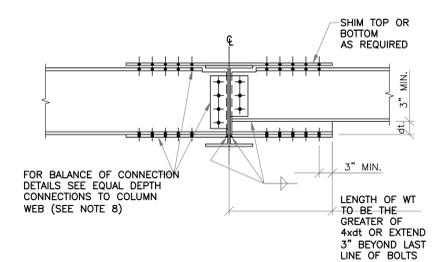
BEAM TO COLUMN FLANGE WITH BOLTED OR WELDED FLANGE PLATES

BEAM TO COLUMN WEB WITH BOLTED OR WELDED FLANGE PLATES

3 MOMENT CONNECTION TO COLUMN WEB AND COLUMN FLANGE
SCALE: 3/4"=1'-0"



BEAM TO COLUMN FLANGE WITH DIFFERENT BEAM DEPTHS
(BEAM TO COLUMN WEB SIMILAR SEE EQUAL DEPTH CONNECTIONS)



BEAM TO BEAM WITH DEFFERENT DEPTHS

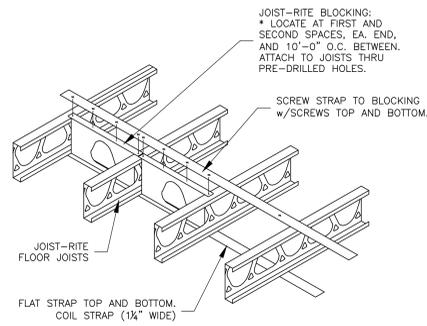
4 MOMENT CONNECTION DIFFERENT DEPTH BEAMS TO COLUMN OR BEAM
SCALE: 3/4"=1'-0"

TERMINOLOGY AND LEGEND FOR L.L.R.S. FRAMES

- "L.L.R.S." MEANS "LATERAL LOAD RESISTING SYSTEM" (USUALLY THIS NOMENCLATURE DOES NOT APPEAR ON FRAMES OR ON INDIVIDUAL MEMBERS).
- "W.F." IS A WIND/SEISMIC LATERAL LOAD RESISTING FRAME ON THE STRUCTURE'S PERIMETER, INTERIOR, OR CORE. (COLUMNS, GIRDERS, BEAMS, TRUSSES, BRACES, ETC.).
- "W.G." IS A WIND/SEISMIC GIRDER: AN INDIVIDUAL MEMBER, COMPONENT OF A WIND/SEISMIC L.L.R.S.
- MC = A MOMENT CONNECTION, TYPE A OR TYPE B.
- OR = A SHEAR CONNECTION.
- TYPE A MOMENT CONNECTION: PART OF A LATERAL LOAD RESISTING SYSTEM, THIS CONNECTION HAS THE MOST STRINGENT REQUIREMENTS - IT MUST DEVELOP THE FULL MOMENT CAPACITY OF THE GIRDER AND PROVIDE THE GREATER SHEAR CAPACITY REQUIRED TO RESIST SHEAR FORCES GENERATED BY COMBINED GRAVITY PLUS LATERAL LOADS. (SEE TYPE A SHEAR CONNECTION DETAILS).
- TYPE B MOMENT CONNECTION: ALL OTHERS, SUCH AS: CANTILEVERS, STIFFENERS OF MEMBERS TO REDUCE DEFLECTIONS, ETC. A DESIGN MOMENT LESS THAN FULL MOMENT CAPACITY MAY BE INDICATED ON THE FRAMING PLANS, IN WHICH CASE THE CONNECTION MAY BE DESIGNED FOR THIS VALUE. IF NO MOMENT IS GIVEN, THE CONNECTION MUST BE DESIGNED FOR FULL MOMENT CAPACITY. (SEE SIMPLE SHEAR CONNECTION DETAILS).

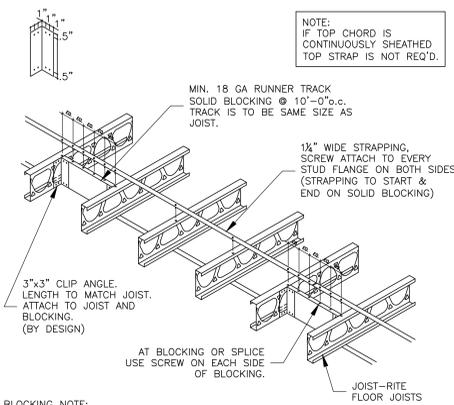
NOTES FOR MOMENT CONNECTIONS

- *CONNECTIONS FOR ALL MEMBERS DESIGNATED AS PART OF A LATERAL LOAD RESISTING SYSTEM (W.F. OR W.G.) SHALL BE TYPE A MOMENT CONNECTIONS (SEE LEGEND FOR DEFINITION AND REQUIREMENTS).
- *SHEAR CONNECTIONS SHALL CONFORM TO "TABLE A -- SHEAR CONNECTION REQUIREMENTS FOR TYPE A MOMENT CONNECTIONS".
- ALL OTHER SHEAR CONNECTIONS (INCLUDING THOSE AT TYPE B MOMENT CONNECTIONS) SHALL CONFORM TO "SIMPLE SHEAR CONNECTION DETAILS".
- WELDS AND BOLTS FOR MOMENT CONNECTIONS SHALL DEVELOP THE FULL MEMBER MOMENT CAPACITY, EXCEPT AT A TYPE B CONNECTION WHERE A LESSER MOMENT VALUE IS INDICATED ON THE FRAMING PLANS. (THIS MAY ONLY BE UTILIZED AT A TYPE B CONNECTION).
- MOMENT CONNECTION PLATES SHALL BE SIZED AS REQUIRED FOR THE SPECIFIED MOMENT.
- WELD SMA Y BE SUBSTITUTED FOR BOLTS UPON PRIOR APPROVAL OF THE STRUCTURAL ENGINEER.
- PROVIDE WEB AND/OR FLANGE REINFORCING WHERE REQUIRED DUE TO WEB CUTS OR COPES FOR CONNECTIONS.
- PER THE PROVISIONS OF CHAPTER J OF THE AISC SPECIFICATIONS, PROVIDE COLUMN FLANGE STIFFENERS WHERE REQUIRED TO RESIST FORCES FROM MOMENT CONNECTIONS. PROVIDE COLUMN WEB DOUBLER PLATES AS REQUIRED FOR UNBALANCED MOMENT. (AT CONTRACTOR'S OPTION A HEAVIER COLUMN MAY BE SUBSTITUTED IN LIEU OF DOUBLER/STIFFENER PLATES, AT NO COST TO THE OWNER).
- SLIP-CRITICAL BOLTS USED IN ALL MOMENT CONNECTIONS SHALL HAVE A MINIMUM DIAMETER OF 7/8" AND SHALL BE BASED UPON BOLT VALUES GIVEN IN TABLE 7-4, "SLIP-CRITICAL CONNECTIONS", WHERE "SLIP IS A STRENGTH LIMIT-STATE", CLASS A FINISH SURFACE (13TH EDITION OF AISC MANUAL). IF THE FABRICATOR PROPOSES TO USE CLASS B FINISH SURFACE AND GREATER BOLT CAPACITY THAN TABLE 7-4 VALUES, HE MUST SUBMIT HIS PROPOSED DESIGN AND FABRICATION PROCEDURES TO THE ENGINEER FOR PRIOR APPROVAL.
- *PROVIDE A MINIMUM OF 3/4 INCH DIAMETER SHEAR STUDS AT 12 INCHES ON CENTER ALONG THE FULL LENGTH OF THE TOP FLANGE OF ALL W.F./W.G. MEMBERS. IF FRAMING PLANS CALL FOR A NUMBER OF STUDS GREATER THAN ONE PER FOOT OF LENGTH, PROVIDE THE GREATER NUMBER.
- *THESE NOTES (NUMBERS 1,2, AND 11) APPLY TO L.L.R.S. FRAMES. BALANCE OF NOTES APPLY TO ALL MOMENT CONNECTIONS, BOTH TYPE A AND TYPE B.



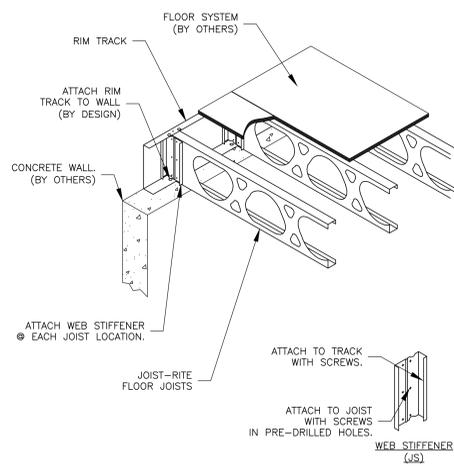
NOTE:
TOP STRAP MAY BE ELIMINATED WITH THE PROPER ATTACHMENT OF DIAPHRAGM RATED SHEATHING OR DECKING.

JOIST-RITE BLOCKING (JB)

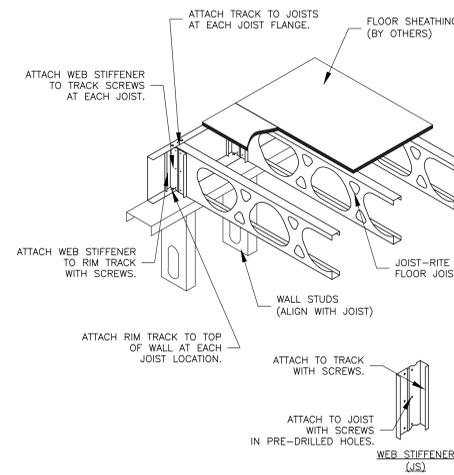


BLOCKING NOTE:
PLACE SOLID BLOCKING AT ENDS OF FLOOR SYSTEM, ADJACENT TO ALL OPENINGS, AND AT 10'-0\"/>

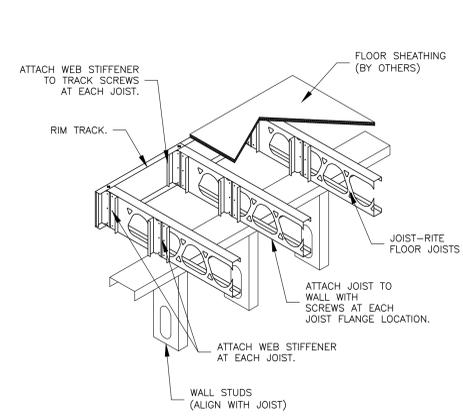
1-1/4\"/>



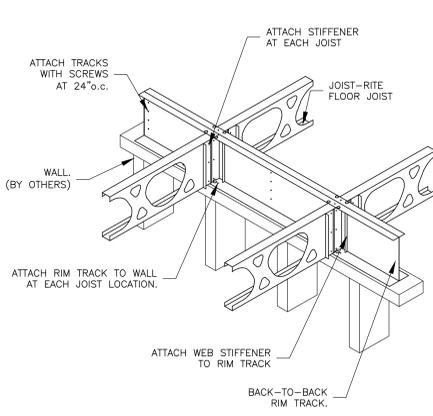
JOIST BEARING ON CONCRETE WALL



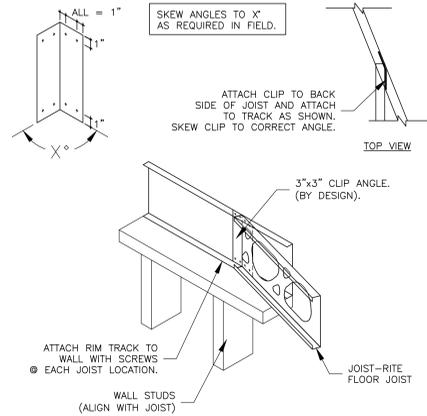
JOIST BEARING ON STUD WALL



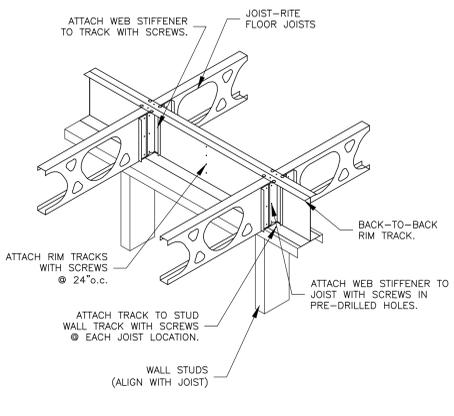
JOIST CANTILEVERED OVER EXTERIOR STUD WALL



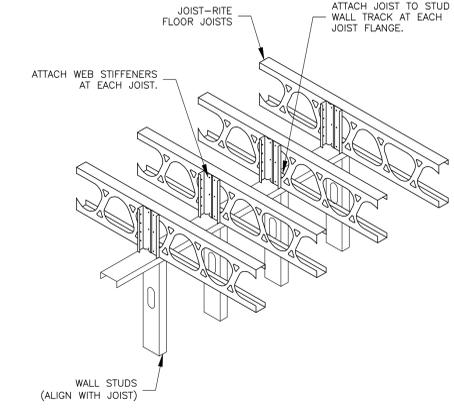
TWO JOIST BEARING ON SINGLE STUD WALL



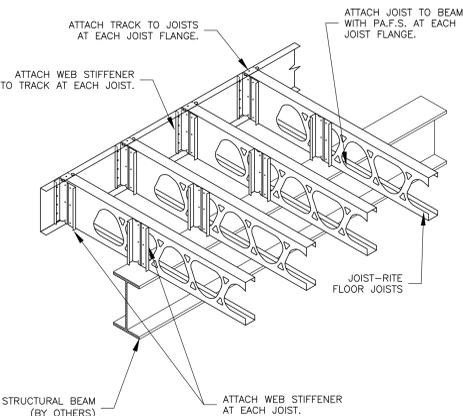
ATTACHMENT OF JOIST TO SKEWED RIM TRACK



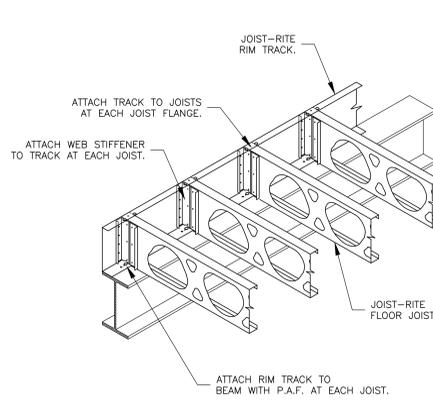
TRACK SUPPORTING JOISTS WITH STIFFENERS AS CLIP



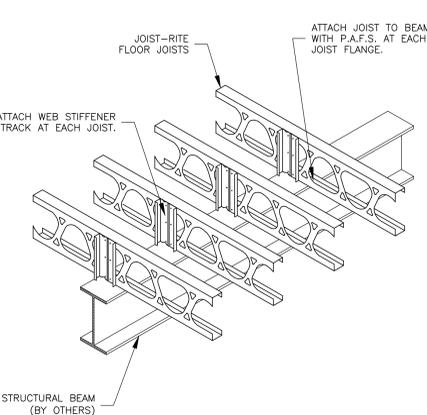
JOIST BEARING OVER STUD WALL



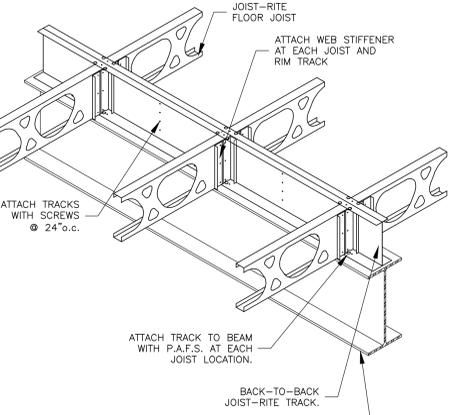
JOIST BEARING ON STRUCTURAL BEAM (CANTILEVER CONDITION)



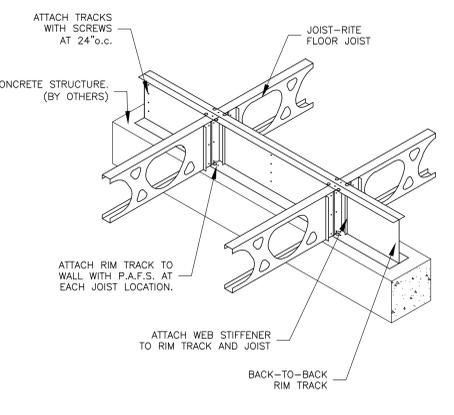
JOIST BEARING ON STRUCTURAL BEAM (END CONDITION)



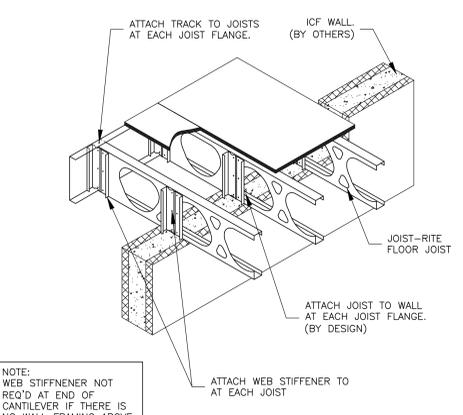
JOIST BEARING OVER STRUCTURAL BEAM (INTERMEDIATE CONDITION)



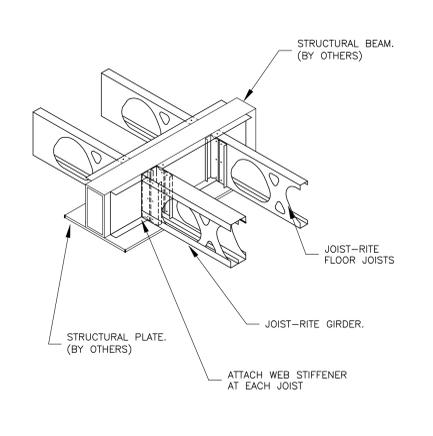
DOUBLE JOISTS BEARING ON STRUCTURAL BEAM



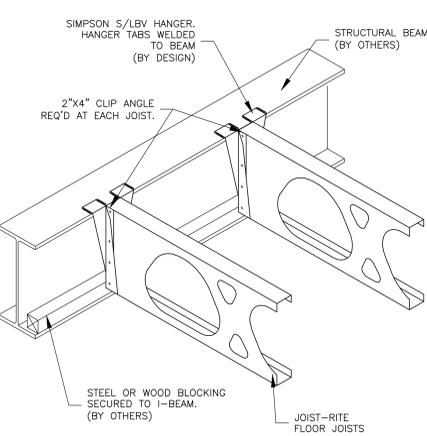
TWO JOIST BEARING ON CONCRETE WALL



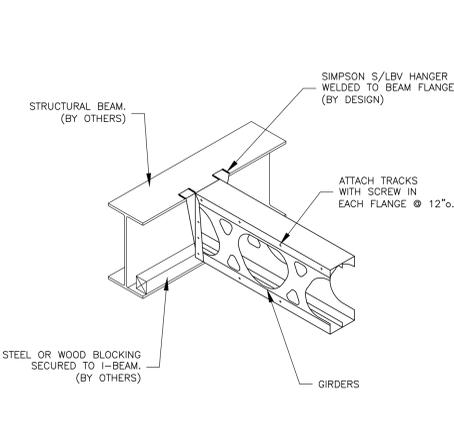
JOIST CANTILEVERED OVER ICF WALL



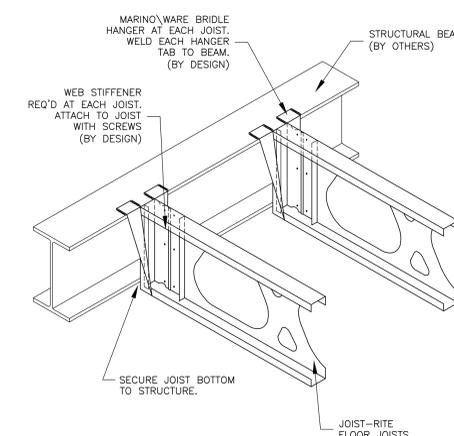
JOIST AND GIRDER BEARING ON STEEL PLATE



CONNECTION TO I-BEAM USING SIMPSON S/LBV HANGER



GIRDER CONNECTION TO I-BEAM USING SIMPSON S/LBV HANGER



JOIST CONNECTION TO I-BEAM USING MARINOWARE BRIDLE HANGER

- PRIOR TO START OF STRUCTURAL WORK:**
- CONTRACTOR SHALL CHECK FOR LATEST PROJECT BULLETINS AND ADDENDA.
 - CONTRACTOR SHALL CONFIRM THAT ALL SUBCONTRACTORS ARE USING THE LATEST STRUCTURAL DRAWINGS.
 - CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS RELATED TO NEW WORK AND PROVIDE FIELD DIMENSIONS.
 - CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL, PRIOR TO MATERIAL ORDERING AND FABRICATION.

09-11-2015
COORDINATION SET

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1,2
JOB: #1683.00

DEVELOPER
STRUCTURAL ENGINEER
MECHANICAL ENGINEER
OWNER
ISSUE
DESIGN DEVELOPMENT
SCALE
AS NOTED
KEY PLAN

PROJECT
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING
TYPICAL LIGHT GAUGE DETAILS 1

SEAL AND SIGNATURE DATE: 09/11/2015
PROJECT NO.: 1683.00
DRAWING BY: JDC
CHK BY: JS
DWG NO.: S-620.00
CAD FILE NO.: OF XX

**09-11-2015
COORDINATION SET**

144 - 146 WEST STREET
BROOKLYN, NY 11222
ZONING: M1-2 / R6A - Special Mixed Use District (MX-8)

BLOCK: #2531
LOT: 1.2
JOB: #1683.00

DEVELOPER

STRUCTURAL ENGINEER

MECHANICAL ENGINEER

OWNER

ISSUE

DESIGN DEVELOPMENT

SCALE

AS NOTED

KEY PLAN

PROJECT

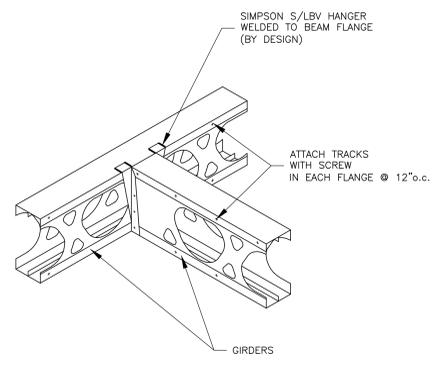
144 - 146 WEST STREET
BROOKLYN, NY 11222

DRAWING

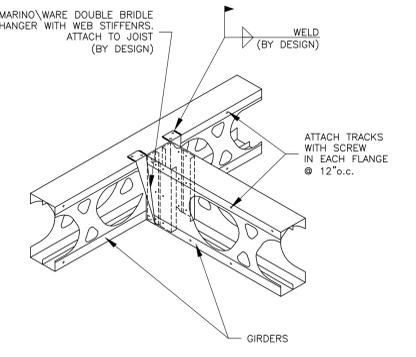
TYPICAL LIGHT GAUGE DETAILS 2

SEAL AND SIGNATURE

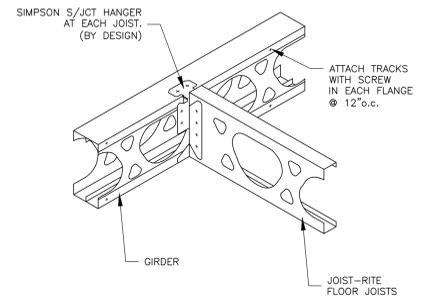
DATE: 09/11/2015
PROJECT NO.: 1683.00
DRAWING BY: PDC
CHK BY: IS
DWG NO.:
S-621.00
CAD FILE NO.: OF XX



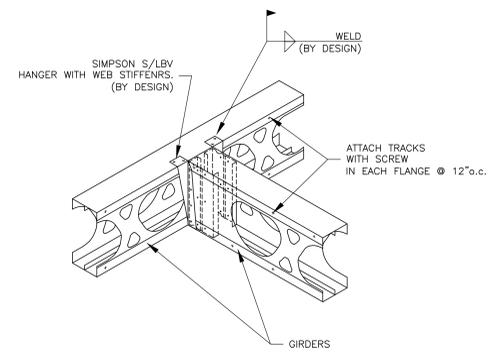
GIRDER TO GIRDER CONNECTION USING SIMPSON S/LBV HANGER



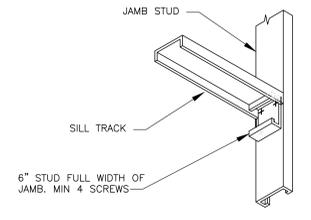
GIRDER TO GIRDER CONNECTION USING M/W DOUBLE BRIDLE HANGER



SINGLE JOIST TO GIRDER CONNECTION USING SIMPSON S/JCT HANGER

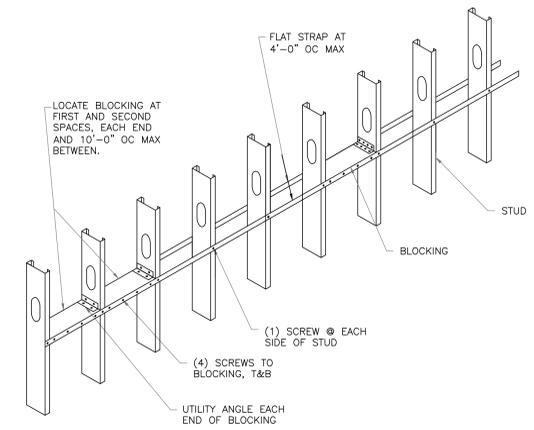


GIRDER TO GIRDER CONNECTION USING SIMPSON S/LBV HANGER

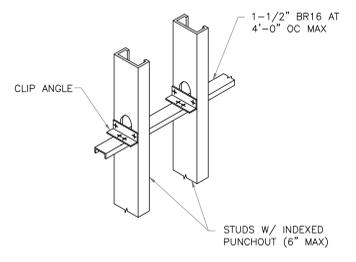
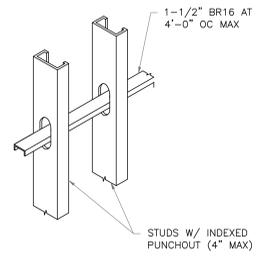


NOTE: CONSTRUCTION REVERSED AT HEAD CONDITIONS. ADD STUD AND TRACK DISTRIBUTION HEADER AND ATTACH TO SILL TRACK FOR R.O. > 4'-0".

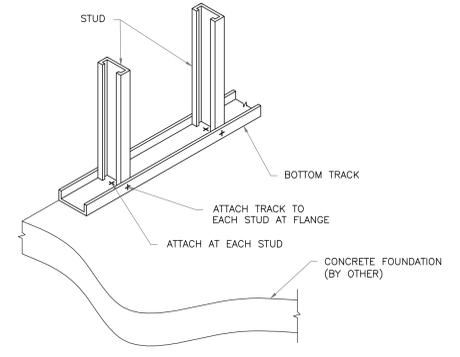
LOAD BEARING WALL - SILL



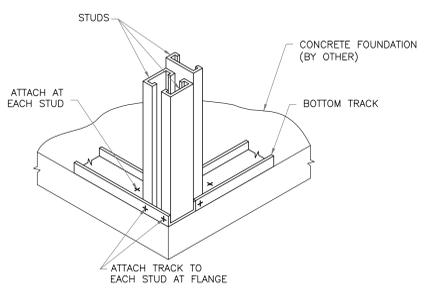
BRIDGING AND BRACING - WALL BRIDGING



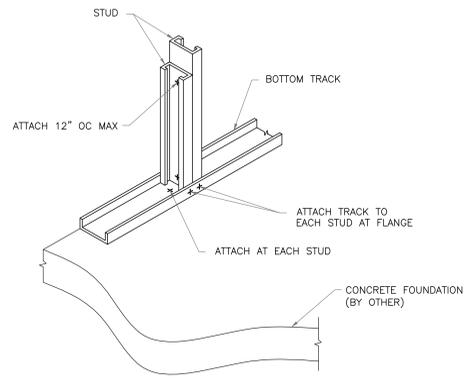
NOTES:
1. IN CURTAIN WALL CONSTRUCTION, STUDS SHALL BE BRACED AGAINST ROTATION BY DIAPHRAGM RATED SHEATHING BOARD APPLIED FULL HEIGHT TO EACH SIDE OF THE WALL. INSTALLATION OF MECHANICAL BRIDGING, SPACED 5'-0" ON CENTER, PROVIDES ADEQUATE ROTATIONAL RESTRAINT FOR WALLS UNDER CONSTRUCTION BEFORE THE INSTALLATION OF SHEATHING. WHERE THE WALL IS NOT SHEATHED FULL HEIGHT EACH SIDE OR SHEATHED ON ONE SIDE ONLY, CONTINUOUS BRIDGING SPACED 5'-0" ON CENTER SHALL PROVIDE ROTATIONAL SUPPORT. REDUCTIONS IN ALLOWABLE BENDING CAPACITY MUST BE INVESTIGATED. WHEN SHEATHING IS USED TO BRACE THE STUDS, THE PRODUCTS SHALL MAINTAIN THEIR STRUCTURAL INTEGRITY DURING THE COURSE OF CONSTRUCTION AND THE SERVICE LIFE OF THE WALL. THE ATTACHMENT OF THE SHEATHING SHOULD CONFORM TO THE MINIMUM REQUIREMENTS OF INDUSTRY STANDARDS AND/OR PRODUCT SPECIFICATIONS.
2. IN AXIAL LOAD BEARING CONSTRUCTION, STUDS SHALL BE BRACED AGAINST ROTATION BEFORE LOADING. INSTALL BRIDGING SPACED AT INTERVALS NOT EXCEEDING 4'-0" ON CENTER. BRIDGING TO BE INSTALLED PRIOR TO LOADING OF WALL. (MIN. 1"x1" CLIP ANGLES REQUIRED WITH STUD WIDTHS OVER 4").
3. FOR INDEXED STUDS, THE FIRST PUNCHOUT SHALL NOT BE LESS THAN 1'-0" FROM THE ENDS AND 2'-0" ON CENTER THEREAFTER.



LOAD BEARING WALL - STUDS IN PLACE



LOAD BEARING WALL - THREE STUD CORNER

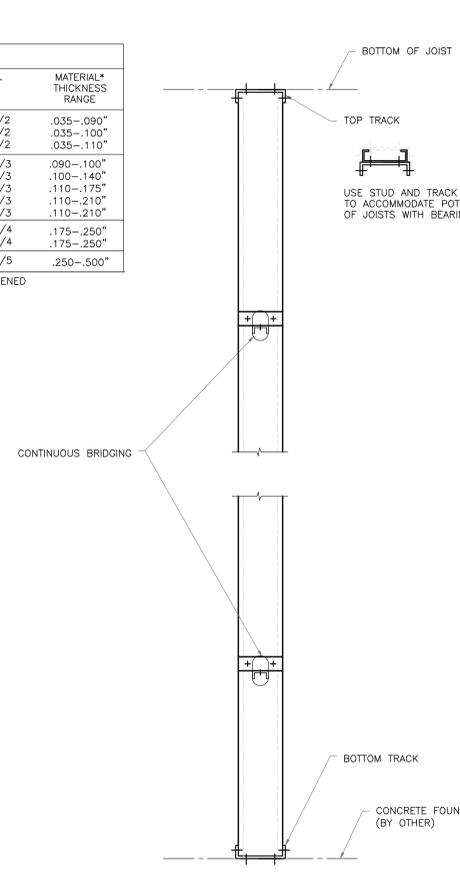


LOAD BEARING WALL - DOUBLED STUDS

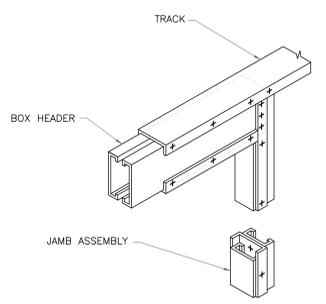
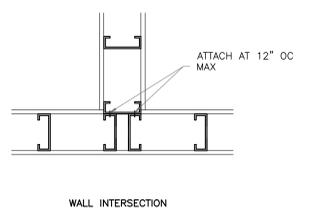
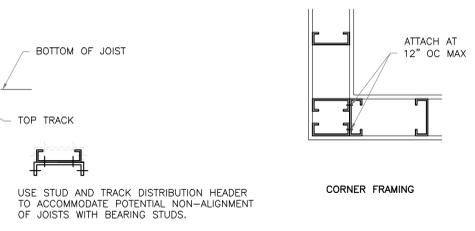
STEEL THICKNESS		
	GAUGE NO.	DECIMAL EQUIVALENT
LIGHT GAUGE	26	.018
	24	.024
MEDIUM GAUGE	22	.030
	20	.036
HEAVY GAUGE	16	.060
	14	.075
EXTRA HEAVY GAUGE	12	.105
	10	.034

FASTENER RECOMMENDATIONS			
SELF-DRILLING APPLICATION	SCREW DIAMETER SIZE	POINT TYPE	MATERIAL* THICKNESS RANGE
LIGHT GAUGE	#6	TEKS/2	.035-.090"
	#8	TEKS/2	.035-.100"
	#10	TEKS/2	.035-.110"
MEDIUM GAUGE	#6	TEKS/3	.090-.100"
	#8	TEKS/3	.100-.140"
	#10	TEKS/3	.110-.175"
	#12	TEKS/3	.110-.210"
HEAVY GAUGE	#12	TEKS/4	.175-.250"
	1/4	TEKS/3	.110-.210"
EXTRA HEAVY GAUGE	#12	TEKS/4	.175-.250"
	#12	TEKS/5	.250-.500"

NOTES:
1. FOR METAL STUD TO METAL STUD, USE NO.12-14 (D=0.160" T=0.177") SCREWS. SCREW SPACING AND EDGE DISTANCE SHALL NOT BE LESS THAN 0.5".
2. FOR METAL TRACK TO CONCRETE, USE POWDER ACTUATED FASTENERS (PAFS) WITH MINIMUM SHANK DIAMETER=0.177" AND MINIMUM EMBEDMENT=1.5".
3. MINIMUM BASE THICKNESS OF THE CONCRETE SHALL BE 1.3 x DEPTH OF EMBEDMENT OF FASTENER. MINIMUM FASTNER SPACING=4". MINIMUM FASTENER EDGE DISTANCE=3".



BEARING WALL SCHEMATIC



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

1 LOAD BEARING WALL - BEARING HEADER
S6.1

APPENDIX 2

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and FHRB, 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, FHRB, 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, Mr. Horace Zhang, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

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

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

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

Greenpoint Library
107 Norman Ave
Brooklyn, NY 11222
Hours of Operation:
Monday – 10am – 6pm
Tuesday – 10am – 8pm
Wednesday – 10am – 8pm
Thursday – 10am – 8pm
Friday – 10am – 6pm
Saturday – 10am – 5pm
Sunday – closed

Digital Documentation: NYC OER requires the use of digital documents in our repository as a means of minimizing paper use while also increasing convenience in access and ease of use.

Issues of Public Concern: There are no issues of public concern.

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 reviewed and approved by OER prior to distribution and mailed by the Enrollee. 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. 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 3

SUSTAINABILITY STATEMENT

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

Reuse of Clean, Recyclable Materials and Reduced Consumption of Non-Renewable Resources: Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

Approximately 20 tons of recycled concrete aggregate (RCA) will be imported to the site under this plan and 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.

RCA material will be imported from local facilities to reduce energy consumption on the transportation of backfill material. 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.

Natural gas will be utilized for fuel in the new building.

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.

Recontamination controls will include the installation of a vapor barrier and an active SSDS which can eliminate the risk of future migration of soil vapor contamination from off-site sources. An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

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

Low-Energy Project Management Program: FHRB, 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.

APPENDIX 4

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 final remedial report. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of final signoff by OER.

1.2 Stockpile Methods

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials.

Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event.

Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

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

1.3 Characterization of Excavated Materials

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

1.4 Materials Excavation, Load-Out, and Departure

The PE/QEP overseeing the remedial action will:

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

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

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

1.5 Off-Site Materials Transport

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

Outbound truck transport routes are described in the remedial report. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to

highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 Materials Disposal Off-Site

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

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

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 final remedial report. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the final remedial report.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

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

1.7 Materials Reuse On-Site

Soil and fill that is derived from the property that meets the Soil Cleanup Objectives (SCOs) established in this plan may be reused on-Site. The SCOs for on-Site reuse are listed in Section 4.2 of this cleanup plan. ‘Reuse on-Site’ means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on land with comparable levels of contaminants in soil/fill material, compliant with applicable laws and regulations, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this remedial plan are followed. The expected location for placement of reused material is shown in Section 4.2.

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. Imported soils will not exceed groundwater protection standards established in Part 375. Imported soils for Track 1 remedial action projects will not exceed Track 1 SCO's.

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 remedial plan. The final remedial report 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.
- All material will be subject to source screening and chemical 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 final remedial report. 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 Stormwater Pollution Prevention

Applicable laws and regulations pertaining to stormwater pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this remedial plan (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 for Unknown Contamination Sources

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 this remedial plan.

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 this remedial plan.

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 5

Vapor Barrier Manufacturer Specifications



September, 17 2015

Ms. Jennifer Lewis
Project Manager
P.W. Grosser Consulting
630 Johnson Ave, Suite 7
Bohemia, NY 11716

Dear Ms. Lewis,

I have reviewed the Data you provided for the remediation/construction project located at 144 West Street, BROOKLYN, NY and noted the contaminants specifically described on the following pages:

- Table 2 - Soil Sample Analytical Data Summary (VOCs)
- Table 3 - Soil Sample Analytical Data Summary (SVOCs)
- Table 4 - Soil Sample Analytical Data Summary (Metals)
- Table 5 - Soil Sample Analytical Data Summary (Pesticides and PCBs)
- Table 10 – Soil Vapor Sample Analytical Data Summary (VOCs)

The identified contaminants at the levels reported will not have an adverse effect on the intended performance of VaporBlock Plus VBP20 as a vapor barrier, provided standard design and application procedures are followed. Standard installation instructions and details can be found on our website at www.ravenefd.com.

If you have any questions, please feel free to call me at the number below.

Sincerely,

A handwritten signature in black ink that reads "Dan Smith". The signature is written in a cursive style with a large, looped initial "D".

Dan Smith
Staff Design Engineer
Raven Ind. Inc.
(800) 635-3456
dan.smith@ravenind.com

ENGINEERED FILMS DIVISION



VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier



Product Description

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

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

Product Use

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

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

Size & Packaging

VaporBlock® Plus™ 20 is available in 10' x 150' rolls to maximize coverage. All rolls are folded on heavy-duty cores for ease in handling and installation. Other custom sizes with factory welded seams are available based on minimum volume requirements. Installation instructions and ASTM E-1745 classifications accompany each roll.



Under-Slab Vapor/Gas Retarder

Product

Part

VaporBlock Plus 20 VBP20

APPLICATIONS

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

VaporBlock® Plus™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

PROPERTIES	TEST METHOD	VAPORBLOCK PLUS 20	
		IMPERIAL	METRIC
APPEARANCE		White/Gold	
THICKNESS, NOMINAL		20 mil	0.51 mm
WEIGHT		102 lbs/MSF	498 g/m ²
CLASSIFICATION	ASTM E 1745	CLASS A, B & C	
TENSILE STRENGTH LBF/IN (N/CM) AVERAGE MD & TD (NEW MATERIAL)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
IMPACT RESISTANCE	ASTM D 1709	2600 g	
MAXIMUM USE TEMPERATURE		180° F	82° C
MINIMUM USE TEMPERATURE		-70° F	-57° C
PERMEANCE (NEW MATERIAL)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.0098 Perms grains/(ft ² ·hr·in·Hg)	0.0064 Perms g/(24hr·m ² ·mm Hg)
(AFTER CONDITIONING) PERMS (SAME MEASUREMENT AS ABOVE PERMEANCE)	ASTM E 154 Section 8, E96 Section 11, E96 Section 12, E96 Section 13, E96	0.0079 0.0079 0.0097 0.0113	0.0052 0.0052 0.0064 0.0074
WVTR	ASTM E 96 Procedure B	0.0040 grains/hr-ft ²	0.0028 gm/hr-m ²
RADON DIFFUSION COEFFICIENT	K124/02/95	< 1.1 x 10 ⁻¹³ m ² /s	
METHANE PERMEANCE	ASTM D 1434	< 1.7 x 10 ⁻¹⁰ m ² /d·atm 0.32 GTR (Gas Transmission Rate) ml/m ² ·D·ATM	

VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.

Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.

ASTM E-1643 also provides general installation information for vapor retarders.

VaporBlock® Plus™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

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

Note: To the best of our knowledge, unless otherwise stated, these are typical property values and are intended as guides only, not as specification limits. Chemical resistance, odor transmission, longevity as well as other performance criteria is not implied or given and actual testing must be performed for applicability in specific applications and/or conditions. RAVEN INDUSTRIES MAKES NO WARRANTIES AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and disclaims all liability for resulting loss or damage. Limited Warranty available at www.RavenEFD.com



Scan QR Code to download current technical data sheets via the Raven website.

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VaporBlock® Plus™

UNDERSLAB VAPOR RETARDER / GAS BARRIER

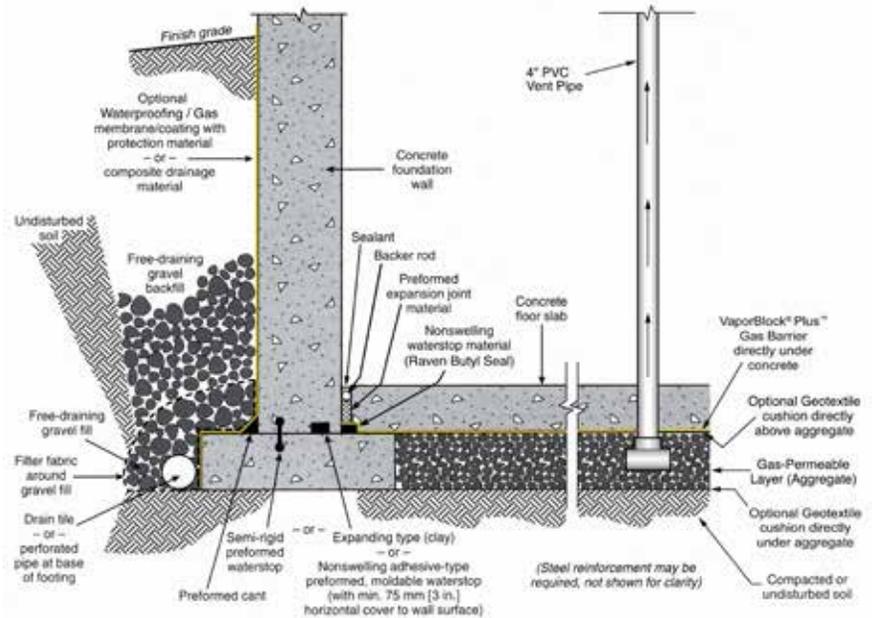
INSTALLATION GUIDELINES

Please Note: Read these instructions thoroughly before installation to ensure proper use of VaporBlock® Plus™. ASTM E 1465, ASTM E 2121 and, ASTM E 1643 also provide valuable information regarding the installation of vapor / gas barriers. When installing this product, contractors shall conform to all applicable local, state and federal regulations and laws pertaining to residential and commercial building construction.

- When VaporBlock Plus gas barrier is used as part of an active control system for radon or other gas, a ventilation system will be required.
- If designed as a passive system, it is recommended to install a ventilation system that could be converted to an active system if needed.

Materials List:

- VaporBlock® Plus™ Vapor / Gas Barrier
- VaporBond Plus 4" Foil Seaming Tape
- Butyl Seal 2-Sided Tape
- VaporBoot Plus Pipe Boots 12/Box (recommended)
- VaporBoot Tape (optional)



Elements of a moisture/gas-resistant floor system. General illustration only.
(Note: This example shows multiple options for waterstop placement.)

VAPORBLOCK® PLUS™ PLACEMENT

- 1.1. Level and tamp or roll granular base as specified. A base for a gas-reduction system may require a 4" to 6" gas permeable layer of clean coarse aggregate as specified by your architectural or structural drawings after installation of the recommended gas collection system. In this situation, a cushion layer consisting of a non-woven geotextile fabric placed directly under VaporBlock® Plus™ will help protect the barrier from damage due to possible sharp coarse aggregate.
- 1.2. Unroll VaporBlock Plus running the longest dimension parallel with the direction of the pour and pull open all folds to full width. (Fig. 1)
- 1.3. Lap VaporBlock Plus over the footings and seal with Raven Butyl Seal tape at the footing-wall connection. Prime concrete surfaces and assure they are dry and clean prior to applying Raven Butyl Seal Tape. Apply even and firm pressure with a rubber roller. Overlap joints a minimum of 6" and seal overlap with Raven VaporBond Tape. When used as a gas

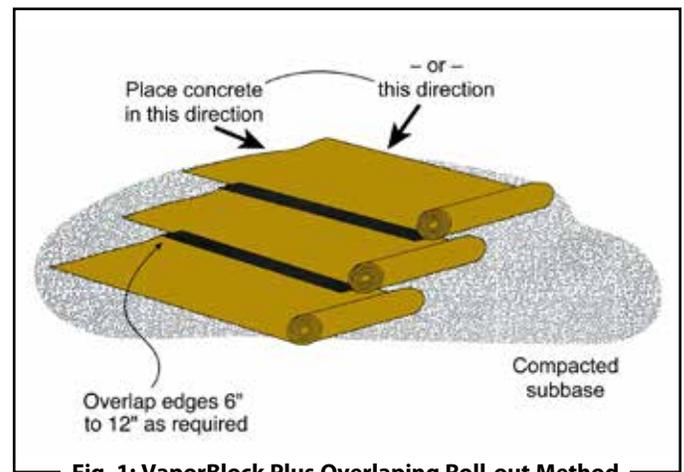


Fig. 1: VaporBlock Plus Overlapping Roll-out Method

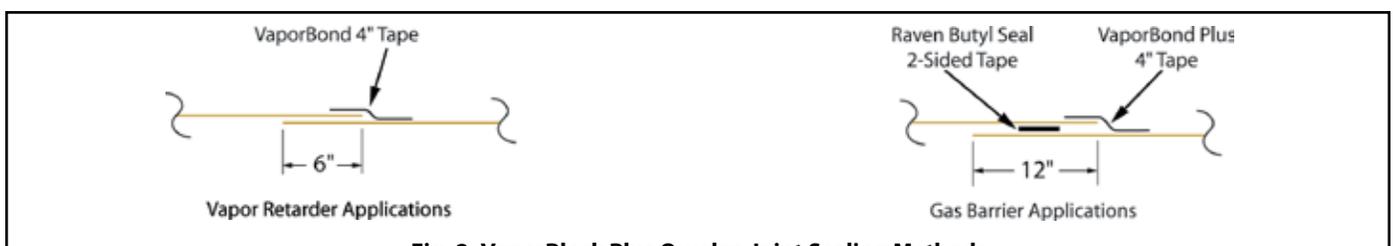


Fig. 2: VaporBlock Plus Overlap Joint Sealing Methods

SINGLE PENETRATION PIPE BOOT INSTALLATION

barrier, overlap joints a minimum of 12" and seal in-between overlap with 2-sided Raven Butyl Seal Tape. Then seal with VaporBond Plus Tape centered on the overlap seam. (Fig. 2)

- 1.4. Seal around all plumbing, conduit, support columns or other penetrations that come through the **VaporBlock Plus** membrane. Pipes four inches or smaller can be sealed with Raven VaporBoot Plus preformed pipe boots. VaporBoot Plus preformed pipe boots are formed in steps for 1", 2", 3" and 4" PVC pipe or IPS size and are sold in units of 12 per box (Fig. 3 & 5).

Pipe boots may also be fabricated from excess **VaporBlock Plus** membrane (Fig. 4 & 6) and sealed with VaporBoot Tape or VaporBond Plus Tape (sold separately).

Reminder Note: All holes or penetrations through the membrane will need a patch cut to a minimum of 12" from the opening in all directions.

To fabricate pipe boots from **VaporBlock Plus** excess material (see Fig. 4 & 6 for A-F):

- A) Cut a square large enough to overlap 12" in all directions.
- B) Mark where to cut opening on the center of the square and cut four to eight slices about 3/8" less than the diameter of the pipe.
- C) Force the square over the pipe leaving the tightly stretched cut area around the bottom of the pipe with approximately a 1/2" of the boot material running vertically up the pipe. *(no more than a 1/2" of stretched boot material is recommended)*
- D) Once boot is positioned, seal the perimeter to the membrane by applying 2-sided Raven Butyl Seal Tape in between the two layers. Secure boot down firmly over the membrane taking care not to have any large folds or creases.
- E) Use VaporBoot Tape or VaporBond Plus Tape to secure the boot to the pipe.

VaporBoot Tape (option) – fold tape in half lengthwise, remove half of the release liner and wrap around the pipe allowing 1" extra for overlap sealing. Peel off the second half of the release liner and work the tape outward gradually forming a complete seal.

VaporBond Plus Tape (option) - Tape completely around pipe overlapping the to get a tight seal against the pipe.
- F) Complete the process by taping over the boot perimeter edge with VaporBond Plus Tape to create a monolithic membrane between the surface of the slab and gas/moisture sources below and at the slab perimeter. (Fig. 4 & 6)

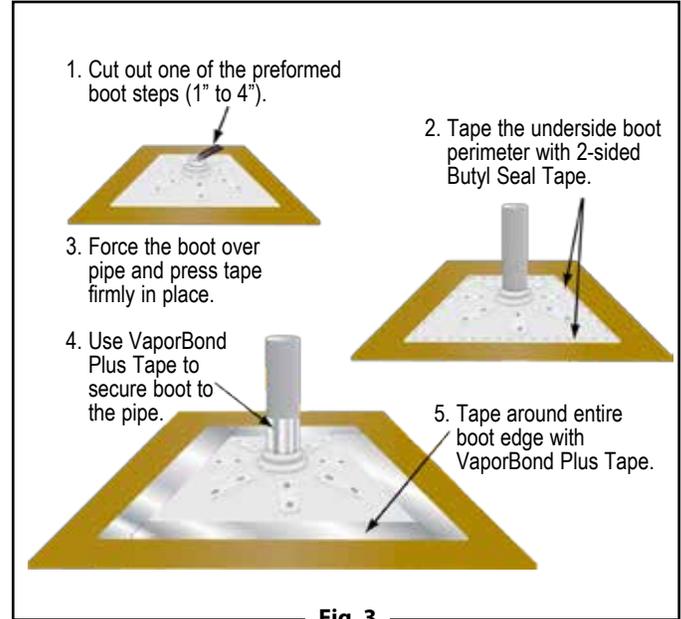


Fig. 3

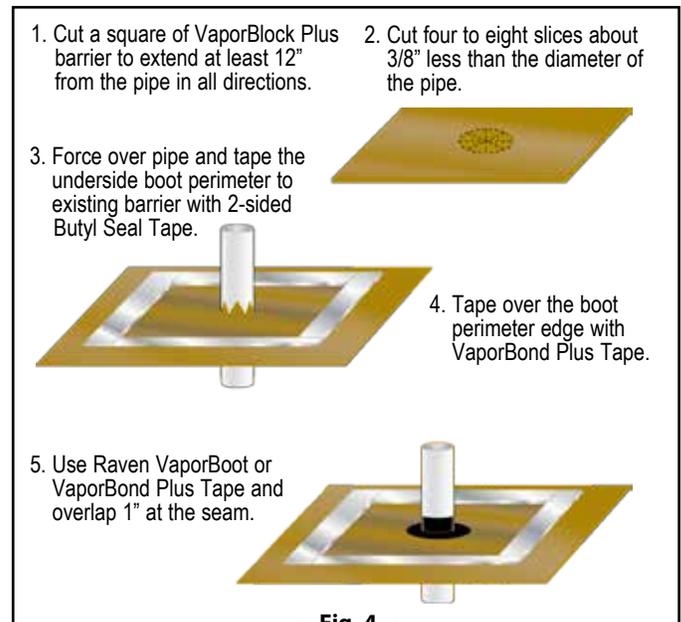


Fig. 4

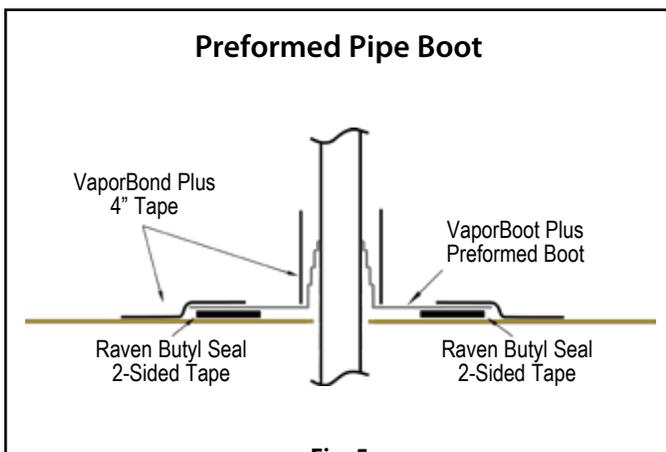


Fig. 5

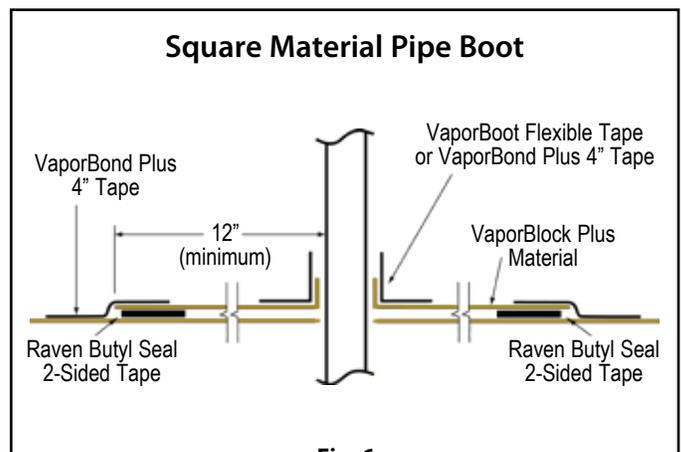


Fig. 6

MULTIPLE PENETRATION PIPE BOOT INSTALLATION

1.5. For side-by-side multiple penetrations;

- A) Cut a patch large enough to overlap 12" in all directions (Fig. 7) of penetrations.
- B) Mark where to cut openings and cut four to eight slices about 3/8" less than the diameter of the penetration for each.
- C) Slide patch material over penetration to achieve a tight fit.
- D) Once patch is positioned, seal the perimeter to the membrane by applying 2-sided Raven Butyl Seal Tape in-between the two layers. (Fig. 8)
- E) After applying Raven Butyl Seal Tape between the patch and membrane, tape around each of the penetrations and the patch with VaporBond Plus 4" foil tape. (Fig. 9) For additional protection apply an acceptable polyurethane elastomeric sealant around the penetrations. (Fig. 10)

1.6. Holes or openings through **VaporBlock Plus** are to be repaired by cutting a piece of **VaporBlock Plus** 12" larger in all directions from the opening. Seal the patch to the barrier with 2-sided Raven Butyl Seal Tape and seal the edges of the patch with VaporBond Plus Tape.

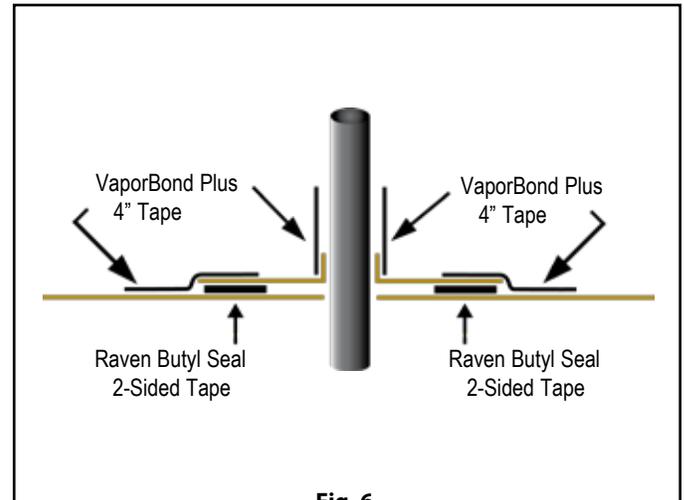


Fig. 6

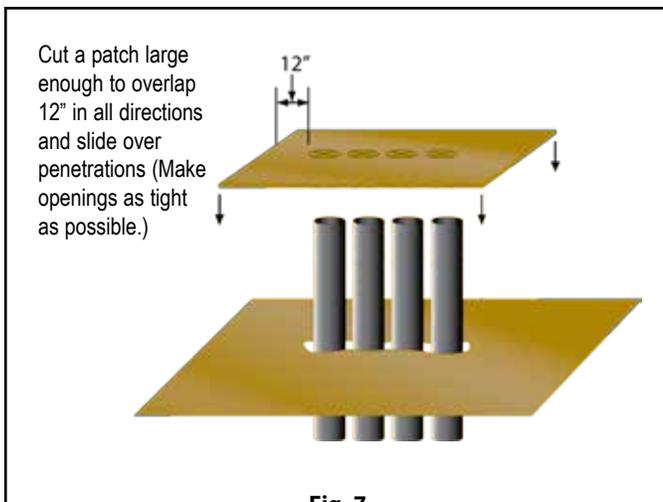


Fig. 7

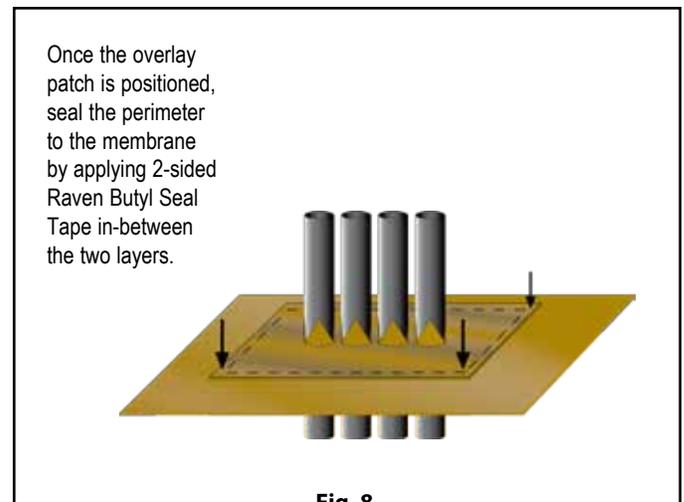


Fig. 8

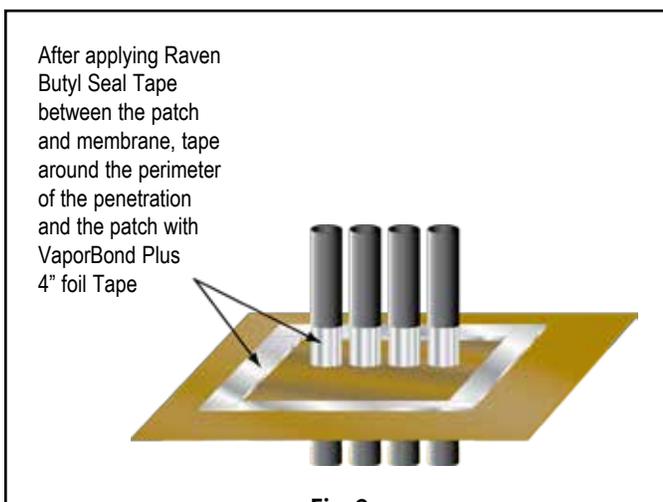


Fig. 9

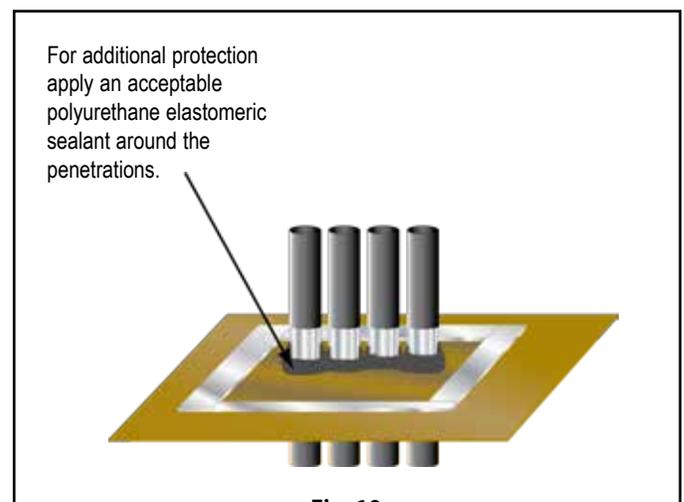


Fig. 10

VAPORBLOCK® PLUS™ PROTECTION

- 2.1. When installing reinforcing steel and utilities, in addition to the placement of concrete, take precaution to protect **VaporBlock Plus**. Carelessness during installation can damage the most puncture-resistant membrane. Sheets of plywood cushioned with geotextile fabric temporarily placed on **VaporBlock Plus** provide for additional protection in high traffic areas including concrete buggies.
- 2.2. Use only brick-type or chair-type reinforcing bar supports to protect **VaporBlock Plus** from puncture.
- 2.3. Avoid driving stakes through **VaporBlock Plus**. If this cannot be avoided, each individual hole must be repaired per section 1.6.
- 2.4. If a cushion or blotter layer is required in the design between **VaporBlock Plus** and the slab, additional care should be given if sharp crushed rock is used. Washed rock will provide less chance of damage during placement. Care must be taken to protect blotter layer from precipitation before concrete is placed.

VaporBlock® Plus™ Gas & Moisture Barrier can be identified on site as gold/white in color printed in black ink with the following logo and classification listing:



VaporBlock® Plus™
Gas & Moisture Barrier



Note: To the best of our knowledge, these are typical installation procedures and are intended as guidelines only. Architectural or structural drawings must be reviewed and followed as well as on a project basis. NO WARRANTIES ARE MADE AS TO THE FITNESS FOR A SPECIFIC USE OR MERCHANTABILITY OF PRODUCTS OR GUIDELINES REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations and we disclaim all liability for resulting loss or damage.

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8/13 EFD 1127

APPENDIX 6
CONSTRUCTION HEALTH AND SAFETY PLAN

144-146 WEST STREET, BROOKLYN, NEW YORK

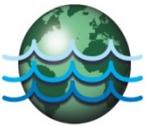
OER PROJECT NUMBER: 16EHAZ057K

CONSTRUCTION HEALTH AND SAFETY PLAN

PREPARED FOR:

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Purchase, NY 10577

PREPARED BY:



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PWGC Project Number: API1501

SEPTEMBER 2015

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FIGURES

FIGURE 1	HOSPITAL ROUTE MAP
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APPENDICES

APPENDIX A	SITE SAFETY PLAN ACCEPTANCE AND ACKNOWLEDGMENT FORM
APPENDIX B	SITE SAFETY AMENDMENT FORM
APPENDIX C	CHEMICAL HAZARDS
APPENDIX D	FIELD ACCIDENT REPORT

STATEMENT OF COMMITMENT

On-site employees may be exposed to chemical contaminants of concern identified within the soil/fill during the planned construction activities to be performed on the 144-146 West Street, Brooklyn, NY project site. P.W. Grosser Consulting Inc.'s (PWGC's) policy is to minimize the possibility of work-related exposure through awareness and qualified supervision, health and safety training, use of appropriate personal protective equipment, and the following activity specific safety protocols contained in this Construction Health and Safety Plan (CHASP). PWGC has established a guidance program to implement this policy in a manner that protects personnel to the maximum reasonable extent.

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

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed by P.W. Grosser Consulting, Inc. (PWGC) at the request of FHRB, LLC for the proposed site re-development to be performed at the 144-146 West Street, Brooklyn, NY site to protect on-site personnel, visitors, and the public from exposure to hazardous materials or wastes. In accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response Final rule, this CHASP, including the attachments, addresses safety and health hazards relating to each phase of site operations and is based on the best information available. The CHASP may be revised by PWGC at the request of FHRB, LLC upon receipt of new information regarding site conditions. Changes will be documented by written amendments.

1.1 *Site Safety Plan Acceptance, Acknowledgment and Amendments*

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

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

1.2 *Daily Safety Meetings*

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

1.3 *Key Personnel - Roles and Responsibilities*

The following key personnel are planned for this project:

- Project Manager - Jennifer Lewis
- Site Safety Officer - Michael Gaul

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

will be consulted.

The site safety officer is responsible for the following:

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

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

2.0 SITE BACKGROUND AND SCOPE OF WORK

The subject property is located at 144-146 West Street, Brooklyn, NY. The site is designated as Block 2531 and Lots 1 and 2 by the City of New York Department of Assessment. The property is approximately 5,000 square feet in size. Currently, the Site is a vacant lot.

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

The proposed use of the Site will consist of construction of a six story building with no basement. Excavation will be conducted to a depth of approximately 2 to 4 feet for the installation of footings and an elevator pit.

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

3.0 CHEMICAL HAZARDS

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

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

Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	

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

Arsenic	Barium	Cadmium	Chromium
Copper	Lead	Mercury	Zinc

Several pesticides were reported at concentrations exceeding their UUSCOs including:

4,4' -DDE	4,4' -DDT	a-Chlordane	
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Several polychlorinated biphenyls were reported at concentrations exceeding their UUSCOs including:

PCB-1254			
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The compounds detected are not associated with a particular on-site source of contamination, but are rather indicative of historic fill material. The primary routes of exposure to suspected and identified contaminants in soil are inhalation, ingestion and absorption.

Groundwater sample results obtained during the Remedial Investigation at the site identified tetrahydrofuran (a typical laboratory contaminant), magnesium, sodium, and PCB-1254 at concentrations greater than NYSDEC Ambient Groundwater Quality Standards (AWQS).

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

Soil vapor results obtained during the Remedial Investigation yield the presence of petroleum

compounds and chlorinated solvents across the site.

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

4.0 PERSONAL PROTECTIVE EQUIPMENT

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

4.1 *Level D*

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

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

4.2 *Level C*

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

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

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

4.3 Level B

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

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

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

5.0 CONTINGENCY PLAN/EMERGENCY RESPONSE PLAN

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

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

5.1 *Emergency Equipment On-site*

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

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

5.2 *Emergency Telephone Numbers*

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

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

5.3 *Personnel Responsibilities During an Emergency*

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

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

5.4 Medical Emergencies

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

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

5.5 Fire or Explosion

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

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

5.6 Evacuation Routes

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

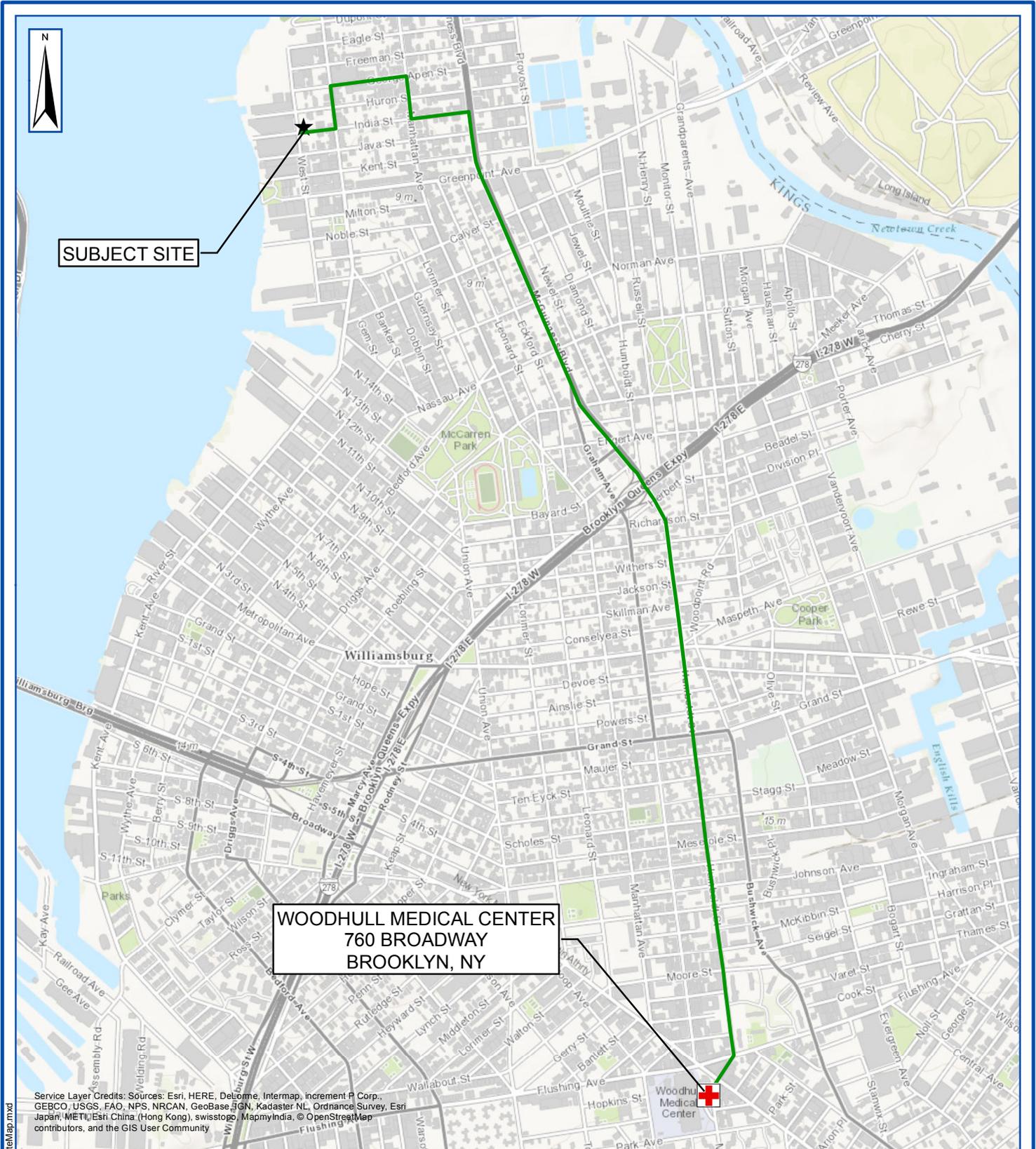
Under extreme emergency conditions, evacuation is to be immediate without regard for equipment. The evacuation signal will be a continuous blast of a vehicle horn, if possible, and/or by verbal/radio communication. When evacuating the site, personnel will follow these instructions:

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

entry/exit log.

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

FIGURE



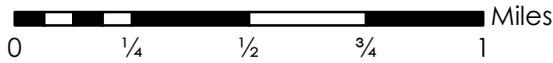
SUBJECT SITE

WOODHULL MEDICAL CENTER
760 BROADWAY
BROOKLYN, NY

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

HOSPITAL ROUTE MAP

144-146 West Street
Brooklyn, NY



Project:	API1501
Date:	8/12/2015
Designed by:	JL
Drawn by:	UC
Approved by:	JL
Figure No:	1

P.W. GROSSER CONSULTING ENGINEER AND HYDROGEOLOGIST, P.C.

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Document Path: G:\Projects\A-D\API\HospitalRouteMap.mxd

APPENDIX A
SITE SAFETY PLAN ACCEPTANCE AND ACKNOWLEDGMENT FORM

APPENDIX B
SITE SAFETY AMENDMENT FORM

SITE SAFETY PLAN AMENDMENT FORM

SITE SAFETY PLAN AMENDMENT # _____: _____

SITE NAME: _____

REASON FOR AMENDMENT: _____

ALTERNATIVE PROCEDURES: _____

REQUIRED CHANGES IN PPE: _____

PROJECT SUPERINTENDENT

DATE

HEALTH & SAFETY CONSULTANT

DATE

SITE SAFETY OFFICER

DATE

APPENDIX C

CHEMICAL HAZARDS

IMPORTANT DATA

Physical State; Appearance

ODOURLESS GREY TO BLUE POWDER.

Physical dangers

Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

Chemical dangers

Upon heating, toxic fumes are formed. The substance is a strong reducing agent and reacts violently with oxidants. Reacts with water and reacts violently with acids and bases forming flammable/explosive gas (hydrogen - see ICSC0001). Reacts violently with sulfur, halogenated hydrocarbons and many other substances causing fire and explosion hazard.

Occupational exposure limits

TLV not established.

Routes of exposure

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

Inhalation risk

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

Effects of short-term exposure

Inhalation of fumes may cause metal fume fever. The effects may be delayed.

Effects of long-term or repeated exposure

Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Boiling point: 907°C
Melting point: 419°C
Relative density (water = 1): 7.14

Solubility in water: reaction
Vapour pressure, kPa at 487°C: 0.1
Auto-ignition temperature: 460°C

ENVIRONMENTAL DATA

NOTES

Zinc may contain trace amounts of arsenic, when forming hydrogen, may also form toxic gas arsine (see ICSC0001 and ICSC0222). Reacts violently with fire extinguishing agents such as water, halons, foam and carbon dioxide. The symptoms of metal fume fever do not become manifest until several hours later. Rinse contaminated clothes (fire hazard) with plenty of water. Card has been partly updated in April 2005. See sections EU classification, Emergency Response.

ADDITIONAL INFORMATION

LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

ZINC POWDER**1205**
October 1994

CAS No: 7440-66-6 Blue powder
RTECS No: ZG8600000 Merrillite
UN No: 1436 (zinc powder or dust) (powder)
EC No: 030-001-00-1 Zn
 Atomic mass: 65.4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Highly flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with acid(s), base(s) and incompatible substances (see Chemical Dangers).	Special powder, dry sand, NO other agents. NO water.
EXPLOSION	Risk of fire and explosion on contact with acid(s), base(s), water and incompatible substances.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Prevent deposition of dust.	In case of fire: cool drums, etc., by spraying with water but avoid contact of the substance with water.

EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
Inhalation	Metallic taste and metal fume fever. Symptoms may be delayed (see Notes).	Local exhaust.	Fresh air, rest. Refer for medical attention.
Skin	Dry skin.	Protective gloves.	Rinse and then wash skin with water and soap.
Eyes		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Refer for medical attention.

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

EMERGENCY RESPONSE	SAFE STORAGE
Transport Emergency Card: TEC (R)-43GWS-II+III NFPA Code: H0; F1; R1	Fireproof. Separated from acids, bases oxidants. Dry.

IMPORTANT DATA

Physical State; Appearance

ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL.

Chemical dangers

Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams.

Occupational exposure limits

TLV: 0.025 mg/m³ as TWA; (skin); A4; BEI issued; (ACGIH 2004).
MAK: 0.1 mg/m³; Sh; Peak limitation category: II(8); Carcinogen category: 3B; (DFG 2003).

Routes of exposure

The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour!

Inhalation risk

A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20/C.

Effects of short-term exposure

The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated.

Effects of long-term or repeated exposure

The substance may have effects on the central nervous system and kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. May cause inflammation and discoloration of the gums. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Boiling point: 357/C
Melting point: -39/C
Relative density (water = 1): 13.5
Solubility in water: none

Vapour pressure, Pa at 20/C: 0.26
Relative vapour density (air = 1): 6.93
Relative density of the vapour/air-mixture at 20/C (air = 1): 1.009

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish.

NOTES

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

ADDITIONAL INFORMATION

LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

MERCURY

0056
April 2004

CAS No: 7439-97-6
RTECS No: OV4550000
UN No: 2809
EC No: 080-001-00-0

Quicksilver
Liquid silver
Hg
Atomic mass: 200.6

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.

EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
Inhalation	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
Skin	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
Eyes		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

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

EMERGENCY RESPONSE	STORAGE
Transport Emergency Card: TEC (R)-80GC9-II+III	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs. Well closed.

This information was last updated on May 20, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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Explosion limits:

Autoignition temperature: 510 C

Stability

Stable. Reacts violently with halogens, chlorinated solvents, chloromethane. Air and moisture sensitive. Incompatible with acids, acid chlorides, strong oxidizing agents. Highly flammable.

Toxicology

Harmful if swallowed or inhaled. Severe irritant. Vesicant.

Risk phrases

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

R11 R20 R22.

Transport information

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

Hazard class 4.1 Packing group III

Personal protection

Safety glasses.

Safety phrases

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

S16 S26 S33 S36 S37 S39.

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

IMPORTANT DATA

Physical State; Appearance

BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

Physical dangers

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

Chemical dangers

On heating, toxic fumes are formed. Reacts with oxidants. Reacts with hot concentrated nitric acid, boiling concentrated hydrochloric acid and sulfuric acid. Attacked by pure water and by weak organic acids in the presence of oxygen.

Occupational exposure limits

TLV: 0.05 mg/m³ as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued; (ACGIH 2004).
MAK: Carcinogen category: 3B; Germ cell mutagen group: 3A; (DFG 2004).
EU OEL: as TWA 0.15 mg/m³; (EU 2002).

Routes of exposure

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

Inhalation risk

A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

Effects of long-term or repeated exposure

The substance may have effects on the blood, bone marrow, central nervous system, peripheral nervous system and kidneys, resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 1740/C
Melting point: 327.5/C

Density: 11.34 g/cm³
Solubility in water: none

ENVIRONMENTAL DATA

Bioaccumulation of this chemical may occur in plants and in mammals. It is strongly advised that this substance does not enter the environment.

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.
Do NOT take working clothes home.
Card has been partly updated in April 2005. See section Occupational Exposure Limits.

ADDITIONAL INFORMATION

LEGAL NOTICE

Neither the EC nor the IPCS nor any person acting on behalf of the EC or the IPCS is responsible

CAS No: 7439-92-1
RTECS No: OF7525000

Lead metal
Plumbum
(powder)
Pb
Atomic mass: 207.2

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/SYMPTOMS	PREVENTION	FIRST AID/FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	

EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
Inhalation		Local exhaust or breathing protection.	Fresh air, rest.
Skin		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
Eyes		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

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

EMERGENCY RESPONSE	SAFE STORAGE
	Separated from food and feedstuffs and incompatible materials. See Chemical Dangers.

Transport information

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

UN No 2761. Hazard class 6.1. Packing group II.

Personal protection

Safety glasses and gloves. Use only in a well-ventilated area.

Safety phrases

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

S36 S37 S45 S60 S61.

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

This information was last updated on October 4, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

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Vapour pressure:

Density (g cm⁻³): 1.58

Flash point:

Explosion limits:

Autoignition temperature:

Water solubility:

Stability

Stable. Non-combustible. Incompatible with strong alkali, oxidizing agents. Corrodes many metals.

Toxicology

Toxic if inhaled, swallowed or absorbed through the skin. Readily absorbed through the skin. Possible carcinogen. May cause systemic effects.

Toxicity data

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

ORL-RAT LD50 40 mg kg⁻¹

SKN-RAT LD50 119 mg kg⁻¹

IPR-RAT LD50 27 mg kg⁻¹

ORL-MUS LD50 68 mg kg⁻¹

IVN-MUS LD50 20 mg kg⁻¹

SKN-GPG LDLO 1000 mg kg⁻¹

Risk phrases

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

R24 R25 R33 R40 R50 R53.

Environmental information

Toxic in the environment - very harmful to aquatic systems. May cause long-term damage.

IMPORTANT DATA

Physical State; Appearance

RED POWDER, TURNS GREEN ON EXPOSURE TO MOIST AIR.

Chemical Dangers

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

Occupational Exposure Limits

TLV: ppm; 0.2 mg/m³ fume (ACGIH 1992-1993).
TLV (as Cu, dusts & mists): ppm; 1 mg/m³ (ACGIH 1992-1993).

Routes of Exposure

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

Inhalation Risk

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

Effects of Short-term Exposure

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

Effects of Long-term or Repeated Exposure

Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES

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

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

ENVIRONMENTAL DATA

NOTES

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

ADDITIONAL INFORMATION

LEGAL NOTICE

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

COPPER**0240**

September 1993

CAS No: 7440-50-8
 RTECS No: GL5325000
 UN No:
 EC No:

Cu
 Atomic mass: 63.5

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

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

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder. Then remove to safe place (extra personal protection: P2 filter respirator for harmful particles).	Symbol R: S:

EMERGENCY RESPONSE	STORAGE
	Separated from: see Chemical Dangers.



Disclaimer

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

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

Not regulated.

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

cis-Chlordane (CAS 5103-71-9)

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

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

US. Pennsylvania RTK - Hazardous Substances

cis-Chlordane (CAS 5103-71-9)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

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

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

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

International Inventories

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

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

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

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

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

DOT



IATA; IMDG



Marine pollutant



15. Regulatory information

US federal regulations

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

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

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

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

SARA 304 Emergency release notification

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

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

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

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

SARA 302 Extremely hazardous substance

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

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

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

Other federal regulations

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

cis-Chlordane (CAS 5103-71-9)

13. Disposal considerations

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

US RCRA Hazardous Waste U List: Reference

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

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

14. Transport information

DOT

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

IATA

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

IMDG

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

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

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

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

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

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

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

Respiratory or skin sensitization

Respiratory sensitization Not available.

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

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

Carcinogenicity Suspected of causing cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

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

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

Not listed.

Reproductive toxicity Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not available.

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

12. Ecological information

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

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

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

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

Bioaccumulative potential Not available.

Partition coefficient n-octanol / water (log Kow)

5.16

Mobility in soil No data available.

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

PCB 1254 (cas 11097-69-1) MSDS

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers

Product name : Aroclor 1254

Product Number : 48586
 Brand : Supelco
 CAS-No. : 11097-69-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]

Specific target organ toxicity - repeated exposure (Category 2)
 Acute aquatic toxicity (Category 1)
 Chronic aquatic toxicity (Category 1)

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Danger of cumulative effects.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008 [CLP]

Pictogram



Signal word : Warning

Hazard statement(s)

H373 : May cause damage to organs through prolonged or repeated exposure.
 H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

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

Supplemental Hazard Statements

none

According to European Directive 67/548/EEC as amended.

Hazard symbol(s)



R-phrase(s)

R33 : Danger of cumulative effects.
 R50/53 : Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-phrase(s)

S35 : This material and its container must be disposed of in a safe way.
 S60 : This material and its container must be disposed of as hazardous waste.
 S61 : Avoid release to the environment. Refer to special instructions/ Safety data sheets.

2.3 Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Component	Concentration
-----------	---------------

Aroclor 1254

CAS-No.	11097-69-1	-
Index-No.	602-039-00-4	

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

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. 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.

4.2 Most important symptoms and effects, both acute and delayed

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

4.3 Indication of any immediate medical attention and special treatment needed

no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

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

5.2 Special hazards arising from the substance or mixture

Nature of decomposition products not known.

5.3 Advice for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information

no data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 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.

6.3 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.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

7.2 Conditions for safe storage, including any incompatibilities

Store in cool place. 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.

7.3 Specific end uses

no data available

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

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

Personal protective equipment

Eye/face 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 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.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

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.

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).

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

- | | |
|---|-------------------|
| a) Appearance | Form: liquid |
| b) Odour | no data available |
| c) Odour Threshold | no data available |
| d) pH | no data available |
| e) Melting point/freezing point | no data available |
| f) Initial boiling point and boiling range | no data available |
| g) Flash point | no data available |
| h) Evaporation rate | no data available |
| i) Flammability (solid, gas) | no data available |
| j) Upper/lower flammability or explosive limits | no data available |
| k) Vapour pressure | no data available |
| l) Vapour density | no data available |
| m) Relative density | no data available |
| n) Water solubility | no data available |
| o) Partition coefficient: n-octanol/water | no data available |
| p) Autoignition temperature | no data available |
| q) Decomposition temperature | no data available |
| r) Viscosity | no data available |
| s) Explosive properties | no data available |
| t) Oxidizing properties | no data available |

9.2 Other safety information

no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

no data available

10.2 Chemical stability

no data available

10.3 Possibility of hazardous reactions

no data available

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Strong oxidizing agents

10.6 Hazardous decomposition products

Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - rat - 1.010 mg/kg

Skin corrosion/irritation

no data available

Serious eye damage/eye irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

Genotoxicity in vitro - rat - liver

Unscheduled DNA synthesis

Genotoxicity in vitro - rat - Liver

DNA damage

Genotoxicity in vitro - mouse - fibroblast

Morphological transformation.

Genotoxicity in vivo - rat - Oral

Morphological transformation.

Genotoxicity in vivo - rat - Intraperitoneal

DNA damage

Genotoxicity in vivo - rat - Oral

DNA damage

Carcinogenicity

Carcinogenicity - rat - Oral

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal: Tumors.

Carcinogenicity - rat - Oral

Tumorigenic: Carcinogenic by RTECS criteria. Liver: Tumors.

Carcinogenicity - mouse - Skin

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.

Tumorigenic: Tumors at site or application.

Carcinogenicity - rat - Oral

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal: Tumors.

Carcinogenicity - mouse - Oral

Tumorigenic: Neoplastic by RTECS criteria. Liver: Tumors.

Carcinogenicity - mouse - Intraperitoneal

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Tumorigenic Effects: Uterine tumors. Lungs, Thorax, or Respiration: Tumors.

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.

Reproductive toxicity

Reproductive toxicity - rabbit - Oral

Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Fertility: Abortion. Effects on Embryo or Fetus: Fetal death.

Reproductive toxicity - rabbit - Oral

Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - rat - Oral

Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - rat - Oral

Effects on Newborn: Behavioral.

Reproductive toxicity - rat - Oral

Effects on Newborn: Delayed effects.

Reproductive toxicity - rat - Intraperitoneal

Maternal Effects: Other effects. Effects on Newborn: Biochemical and metabolic.

Reproductive toxicity - mouse - Oral

Effects on Newborn: Behavioral.

Reproductive toxicity - Mammal - Oral

Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated).

Developmental Toxicity - rat - Oral

Specific Developmental Abnormalities: Hepatobiliary system.

Specific target organ toxicity - single exposure

no data available

Specific target organ toxicity - repeated exposure

May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard

no data available

Potential health effects

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

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information

RTECS: Not available

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0,22 µg/l - 96,0 h
Toxicity to algae	LC50 - Algae - 0,015 mg/l - 28 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Pimephales promelas (fathead minnow) - 8 Months -1,8 µg/l
	Bioconcentration factor (BCF): 238.000

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

no data available

12.6 Other adverse effects

Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

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

14.1 UN number

ADR/RID: 2315	IMDG: 2315	IATA: 2315
---------------	------------	------------

14.2 UN proper shipping name

ADR/RID:	POLYCHLORINATED BIPHENYLS, LIQUID
IMDG:	POLYCHLORINATED BIPHENYLS, LIQUID
IATA:	Polychlorinated biphenyls, liquid

14.3 Transport hazard class(es)

ADR/RID: 9	IMDG: 9	IATA: 9
------------	---------	---------

14.4 Packaging group

ADR/RID: II	IMDG: II	IATA: II
-------------	----------	----------

14.5 Environmental hazards

ADR/RID: yes

IMDG Marine pollutant: yes

IATA: no

14.6 Special precautions for user

no data available

15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

no data available

15.2 Chemical Safety Assessment

no data available

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 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. guidechem shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MATERIAL SAFETY DATA SHEET

ERA A Waters Company

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: ERA BUSINESS PHONE: 303-431-8454
ADDRESS: 16341 Table Mountain Parkway FAX: 303-421-0159 EMAIL: info@eraqc.com
Golden, CO, 80403 U.S.A. CHEMICAL EMERGENCY PHONE: 352-535-5053 (INFOTRAC)

Product Name(s): Chlordane in Soil, PriorityPollutnT™, Toxaphene in Soil, PriorityPollutnT™

Catalog / Part Number(s): 627, 627ASL1-4, 628, 628AL1-4, 724, 725, 186004319, 186004320

MSDS Creation Date: November 22, 2005

Revision Date: July 19, 2012

MSDS Reference Number: 628-725

SECTION 2: HAZARDS IDENTIFICATION

Not hazardous according to Directive 199/45/EC. Use only as directed and in accordance with good laboratory practices.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL INGREDIENT NAME	CAS NUMBER	EC NUMBER	% BY WT.	EXPOSURE LIMITS		EU LABEL
				OSHA	ACGIH	HAZARD LABEL
No Hazardous Ingredients	NA	NA	NA	NA	NA	NA

Notes: Each product is 20-50 grams of an internal standard containing a mixture of organic chemicals & polychlorinated camphenes with levels <0.00005 % dried in inert clean topsoil/sand. The soil may contain silica, crystalline – quartz. The sample is solid, loose dirt and does not contain liquid. Considered Non-Hazardous under OSHA 1910.1200 (HazCom) as product contains no known or potential carcinogens in excess of 0.1% of the composition nor any other hazardous chemical in excess of 1% of the composition.

Material Use: Analytical reagent or certified reference material used in laboratories. Uses also include research and development.

SECTION 4: FIRST-AID MEASURES

Inhalation: Remove to fresh air.

Skin Contact: Flush with water.

Eye Contact: Immediately flush with water for a minimum of 15 minutes.

Ingestion: Get medical attention.

After following first aid measures, seek medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

Flammable Properties: Not flammable.

Extinguishing Media: Dry chemical, carbon dioxide or appropriate foam.

Unique Aspects Contributing To a Fire: None.

Special Fire Fighting Procedures: None.

Note: As in any fire, wear self-contained breathing apparatus, and full protective gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Sweep up dirt and avoid creating dust. Place wastes into closed containers for proper disposal.

SECTION 7: HANDLING AND STORAGE

Keep container tightly closed. Store in a cool dry place. Handle in accordance with good laboratory practices. This product is intended for use only by people trained in the safety and handling of chemicals and laboratory preparations.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Handle in accordance with good laboratory practices.

Respiratory Protection: Not normally needed. May use HEPA or nuisance dust mask to reduce inhalation of dust.

Eye Protection: Safety glasses with side shields.

Skin Protection: Neoprene or other chemical resistant gloves. Disposable nitrile gloves are acceptable for light intermittent exposure.

Engineering Controls: Work in a fume hood or use general or other local exhaust ventilation to meet Exposure Limits.

MATERIAL SAFETY DATA SHEET

ERA A Waters Company

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

DATA FOR MIX/MATRIX:

Appearance:	brown soil or blond sand	Specific Gravity:	NA	Melting Point:	NA
Physical State:	Solid	Flash Point:	NA	Vapor Pressure:	NA
Odor:	NA	Explosion Limits:	NA	Vapor Density (air=1):	NA
pH:	NA	Boiling Point:	NA	Solubility in Water:	NA

SECTION 10: STABILITY AND REACTIVITY

Hazardous Polymerization Will Not Occur May Occur Stability: Stable Unstable
Hazardous Decomposition/Combustion Products: NA
Conditions and Materials to Avoid: NA

SECTION 11: TOXICOLOGICAL INFORMATION

Primary Route(s) of Exposure Under Normal Use: NA

Target Organ(s): NA

Acute Effects: NA

Chronic Effects: NA

Other Information: Chemical Ingredient(s) not classified as carcinogen(s) by OSHA, IARC, NTP, ACGIH, or California.

SECTION 12: ECOLOGICAL INFORMATION

No information available on this preparation or mixture. By complying with sections 6 & 7 there will be no release into the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

To determine proper disposal, consult applicable federal, state and local environmental control regulations.

SECTION 14: TRANSPORT INFORMATION

Shipment Name/Type: Non-hazardous for transport.
UN Number: NA Shipping/Hazardous Class: NA Packing Group: NA
Shipping regulations are based on combinations of criteria such as quantity, class and packaging according to DOT, IATA and (49) CFR.

SECTION 15: REGULATORY INFORMATION

EU Symbol of Danger: NA
EU Risk Phrases: NA

U.S. TSCA: NA
Canada: This product has been classified according to the hazard criteria of the CPR and this MSDS contains all the information required by the CPR.

SECTION 16: OTHER INFORMATION

United States EPA Regulatory Information:	NFPA Rating:	Health: NA	Flammability: NA	Reactivity: NA
SARA 313: NA	HMIS Rating:	Health: NA	Flammability: NA	Physical Hazard: NA
CERCLA RQ: NA				

NOTE: NA = Data not available, not established, determined or not pertinent.

DISCLAIMER: The information contained herein has been compiled from data presented in various technical sources believed to be accurate. This information is intended to be used only as a guide and does not purport to be complete. ERA makes no warranties and assumes no liability in connection with the use of this information. It is the user's responsibility to determine the suitability of this information and to assure the adoption of necessary precautions.

Chem Service Inc. Material Safety Data Sheet

Last Revised On: 11/3/2011

SECTION 1 - CHEMICAL PRODUCT and COMPANY IDENTIFICATION

Catalog Number: S-10875M1
Description: 4,4'-DDE
Product is: Solution
Other Name(s): 1,1-Dichloro-2,2-bis[p-chlorophenyl]ethylene/p,p'-DDE/1,1
-(Dichloroethenylidene)bis[4-chlorobenzene]
Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA 19381 (610)-692-3026
EMERGENCY PHONE: 1-610-692-3026

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

CAS No.: 72-55-9
Description: 4,4'-DDE Solution
Concentration: 100ug/mL in Methanol
EINECS No.: 200-784-6
Hazard Symbols: XN

SECTION 3 - HAZARDS IDENTIFICATION

Contact lenses should not be worn in the laboratory. All chemicals should be considered hazardous - Avoid direct physical contact!

For the solvent: Methanol

Health Risks: May be fatal if absorbed through the skin! Repeated exposure to vapors and/or dust can cause eye injury. May be fatal if inhaled! Can cause cardiovascular system injury. Exposure can cause liver damage. Exposure can cause kidney damage. May be fatal or cause blindness if swallowed. Can cause gastro-intestinal disturbances. Can cause convulsions.

Property 65: Data Not Available

SECTION 4 - FIRST AID MEASURES

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.

For the solvent: Methanol

First Aid: In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If patient has stopped breathing administer artificial respiration. If patient is in cardiac arrest administer CPR. Continue life supporting measures until medical assistance has arrived. Do not wear shoes or clothing until absolutely free of all chemical odors. Get medical attention if necessary. If no burns have occurred-use soap and water to cleanse skin. If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If swallowed do not induce vomiting.

SECTION 5 - FIRE AND EXPLOSION DATA

For the solvent: Methanol

Flash Point: 11°C This is a flammable chemical.

Extinguishing Media: Carbon dioxide or dry chemical powder. DO NOT USE WATER!

Upper Explosion Limit: 36%

Lower Explosion Limit: 6.0%

Autoignition Temperature: 464°C

NFPA Scale: 0 - Least, 1 - Slight, 2 - Moderate, 3 - High, 4 - Severe

NFPA Hazard Rating: Health: 1. Reactivity: 0. Flammability: 3. Special: No Data.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spills or Leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area.

Absorb on vermiculite or similar material. Sweep up and place in an appropriate container.

Hold for disposal.

Wash contaminated surfaces to remove any residue.

Remove contaminated clothing and wash before reuse.

SECTION 7 - HANDLING AND STORAGE

Handling: This chemical should be handled only in a hood. Eye shields should be worn.

Use appropriate OSHA/MSHA approved safety equipment. Avoid contact with skin, eyes and clothing. Avoid ingestion and inhalation. Wash thoroughly after handling.

Storage:

Store in a cool dry place. Store only with compatible chemicals.

Keep tightly closed.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

For the solvent: Methanol

OSHA PEL (TWA): 200 ppm (260 mg/m³)

ACGIH TLV (TWA): 200 ppm (262 mg/m³)

ACGIH TLV (STEL): Data Not Available

Personal Protective Equipment

Eyes: Wear Safety Glasses.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 requirements must be followed whenever workplace conditions warrant a respirators use.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

For the solvent: Methanol

Color: Colorless

Phase: Liquid

Melting Point: -98°C

Boiling Point: 64.6°C

Specific Gravity: 0.791g/mL

Vapor Density: 1.11

Vapor Pressure: 130.3 hPa @ 20°C

Solubility in Water: Completely miscible.

Odor: Data Not Available

Evaporation Rate (Butyl acetate=1): Data Not Available

Molecular Weight: 32.05
Molecular Formula: CH4O

SECTION 10 - STABILITY AND REACTIVITY

For the solvent: Methanol

Reacts with Acid halides and anhydrides. Flammable. Incompatible with strong acids. Incompatible with strong reducing agents. Incompatible with strong oxidizing agents. Decomposition liberates toxic fumes. Hygroscopic. Incompatible with active metals (e.g. Sodium).

SECTION 11 - TOXICOLOGY INFORMATION

The primary hazards for this solution are predominantly from the solvent.

For the solvent: Methanol

RTECS: PC1400000

Oral Rat or Mouse LD50: 5628 mg/kg

Dermal Rat or Mouse LD50: N/A mg/kg

Rat or Mouse LC50 : 64000 ppm/8H

Carcinogenicity

OSHA: NO

IARC: NO

NTP: NO

ACGIH: NO

NIOSH: NO

Other: NO

Property 65: Data Not Available

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity: Not Available

Environmental Fate: Not Available

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal: Dispose in accordance with Federal, State and Local regulations.

SECTION 14 - TRANSPORTATION INFORMATION

For the solvent: Methanol

UN Number: UN1230

Class: 3

Packing Group: II

Proper Shipping Name: Methanol

SECTION 15 - REGULATORY INFORMATION

For the solvent: Methanol

European Labeling in Accordance with EC Directives

Hazard Symbols: T F

Risk Phrases

R11 Highly Flammable.

R23/25 Toxic by inhalation and if swallowed.

Safety Phrases

S16 Keep away from sources of ignition- No smoking.

S2 Keep out of reach of children.

- S24 Avoid contact with the skin.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).
S7 Keep container tightly closed

SECTION 16 - OTHER INFORMATION

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

Persons not specifically and properly trained should not handle this chemical or its container. This product is furnished FOR LABORATORY USE ONLY! Our products may NOT BE USED as drugs, cosmetics, agricultural or pesticide products, food additives or as household chemicals.

This Material Safety Data Sheet (MSDS) is intended only for use with Chem Service, Inc. products and should not be relied on for use with materials from any other supplier even if the chemical name(s) on the product are identical! Whenever using an MSDS for a solution or mixture the user should refer to the MSDS for every component of the solution or mixture. Chem Service warrants that this MSDS is based upon the most current information available to Chem Service at the time it was last revised. THIS WARRANTY IS EXCLUSIVE, AND CHEM SERVICE, INC. MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. This MSDS is provided gratis and CHEM SERVICE, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR CONTINGENT DAMAGES. Copyright © 2011 Chem Service, Inc. All rights reserved except that this MSDS may be printed for the use of a customer or prospective customer of Chem Service, Inc provided the entire MSDS is printed. The MSDS may not be placed in any database or otherwise stored or distributed in electronic or any other form.

This product is furnished FOR LABORATORY USE ONLY!

MSDS # 84.00

Barium Metal**Section 1: Product and Company Identification****Barium Metal****Synonyms/General Names:** Barium**Product Use:** For educational use only**Manufacturer:** Columbus Chemical Industries, Inc., Columbus, WI 53925.**24 Hour Emergency Information Telephone Numbers****CHEMTREC (USA): 800-424-9300****CANUTEC (Canada): 613-424-6666**

ScholarAR Chemistry; 5100 W. Henrietta Rd, Rochester, NY 14586; (866) 260-0501; www.Scholarchemistry.com

Section 2: Hazards Identification*Soft, silvery, lustrous metal immersed in heavy mineral oil; no odor.***HMIS (0 to 4)**

Health	3
Fire Hazard	3
Reactivity	2

WARNING! Flammable solid, dangerous when wet, highly toxic by ingestion.

Flammable solid, keep away from all ignition sources. Contact with water produces flammable gas.

Target organs: Central nervous system, kidneys.

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Section 3: Composition / Information on Ingredients

Barium Metal (7440-39-3), 100%

Section 4: First Aid Measures*Always seek professional medical attention after first aid measures are provided.***Eyes:** Immediately flush eyes with excess water for 15 minutes, lifting lower and upper eyelids occasionally.**Skin:** Immediately flush skin with excess water for 15 minutes while removing contaminated clothing.**Ingestion:** Call Poison Control immediately. Rinse mouth with cold water. Give victim 1-2 tbsps of activated charcoal mixed with 8 oz water.**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration.**Section 5: Fire Fighting Measures**

Flammable solid. When heated to decomposition, emits acrid fumes and explosive hydrogen gas.

Protective equipment and precautions for firefighters: Do Not Use carbon dioxide, foam, water or halogenated extinguishing agents. Use class D extinguisher or smother with dry sand, dry clay, dry ground limestone or dry graphite. Firefighters should wear full fire fighting turn-out gear and respiratory protection (SCBA).
Material is not sensitive to mechanical impact or static discharge.**Section 6: Accidental Release Measures**

Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Remove all ignition sources and ventilate area. Sweep up spill and place material in a dry container for disposal. See Section 13 for disposal information.

Section 7: Handling and Storage**Red****Handling:** Use with adequate ventilation and do not breathe dust or vapor. Avoid contact with skin, eyes, or clothing. Wash hands thoroughly after handling.**Storage:** Store in Flammable Area [Red Storage] with other flammable materials and away from any strong oxidizers. Store in a dedicated flammables cabinet. Store in a cool, dry, well-ventilated, locked store room away from incompatible materials.**Section 8: Exposure Controls / Personal Protection**Use ventilation to keep airborne concentrations below exposure limits. Have approved eyewash facility, safety shower, and fire extinguishers readily available. Wear chemical splash goggles and chemical resistant clothing such as gloves and aprons. Wash hands thoroughly after handling material and before eating or drinking. Use NIOSH-approved respirator with a dust cartridge. Exposure guidelines: Barium compounds: OSHA PEL: 0.5 mg/m³ and ACGIH TLV: 0.5 mg/m³, STEL: N/A.

Section 9: Physical and Chemical Properties

Molecular formula	Ba.	Appearance	Silver metal in heavy mineral oil.
Molecular weight	137.33.	Odor	No odor.
Specific Gravity	3.62 g/mL @ 20°C..	Odor Threshold	N/A.
Vapor Density (air=1)	N/A.	Solubility	Reacts violently with water.
Melting Point	850°C.	Evaporation rate	N/A (<i>Butyl acetate = 1</i>).
Boiling Point/Range	1695°C.	Partition Coefficient	N/A (<i>log P_{ow}</i>).
Vapor Pressure (20°C)	N/A.	pH	N/A.
Flash Point:	N/A.	UEL	N/A.
Autoignition Temp.:	N/A.	LEL	N/A.

N/A = Not available or applicable

Section 10: Stability and Reactivity

Avoid heat and ignition sources

Stability: Stable under normal conditions of use.**Incompatibility:** Water, acids, chlorine, iodine, bromine and oxidizing agents.**Shelf life:** Indefinite if stored properly.**Section 11: Toxicology Information****Acute Symptoms/Signs of exposure:** *Eyes:* Stinging pain, burns, watering of eyes, inflammation of eyelids and conjunctivitis. Avoid looking at burning magnesium. *Skin:* Irritation, redness, burns. Powdered metal ignites readily on skin causing burns.*Ingestion:* Nausea, vomiting and headache. *Inhalation:* Rapid irregular breathing, headache, burns to mucous membranes. Inhalation of dust or fumes causes metal fume fever.**Chronic Effects:** Repeated/prolonged skin contact may cause dryness or rashes.**Sensitization:** none expected*Barium: LD50 [oral, rat]; Not Available; LC50 [rat]; Not Available; LD50 Dermal [rabbit]; Not Available*
*Material has not been found to be a carcinogen nor produce genetic, reproductive, or developmental effects.***Section 12: Ecological Information****Ecotoxicity (aquatic and terrestrial):** LC50 – 500mg/l – 96h – Cyprinodon variegates.**Section 13: Disposal Considerations**

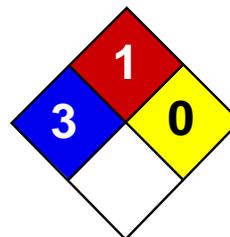
Check with all applicable local, regional, and national laws and regulations. Local regulations may be more stringent than regional or national regulations. Use a licensed chemical waste disposal firm for proper disposal.

Section 14: Transport Information

DOT Shipping Name:	Barium.	Canada TDG:	Barium .
DOT Hazard Class:	4.3, pg II.	Hazard Class:	4.3, pg II.
Identification Number:	UN1400.	UN Number:	UN1400.

Section 15: Regulatory Information**EINECS:** Listed (231-149.1) .**WHMIS Canada:** B6:D2B: Reactive Flammable: Toxic Material.**TSCA:** All components are listed or are exempt.**California Proposition 65:** Not listed.*The product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.***Section 16: Other Information****Current Issue Date:** September 22, 2012

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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:

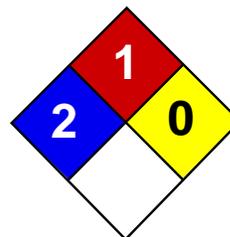
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Industrial 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 dangereuses au Canada. Centre de conformité international 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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Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Chromium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chromium

Catalog Codes: SLC4711, SLC3709

CAS#: 7440-47-3

RTECS: GB4200000

TSCA: TSCA 8(b) inventory: Chromium

CI#: Not applicable.

Synonym: Chromium metal; Chrome; Chromium Metal Chips 2" and finer

Chemical Name: Chromium

Chemical Formula: Cr

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
Chromium	7440-47-3	100

Toxicological Data on Ingredients: Chromium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

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 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.

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: 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: May be combustible at high temperature.

Auto-Ignition Temperature: 580°C (1076°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:

Slightly flammable to 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:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame. Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence. Pyrophoric chromium unites with nitric oxide with incandescence. Incandescent reaction with nitrogen oxide or sulfur dioxide.

Special Remarks on Explosion Hazards:

Powdered Chromium metal +fused ammonium nitrate may react violently or explosively. Powdered Chromium will explode spontaneously in air.

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. 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. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

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 (mg/m³) from ACGIH (TLV) [United States] TWA: 1 (mg/m³) from OSHA (PEL) [United States] TWA: 0.5 (mg/m³) from NIOSH [United States] TWA: 0.5 (mg/m³) [United Kingdom (UK)] TWA: 0.5 (mg/m³) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 52 g/mole

Color: Silver-white to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 2642°C (4787.6°F)

Melting Point: 1900°C (3452°F) +/- !0 deg. C

Critical Temperature: Not available.

Specific Gravity: 7.14 (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. Soluble in acids (except Nitric), and strong alkalies.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:

Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalies and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride. It may react violently or ignite with bromine pentafluoride. Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate. Potentially hazardous incompatibility with strong oxidizers.

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: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: May cause skin irritation. Eyes: May cause mechanical eye irritation. Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea. Chronic Potential Health Effects: Inhalation: The effects of chronic exposure include irritation, sneezing, redness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconiosis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur. Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

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: 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:**

Connecticut hazardous material survey.: Chromium Illinois toxic substances disclosure to employee act: Chromium Illinois chemical safety act: Chromium New York release reporting list: Chromium Rhode Island RTK hazardous substances: Chromium Pennsylvania RTK: Chromium Minnesota: Chromium Michigan critical material: Chromium Massachusetts RTK: Chromium Massachusetts spill list: Chromium New Jersey: Chromium New Jersey spill list: Chromium Louisiana spill reporting: Chromium California Director's List of Hazardous Substances: Chromium TSCA 8(b) inventory: Chromium SARA 313 toxic chemical notification and release reporting: Chromium CERCLA: Hazardous substances.: Chromium: 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): Not controlled under WHMIS (Canada).

DSCL (EEC):

R40- Limited evidence of carcinogenic effect S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

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. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:16 PM

Last Updated: 05/21/2013 12:00 PM

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 4,4'-DDT

Product Number : 386340
Brand : Aldrich

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

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

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

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards

Carcinogen, Toxic by ingestion, Toxic by skin absorption

Target Organs

Liver, Pancreas.

GHS Classification

Acute toxicity, Dermal (Category 3)

Acute toxicity, Oral (Category 3)

Carcinogenicity (Category 2)

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

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 4)

GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H301 + H311

Toxic if swallowed or in contact with skin

H351

Suspected of causing cancer.

H372

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

H400

Very toxic to aquatic life.

H413

May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P273

Avoid release to the environment.

P280

Wear protective gloves/ protective clothing.

P301 + P310

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

P314

Get medical advice/ attention if you feel unwell.

APPENDIX D
FIELD ACCIDENT REPORT

FIELD ACCIDENT REPORT

This report is to be filled out by the designated Site Safety Officer after EVERY accident.

PROJECT NAME: _____ PROJECT. NO.: _____

Date of Accident: _____ Time: _____ Report By: _____

Type of Accident (Check One):

Vehicular Personal Property

Name of Injured: _____ DOB or Age _____

How Long Employed: _____

Names of Witnesses: _____

Description of Accident: _____

Action Taken: _____

Did the Injured Lose Any Time? _____ How Much (Days/Hrs.)? _____

Was Safety Equipment in Use at the Time of the Accident (Hard Hat, Safety Glasses, Gloves, Safety Shoes, etc.)? _____

(If not, it is the EMPLOYEE'S sole responsibility to process his/her claims through his/her Health and Welfare Fund.)

INDICATE STREET NAMES, DESCRIPTION OF VEHICLES, AND NORTH ARROW

