100 UNION AVENUE

BROOKLYN, NEW YORK

Remedial Action Work Plan

OER Project Number: 14EHA461K
NYC VCP Number: 16CVCP018K

Prepared For:

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OCTOBER 2015

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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, Shaik A. Saad, 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 100 Union Avenue, Brooklyn, New York site, site number 16CVCP018K. 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.

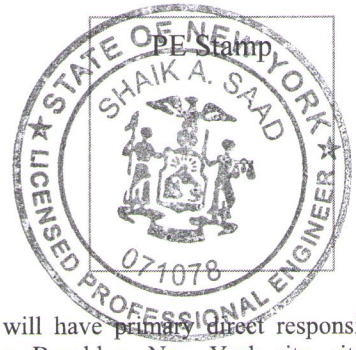
SHAIK SAAD
Name

071078
PE License Number

Signature

Date

PE Stamp



I, Mark E. Robbins, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 100 Union Avenue, Brooklyn, New York site, site number 16CVCP018K. 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.

Mark E. Robbins
QEP Name

QEP Signature

Date

EXECUTIVE SUMMARY

MGM Property Group is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 10,566-square foot site located at 100 Union Avenue 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 100 Union Avenue in the Broadway Triangle section of Brooklyn, New York and is identified as Block 2242 and Lot 3 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 10,566-square feet and is bounded by Middleton Street to the north, a vacant undeveloped lot to the south, Union Avenue to the west and a parking lot and a multi-story residential building to the east. A map of the site boundary is shown in Figure 2. Currently, the Site is occupied by Knights Collision and Towing and is developed with a 1-story building used for tow truck repairs in the northern portion and the remaining portion consists of an auto salvage yard.

Summary of Redevelopment Plan

The proposed future use of the Site will consist of a new 7-story residential slab on grade building. The proposed building footprint will be 7,106 square feet. The remaining portion of the Site to the east of the structure will consist of an open area and will be utilized as a paved rear parking lot. The first floor of the structure will consist of a mechanical/utility room located in the northern portion of the structure and a lobby with an elevator located in the southern portion of the structure, with an open-air car port, which provides access to the eastern parking area, situated between the two rooms. The proposed development is presented in Figure 3. The current zoning designation is R6A with a commercial overlay of C2-4. The proposed use is consistent with existing zoning for the property. The total gross area of the structure is calculated to be 32,743 square feet. The building slab will consist of 10-inch thick reinforced concrete at grade

with deep foundation piles and their associated pile caps built integral with the first floor. No basement is associated with the structure, thus the only significant excavations are for a detention tank with a total depth of 8-feet below grade and an elevator pit with a total depth of 9-feet below grade.

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

Summary of Surrounding Property

Within a 500 feet radius of the Site, there are a variety of land uses including: residential (multi-story residential apartments), commercial, parking, industrial, institutions and vacant properties. Properties located within a 1/4-mile radius of the Site are zoned R6, R6B, R7A, R7-1 (general residential districts), C1-3, C2-1 C2-2 (general commercial districts) and M1-3 and M3-1 (light manufacturing districts). No sensitive receptor is identified within a 250-foot radius of the Site. The land uses include residential buildings, industrial uses, institutions and vacant lots.

Figure 4 shows surrounding land usage.

Summary of Past Site Uses and Areas of Concern

Based upon the review of the Fire Insurance Maps and Regulatory Agency documents from the Phase I Environmental Site Assessment (ESA) Reports prepared by Hydro Tech Environmental Corp. in January 2014 a Site history was established. The Site was occupied by a church and residential dwellings between 1887 and 1935. The Site became vacant and undeveloped in 1950. The Site was utilized for auto sales with a one story building in the northern portion between 1965 and 1991 and an auto repair shop and junkyard from 1992 until present.

The AOCs identified for this site include:

- The historical use of the property of auto repairs and an auto junk yard;
- The presence of a NYC Little “E” Designation for Hazmat and Air;
- The historical presence of underground storage tanks;
- The suspect presence of underground storage tanks; and
- The presence of an oil-water separator

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. Performed a Ground Penetrating Radar (GPR) survey over all accessible portions (approximately 60%) of the Site;
3. Installed six (6) soil borings across the entire project Site, and collected twelve (12) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed four (4) groundwater monitoring wells throughout the Site to establish groundwater flow and collected four (4) groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed four (4) soil vapor probes around Site perimeter and collected four (4) samples for chemical analysis.
6. One (1) outdoor air sample was collected for chemical analysis.

Summary of Findings of Remedial Investigation

1. Elevation of the property is 16 feet.
2. No anomalies indicative of USTs were identified during the GRP survey
3. Depth to groundwater ranges from 6.82 feet to 9.74 feet at the Site.
4. Groundwater flow is generally from north-northeast to south-southwest beneath the Site.
5. The stratigraphy of the site, from the surface down, consists of historic fill with variable thickness ranging between zero and 8 feet (brown coarse grained sand with varying amounts of bricks and pebbles). Boring logs describing surface conditions are presented in Appendix D.
6. Twelve soil/fill samples collected during the remedial investigation were compared to 6NYCRR Part 375-6.8 Track 1 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Track 2 Restricted Residential Use SCOs. VOCs including Methylene chloride (0.0025 ppm), tetrachloroethylene (PCE) (max. 0.05 ppm),

trichloroethylene (TCE) (0.00054 ppm) and cis-1,2-dichloroethylene (cis-1,2-DCE) (0.0098 ppm) were detected at concentrations below Track 1 Unrestricted Use SCOs (SCOs). SVOCs including benzo(a)anthracene (max. of 7.47 mg/Kg), benzo(a)pyrene (max. of 5.16 mg/Kg), benzo(b)fluoranthene (max. of 5.70 mg/Kg), benzo-(k)fluoranthene (max. of 5.07 mg/Kg), chrysene (max. of 5.66 mg/Kg), dibenzo(a,h)anthracene (max of 0.95 mg/kg) and indeno(1,2,3-cd)pyrene (max. of 2.20 mg/Kg) were detected at concentrations exceeding Track 2 Restricted Residential SCOs. Metals including arsenic (max. 25.8 ppm), barium (max. 468 ppm), cadmium (max. 11.8 ppm), copper (max. 188 ppm), lead (max. 900 ppm) and zinc (max. 234 ppm) were detected at concentrations above Track 1 Unrestricted Use SCOs. Among these, arsenic, barium, cadmium and lead also exceeded the Track 2 Restricted Residential SCOs. Pesticides and PCBs were detected at trace levels below Track 1 Unrestricted Use SCOs.

7. Four groundwater samples collected were compared to 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Chlorinated VOCs including methylene chloride (11 µg/L) and PCE (19 µg/L) were detected at concentrations exceeding New York State 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). No Pesticides or PCBs occurred in the groundwater samples. The SVOC bis(2-ethylhexyl) phthalate (50.10 µg/L) was detected at a concentration exceeding its GQS. Metals including magnesium, manganese, selenium and sodium, were detected in filtered groundwater samples at concentrations exceeding GQS.

8. Soil vapor samples collected during the RI were compared to the compounds listed in Matrices 1 and 2 in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. VOCs including benzene, toluene ethylbenzene and xylenes (BTEX) were found in all soil vapor samples at concentrations ranging between 10.63 $\mu g/m^3$ and 346.6 $\mu g/m^3$. The BTEX compounds were not identified in soil or groundwater on the property. The greatest concentrations of PCE are present beneath the northern portion of the Site (max. 920 $\mu g/m^3$) in SV-1 and SV-2. VOCs TCE (max. of 47 $\mu g/m^3$), 1,1,1-Trichloroethane (1,1,1-TCA) (max. of 12 $\mu g/m^3$) and methylene chloride (max. of 14 $\mu g/m^3$) were also detected in Site soil vapor samples. PCE and TCE concentrations in soil vapors

exceed NYSDOH guidance value for Evaluating Soil Vapor Intrusion dated October 2006. PCE is present in the outdoor air sample at a concentration of 1.7 $\mu g/m^3$. BTEX and associated compounds were also detected in the outdoor air sample, at a concentration of 5.1 $\mu g/m^3$.

Summary of the Remedial Action

Track 4 Site Specific cleanup is proposed. Track 1 Unrestricted Use SCOs is not feasible because historic fill will remain at site as well as because need for active SSDS. 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. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs.
   The entire footprint of the new structure will be excavated to a depth of approximately 2 feet below grade and the remaining footprint of the Site (parking area) will be excavated to a depth of approximately 1 foot below grade for

development purposes. Two smaller portions of the property will be excavated to the depths of 9 and 8 feet below grade for an elevator pit and water detention tank, respectively. In addition, one hot spot excavation would occur to an approximate depth of 8 feet below grade in the entire footprint area of the former one-story garage located on the northern portion of the Site. Approximately, 1300 tons of soil will be excavated and removed from this Site.

7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of all UST's that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Transportation and off-Site disposal of all soil/fill material at 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.
11. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. 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.
14. Dewatering if needed, in compliance with city, state, and federal laws and regulations. Extracted groundwater will either be containerized for off-site licensed or permitted disposal or will be treated under a permit from New York City Department

of Environmental Protection (NYCDEP) to meet pretreatment requirements prior to discharge to the sewer system.

15. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
16. Construction of an engineered composite cover consisting of a ten-inch thick reinforced concrete building slab with a minimum 6-inch clean granular sub-base beneath all building areas, 4-inch poured concrete on a 6-inch sub-base in sidewalk areas, and 1 foot of asphalt and gravel sub-base in parking areas.
17. 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 minimum 20-mil vapor barrier below the slab throughout the full building area. 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.
18. 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 schedule 40 4-inch PVC pipe connected to a 4-inch riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consistent of a 6-inch thick layer of 2-inch trap rock stone. The pipe will be finished at the roof line with a goose neck pipe to prevent rain infiltration. The active SSDS will be hardwired and will include a blower installed on the roof line and a pressure gauge and alarm located in an accessible area of the structure. 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.

19. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
20. 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.
21. 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.
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: 100 Union Avenue, Brooklyn New York
- NYC Voluntary Cleanup Program Project Number: 16CVCP018K

Project Contacts:

- OER Project Manager: Horace Zhang, 212-788-8841
- Site Project Manager: Rachel Ataman, 631-462-5866
- Site Safety Officer: A.J. Infante, 718-636-0800
- 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.

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

Hours of Operation: The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances

issued by that agency. For this cleanup project, the hours of operation 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

MGM Property Group 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 100 Union Avenue in the Williamsburg section of Brooklyn, New York (the "Site"). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, 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 100 Union Avenue in the Broadway Triangle section of Brooklyn, New York and is identified as Block 2242 and Lot 3 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 10,566-square feet and is bounded by Middleton Street to the north, a vacant undeveloped lot to the south, Union Avenue to the west and a parking lot and a multi-story residential building to the east. A map of the site boundary is shown in Figure 2. Currently, the Site is occupied by Knights Collision and Towing and is developed with a 1-story building used for tow truck repairs in the northern portion and the remaining portion consists of an auto salvage yard.

1.2 Redevelopment Plan

The proposed future use of the Site will consist of a new 7-story residential building. The proposed building footprint will be 7,106 square feet. The remaining portion of the Site to the east of the structure will consist of an open area and will be utilized as a paved rear parking lot. The first floor of the structure will consist of a mechanical/utility room located in the northern portion of the structure and a lobby with an elevator located in the southern portion of the

structure, with an open-air car port, which provides access to the eastern parking area, situated between the two rooms. The proposed redevelopment is presented in Figure 3. The current zoning designation is R6A with a commercial overlay of C2-4. The proposed use is consistent with existing zoning for the property. The total gross area of the structure is calculated to be 32,743 square feet. The building slab will consist of 10-inch thick reinforced concrete at grade with deep foundation piles and their associated pile caps built integral with the first floor. No basement is associated with the structure, thus the only significant excavations are for a detention tank with a total depth of 8-feet below grade and an elevator pit with a total depth of 9-feet below grade.

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

1.3 Description of Surrounding Property

Within a 500 feet radius of the Site, there are a variety of land uses including: residential (multi-story residential apartments), commercial, parking, industrial, institutions and vacant properties. Properties located within a 1/4-mile radius of the Site are zoned R6, R6B, R7A, R7-1 (general residential districts), C1-3, C2-1 C2-2 (general commercial districts) and M1-3 and M3-1 (light manufacturing districts). No sensitive receptor is identified within a 250-foot radius of the Site. The land uses include residential buildings, industrial uses, institutions and vacant lots.
Figure 4 shows the surrounding land usage.

1.4 Summary of Past Site Uses and Areas of Concern

Based upon the review of the Fire Insurance Maps and Regulatory Agency documents from the Phase I Environmental Site Assessment (ESA) Reports prepared by Hydro Tech Environmental Corp. in January 2014 a Site history was established. The Site was occupied by a church and residential dwellings between 1887 and 1935. The Site became vacant and undeveloped in 1950. The Site was utilized for auto sales with a one story building in the northern portion between 1965 and 1991 and an auto repair shop and junkyard from 1992 until present.

The AOCs identified for this site include:

- The historical use of the property of auto repairs and an auto junk yard;

- The presence of a NYC Little "E" Designation for Hazmat and Air;
- The historical presence of underground storage tanks;
- The suspect presence of underground storage tanks; and

The presence of an oil-water separator

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. Performed a Ground Penetrating Radar (GPR) survey over all accessible portions (approximately 60%) of the Site;
3. Installed six (6) soil borings across the entire project Site, and collected twelve (12) soil samples for chemical analysis from the soil borings to evaluate soil quality;
4. Installed four (4) groundwater monitoring wells throughout the Site to establish groundwater flow and collected four (4) groundwater samples for chemical analysis to evaluate groundwater quality;
5. Installed four (4) soil vapor probes around Site perimeter and collected four (4) samples for chemical analysis.
6. One (1) outdoor air sample was collected 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, 100 Union Avenue, Brooklyn, New York", dated June 2014 (RIR).

1. Elevation of the property is 16 feet.
2. No anomalies indicative of USTs were identified during the GRP survey
3. Depth to groundwater ranges from 6.82 feet to 9.74 feet at the Site.

4. Groundwater flow is generally from north-northeast to south-southwest beneath the Site.

5. The stratigraphy of the site, from the surface down, consists of historic fill with variable thickness ranging between zero and 8 feet (brown coarse grained sand with varying amounts of bricks and pebbles). Boring logs describing surface conditions are presented in Appendix D.

6. Twelve soil/fill samples collected during the remedial investigation were compared to 6NYCRR Part 375-6.8 Track 1 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Track 2 Restricted Residential Use SCOs. VOCs including Methylene chloride (0.0025 ppm), tetrachloroethylene (PCE) (max. 0.05 ppm), trichloroethylene (TCE) (0.00054 ppm) and cis-1,2-dichloroethylene (cis-1,2-DCE) (0.0098 ppm) were detected at concentrations below Track 1 Unrestricted Use SCOs (SCOs). SVOCs including benzo(a)anthracene (max. of 7.47 mg/Kg), benzo(a)pyrene (max. of 5.16 mg/Kg), benzo(b)fluoranthene (max. of 5.70 mg/Kg), benzo-(k)fluoranthene (max. of 5.07 mg/Kg), chrysene (max. of 5.66 mg/Kg), dibenzo(a,h)anthracene (max of 0.95 mg/kg) and indeno(1,2,3-cd)pyrene (max. of 2.20 mg/Kg) were detected exceeding Track 2 Restricted Residential SCOs (RSCOs). Metals including arsenic (max. 25.8 ppm), barium (max. 468 ppm), cadmium (max. 11.8 ppm), copper (max. 188 ppm), lead (max. 900 ppm) and zinc (max. 234 ppm) were detected at concentrations above Track 1 Urestricted Use SCOs. Among these, arsenic, barium, cadmium and lead also exceeded the Track 2 Restricted Residential SCOs. Pesticides and PCBs were detected at trace levels below Track 1 Unrestricted Use SCOs.
7. Four groundwater samples collected were compared to 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). Chlorinated VOCs including methylene chloride (11 µg/L) and PCE (19 µg/L) were detected at concentrations exceeding New York State 6NYCRR Part 703.5 Groundwater Quality Standards (GQS). No Pesticides or PCBs occurred in the groundwater samples. The SVOC bis(2-ethylhexyl)phthalate (50.10 µg/L) was detected at a concentration exceeding its

GQS. Metals including magnesium, manganese, selenium and sodium, were detected in filtered groundwater samples at concentrations exceeding GQS.

8. Soil vapor samples collected during the RI were compared to the compounds listed in Matrices 1 and 2 in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. VOCs including benzene, toluene ethylbenzene and xylenes (BTEX) were found in all soil vapor samples at concentrations ranging between 10.63 $\mu g/m^3$ and 346.6 $\mu g/m^3$. The BTEX compounds were not identified in soil or groundwater on the property. The greatest concentrations of PCE are present beneath the northern portion of the Site (max. 920 $\mu g/m^3$) in SV-1 and SV-2. VOCs TCE (max. of 47 $\mu g/m^3$), 1,1,1-Trichloroethane (1,1,1-TCA) (max. of 12 $\mu g/m^3$) and methylene chloride (max. of 14 $\mu g/m^3$) were also detected in Site soil vapor samples. PCE and TCE concentrations in soil vapors exceed NYSDOH guidance value for Evaluating Soil Vapor Intrusion dated October 2006. PCE is present in the outdoor air sample at a concentration of 1.7 $\mu g/m^3$. BTEX and associated compounds were also detected in the outdoor air sample, at a concentration of 5.1 $\mu g/m^3$.

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.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Groundwater

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

Soil Vapor

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

3.0 Remedial Alternatives Analysis

The goal of the remedy selection process is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing 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 site-wide excavation of historic fill to a minimum depth of 8 feet below grade surface (bgs) to achieve Unrestricted Use SCOs. If soil/fill containing analytes at concentrations above Unrestricted Use SCOs is still

present at the base of the excavation, additional excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 1 Unrestricted Use SCOs.

- As part of development a vapor barrier and passive 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 SCOs;
- Removal of all soil/fill exceeding Track 4 Site-specific SCOs and confirmation that Track 4 Site-specific SCOs have been achieved with post-excavation end point sampling. Based on the results of the Remedial Investigation, it is expected that SCOs would be achieved by excavating one hot spot located within the footprint of the former 1-story garage located on the northern portion of the site. The hot spot remediation would include excavation of the entire footprint area to an approximate total depth of 8 feet below grade. Remaining site soil/fill exceeding Track 4 Site-specific SCOs will be excavated for construction of the new building's concrete foundation to an approximate depth of 2 feet below grade within the building's footprint area, with two deeper excavation areas to depths of 9 feet below grade and 8 feet below grade for a Site elevator pit and water detention tank, respectively. Additional soils located in the Site parking area will be excavated to approximately 1 foot below grade for asphalt construction. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavations, 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 (where applicable) to prevent potential exposures from soil vapor;
- Installation and operation of an active 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 and passive SSDS below the new building's slab as part of development.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCG's and RAOs for soil through hot spot and Site-wide 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 and active SSDS below the new building's slab. 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 would 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 would permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 Unrestricted Use 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 four 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.

Historic fill at the Site was found to extend to a depth of at least 8 feet below grade during the RI, and the new building requires excavation of the entire Site to a depth of 2 feet. The costs associated with Alternative 1 would be significantly higher than Alternative 2 if soil with analytes above Track 1 Unrestricted Use SCOs is encountered below the excavation depth required for development. Additional costs would include installation of additional shoring/underpinning, 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 seven story residential structure to provide 34 dwelling units and parking at grade. 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 in zoning districts designated for commercial, light manufacturing, and residential uses. The development would remediate a contaminated automobile towing/repair lot and provide a modern residential building. The proposed development would clean up the property and make it safer, create new employment opportunities, living space 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 does not lie in a Federal Emergency Management Agency (FEMA)-designated flood plain. 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. Completion of a Waste Characterization Study prior to excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs.
   The entire footprint of the new Structure will be excavated to a depth of approximately 2 feet below grade and the remaining footprint of the Site (parking area) will be excavated to a depth of approximately 1 foot below grade for development purposes. Two smaller portions of property will be excavated to the depths of 9 and 8 feet below grade for an elevator pit and water detention tank, respectively. In addition, one hot spot excavation would occur to an approximate depth of 8 feet below grade in the entire footprint area of the former one-story garage located on the northern portion of the Site.

7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of all UST's that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Transportation and off-Site disposal of all soil/fill material at 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.
11. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
12. Demarcation of residual soil/fill in landscaped areas.
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. 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.
15. Dewatering in compliance with city, state, and federal laws and regulations. Extracted groundwater will either be containerized for off-site licensed or permitted disposal or will be treated under a permit from New York City Department of Environmental Protection (NYCDEP) to meet pretreatment requirements prior to discharge to the sewer system.
16. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
17. Construction of an engineered composite cover consisting of a ten-inch thick reinforced concrete building slab with a minimum 6-inch clean granular sub-base

beneath all building areas, 4-inch poured concrete on a 6-inch sub-base in sidewalk areas, and 1 foot of asphalt and gravel sub-base in parking areas.

18. 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 minimum 20-mil vapor barrier below the slab throughout the full building area. 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.
19. 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 schedule 40 4-inch PVC pipe connected to a 4-inch riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consistent of a 6-inch thick layer of 2-inch trap rock stone. The pipe will be finished at the roof line with a goose neck pipe to prevent rain infiltration. The active SSDS will be hardwired and will include a blower installed on the roof line and a pressure gauge and alarm located in an accessible area of the structure. 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.
20. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
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. 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.
23. 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:

Contaminant	Site-Specific SCO's
Total SVOCs	250 ppm
Lead	1,000 ppm
Arsenic	24 ppm
Barium	750 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 3. Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Soil/Fill Excavation and Removal

Soil/fill excavation is anticipated to be Site-wide for developmental purposes. Soil/fill excavations will vary in depth from 1 foot in the Site parking area to 8 feet in the Site hot spot excavation area. The location and depth of planned excavations is shown in Figure 5. The total

quantity of soil/fill expected to be excavated and disposed off-Site is 1,300 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.

End-point Sampling

End-point samples will be analyzed for compounds and elements as described below utilizing the following methodology:

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

New York State ELAP certified labs will be used for all end-point sample analyses. Labs performing end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values.

Confirmation End-point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with five confirmation end-point soil samples. To evaluate attainment of Track 4 Site-specific SCOs, analytes will include those for which SCOs have been developed, including SVOCs, lead, barium and arsenic according to analytical methods described above. If Track 1 Unrestricted Use SCOs are pursued, samples will be analyzed for VOCs, SVOCs, pesticides, PCBs and metals according to analytical methods described above.

Hotspot End-point Sampling

End-point samples will be collected from the sidewalls and base of excavation at the hot spot location identified in the Remedial Investigation, according to the procedure listed below. The

hot spot includes the entire former garage footprint area, as discussed with the OER. 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 laboratory will address the accuracy, precision and completeness requirements for all data generated.

Field QA/QC will include the following procedures:

- Calibration of field equipment, including PID, on a daily basis;
- Use of dedicated and/or disposable field sampling equipment;
- Proper sample handling and preservation;
- Proper sample chain of custody documentation; and
- Completion of report logs.

The above procedures will be executed as follows:

- Disposable sampling equipment will be used to minimize cross-contamination between samples;
- For each of the parameters analyzed, a sufficient sample volume will be collected to adhere to the specific analytical protocol, and provide sufficient sample for reanalysis if necessary;
- Because plasticizers and other organic compounds inherent in plastic containers may contaminate samples requiring organic analysis, samples will be collected in glass containers;

- Appropriate sample preservation techniques, including cold temperature storage at 4º C, will be utilized to ensure that the analytical parameters concentrations do not change between the time of sample collection and analysis; and
- Samples will be analyzed prior to the expiration of the respective holding time for each analytical parameter to ensure the integrity of the analytical results.

Import of Soils

Import of soils onto the property will be performed in conformance with the Soil/Materials Management Plan in Appendix 4. Imported soil will meet the lower of:

- Track 2 Restricted Residential Use SCO's, and
- Groundwater Protection Standards in Part 375-6.8.

The estimated quantity of soil to be imported into the Site for backfill and cover soil is 450 tons. A map of soil backfill placement locations is shown in Figure 6.

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 3 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 ten-inch thick reinforced concrete building slab with a minimum 6-inch clean granular sub-base beneath all building areas, 4-inch poured concrete on a 6-inch sub-base in sidewalk areas, and 1 foot of asphalt and gravel sub-base in parking areas.

- 10-inch concrete slab on grade;

- 6-inch poured concrete sidewalk areas;
- 12-inch asphalt pavement and sub-base in eastern parking area.

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. In order to prevent subsurface vapors from impacting the interior air of the building at the Site, a minimum 20-mil vapor barrier will be installed beneath the building slab according to manufacturer specifications. Design specifications of the vapor barrier system will be provided to OER prior to the start of remedial action.

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

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

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 horizontal piping will consist of fabric wrapped, perforated schedule 40 4-inch PVC pipe connected to a 4-inch riser pipe that penetrates the slab and travels through the building to the roof. The gas permeable layer will consistent of a 6-inch

thick layer of 2-inch trap rock stone. The pipe will be finished at the roof line with a goose neck pipe to prevent rain infiltration. The active SSDS will be hardwired and will include a blower installed on the roof line and a pressure gauge and alarm located in an accessible area of the structure. 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.

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 7. A typical section of the system 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(l)(3).

- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for residential 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 on the results of the RIR, the contaminants of concern are:

- Soil: Benzo(k)fluoranthene, lead, arsenic, cadmium, and barium.
- Groundwater: Bis(2-ethylhexyl)phthalate (50.1 µg/L), methylene chloride (11 µg/L), tetrachloroethylene (19 µg/L), selenium (16 µg/L), magnesium (96,500 µg/L), manganese (618 µg/L) and sodium (31,400 µg/L).
- Soil Vapor: Tetrachloroethylene (max. 920 µg/m^3) and trichloroethylene (max. of 47 µg/m^3) were detected at concentrations exceeding the NYSDOH guidance value for Evaluating Soil Vapor Intrusion, dated October 2006.

Nature, Extent, Fate and Transport of Contaminants

SVOCs and metals are present in the soil/fill materials throughout the Site at shallow and deep depths. Transport mechanisms for soil contamination is anticipated to be direct dermal/ingestion contact, migration into groundwater, and volatilization into soil vapor.

The VOCs of concern are located in an on-site upgradient monitoring well located adjacent to the drain located in the former garage on the northern portion of the Site. The drain is the suspected source for contamination in that area. Groundwater contamination is anticipated to volatize and impact Site soil vapor.

Chlorinated VOCs including tetrachloroethylene and trichloroethylene were detected in soil vapor sampling locations in the garage structure footprint. The soil vapor contaminants are anticipated to be associated with soil and groundwater contamination located on the northern portion of the site.

Receptor Populations

On-Site Receptors: The site is currently developed with a 1-story garage and towing yard 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 partially capped with impervious surface consisting of concrete slab beneath the 1-story building in the northern portion. Remaining eastern portion of the site is undeveloped and uncapped. Therefore, exposure to surficial soil/fill material is possible. Groundwater is not exposed at the Site, and because the Site is served by the public water supply, groundwater is not used at the Site. There is potential for soil vapor to accumulate in on-Site structures.

Construction/ Remediation Conditions: Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils and groundwater as a result of on-Site construction/excavation activities. Similarly, off-Site receptors could be exposed to dust from onsite activities. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through dust controls, and through the implementation of the Community Air Monitoring Plan and 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 (vapor barrier/ 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 potential complete exposure pathways for the current site condition. There are potential 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 residential structure, site-wide surface cover, subsurface vapor barrier and active SSDS for the building. Under current conditions, on-Site exposure pathways exist for those with access to the Site and trespassers. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. 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 Andrew J. Infante, Project Geologist, and Rachel Ataman, Vice President of Technical Services. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Owais Ahmad and Mark E. Robbins, respectively.

5.2 Site Security

The Applicant will control site access of the fenced property through gated entrances. Barriers will be installed around work areas as needed to delineate and restrict access to the work area. For work areas of limited size, barrier tape will be sufficient to delineate and restrict access. For larger worker areas, temporary fencing will be provided.

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 5. The Site Safety Coordinator will be Andrew J. Infante. 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. Exceedances of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

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

5.9 Demobilization

Demobilization will include:

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

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

5.10 Reporting and Record Keeping

Daily reports

Daily reports providing a general summary of activities for each day of active remedial work will be emailed to the OER Project Manager by the end of the following 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 al 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, Shaik A. Saad, 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 100 Union Avenue, Brooklyn, New York site, site number 16CVCP018K. 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 October 2015 and Stipulations in a letter 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, Mark E. Robbins, am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 100 Union Avenue, Brooklyn, New York site, site number 16CVCP018K. 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 24 month remediation period is anticipated.

Schedule Milestone	**Weeks from Remedial Action Start**	**Duration (weeks)**
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	2	1
Remedial Excavation	5	3
Demobilization	24	2
Submit Remedial Action Report	35	2

APPENDIX 1

PROPOSED DEVELOPMENT PLANS

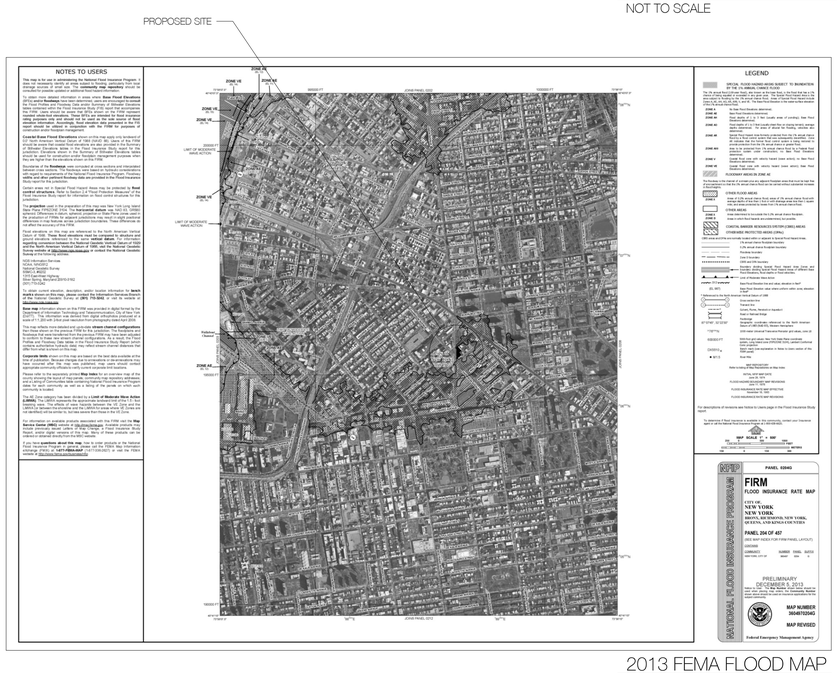
PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE, BROOKLYN, NY

ELEVATION FROM UNION AVE

NOT TO SCALE

PROPOSED SITE

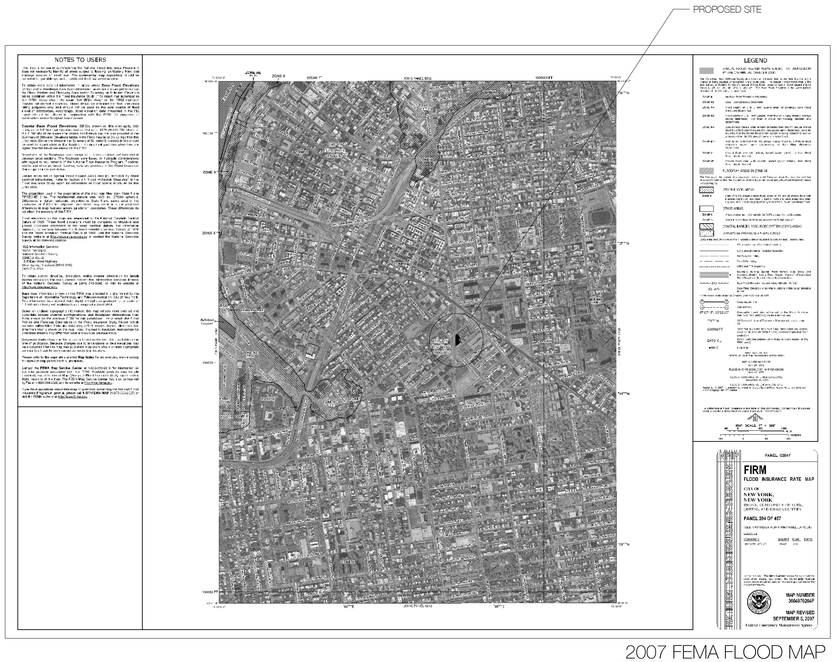


2013 FEMA FLOOD MAP

NOT TO SCALE

THIS SITE DOES NOT FALL UNDER A FLOOD HAZARD AS PER FLOOD INSURANCE RATE

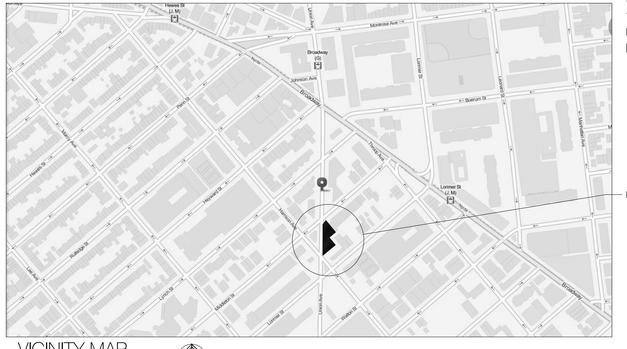
PROPOSED SITE



2007 FEMA FLOOD MAP

NOT TO SCALE

THIS SITE DOES NOT FALL UNDER A FLOOD HAZARD AS PER FLOOD INSURANCE RATE



VICINITY MAP

NOT TO SCALE

APAPRTMENT DISTRIBUTION						8/14/2015
	1BR.	2BED	3BED.	TOTAL	GROSS	NET
1ST FLOOR					1,834	
2ND FLOOR	3	2	1	6	6,090	4,362
3RD FLOOR	4	2	1	7	6,303	4,915
4TH FLOOR	4	2	1	7	6,303	4,915
5TH FLOOR	4	2	1	7	6,303	4,915
6TH FLOOR	4	2	1	7	6,303	4,915
ROOF					566	
TOTAL	19	10	5	34	33,702	24,022
PERCENT	56%	29%	15%	100%		

APARTMENT DISTRIBUTION

NOT TO SCALE

DRAWING SCHEDULE:

T-001	COVER SHEET
C-001	SURVEY
C-002	SCHEMATIC SITE PLAN
Z-001	ZONING ANALYSIS
Z-002	ZONING CALCULATION
EN-001	ENERGY ANALYSIS

ARCHITECTURAL:

A-001	GENERAL NOTES
A-002	ACCESSIBILITY DIAGRAMS
A-003	EGRESS PLANS
A-100	1ST FLOOR PLAN
A-101	2ND FLOOR PLANS
A-102	3RD - 6TH FLOOR PLAN
A-103	ROOF AND BULKHEAD PLANS
A-200	EXTERIOR ELEVATIONS
A-201	EXTERIOR ELEVATIONS
A-202	EXTERIOR ELEVATIONS
A-203	BUILDING CROSS SECTION
A-400	TYPICAL WALL SECTION & DETAILS
A-500	ENLARGED APARTMENT LAYOUTS
A-600	DOOR, WINDOW & FINISH SCHEDULES

STRUCTURAL:

FO-400	FOUNDATION SECTIONS-I
FO-401	FOUNDATION SECTION -II
FO-402	FOUNDATION SECTIONS-III
S-001	GENERAL NOTES
S-002	NYC MTA NOTES
S-100	FIRST FLOOR FOUNDATION FRAMING PLAN
S-101	SECOND FLOOR FRAMING PLAN
S-102	THIRD TO SIXTH FLOOR FRAMING PLAN
S-103	7TH FLOOR/ROOF FRAMING PLAN
S-104	ROOF -BULKHEAD FRAMING PLAN
S-300	TYPICAL DETAILS-I
S-301	TYPICAL DETAILS-II
S-302	TYPICAL DETAILS-III
S-304	TYPICAL DETAILS-IV

MECHANICAL:

EN-001	COMCHECK SHEET1
M-101	MECHANICAL1ST FLOOR PLAN
M-102	MECHANICAL 2ND FLOOR PLAN
M-103	MECHANICAL 3RD-6TH FLOOR PLAN
M-104	MECHANICAL ROOF PLAN
M-200	MECHANICAL WATER AND AIR RISER DIAGRAMS
M-300	MECHANICAL SCHEDULES
M-400	MECHANICAL DETAILS SHEET #1
M-401	MECHANICAL DETAILS SHEET #2
M-402	MECHANICAL DETAILS SHEET #3

PLUMBING:

P-001	PLUMBING SITE PLAN
P-102	PLUMBING 1ST FLOOR PLAN
P-102	PLUMBING 2ND FLOOR PLAN
P-103	PLUMBING 3RD-6TH FLOOR PLAN
P-104	PLUMBING ROOF PLAN
P-200	PLUMBING SANITARY RISER DIAGRAM
P-201	PLUMBING WATER RISER DIAGRAM
P-202	PLUMBING GAS RISER DIAGRAM
P-203	PLUMBING STORM RISER DIAGRAM
P-300	PLUMBING DETAILS SHEET #1

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

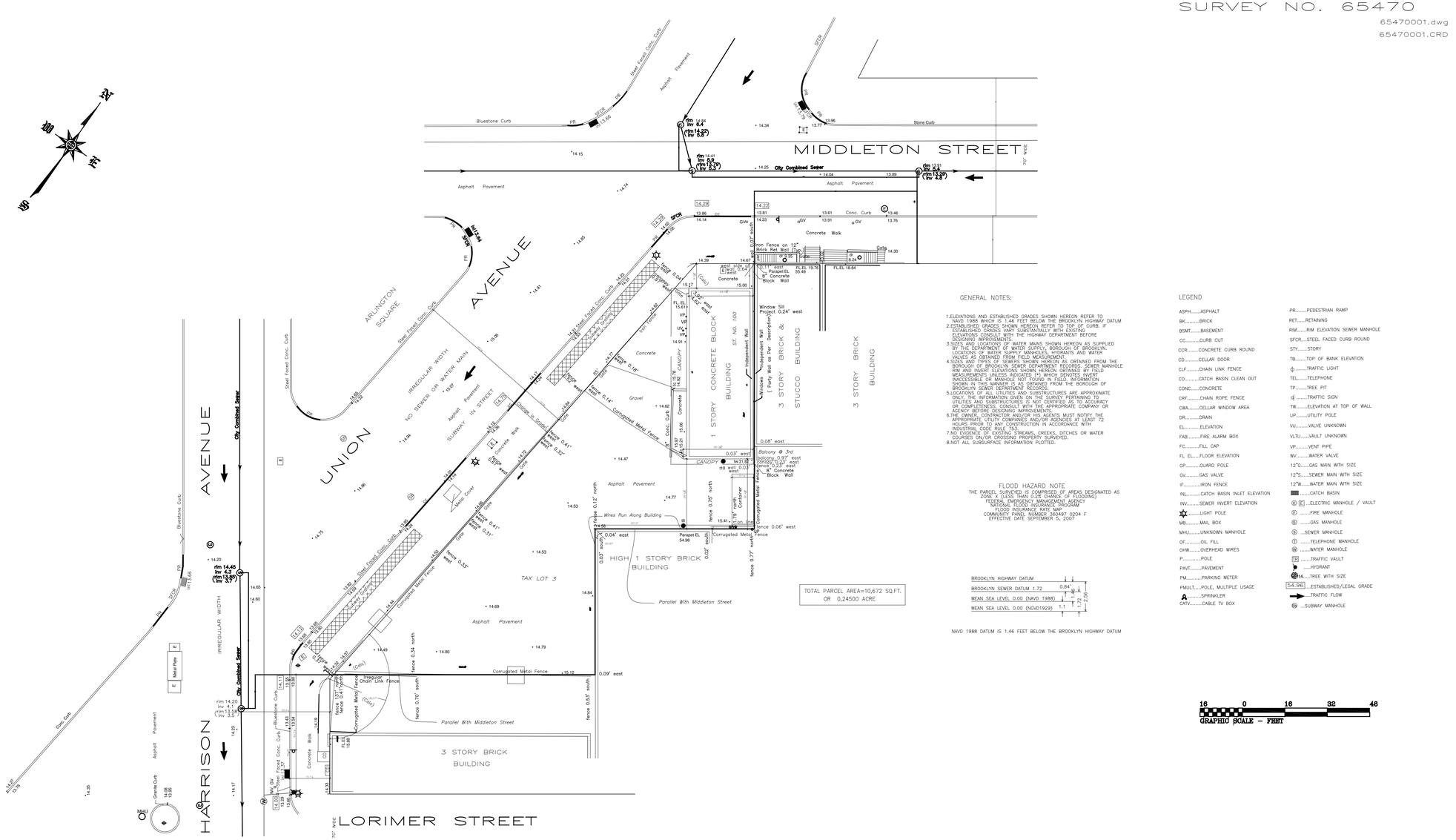
COVER SHEET

REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: T-001.00
NYC DOB NUMBER: NB # XXX XXX XXX

SURVEY NO. 65470

65470001.dwg
65470001.CRD



GENERAL NOTES:

1. ELEVATIONS AND ESTABLISHED GRADES SHOWN HEREON REFER TO NAVD 1988 WHICH IS 1.46 FEET BELOW THE BROOKLYN HIGHWAY DATUM
2. ESTABLISHED GRADES SHOWN HEREON REFER TO TOP OF CURB. IF ESTABLISHED GRADES VARY SUBSTANTIALLY WITH EXISTING ELEVATIONS CONSULT WITH THE HIGHWAY DEPARTMENT BEFORE DESIGNING IMPROVEMENTS.
3. SIZES AND LOCATIONS OF WATER MAINS SHOWN HEREON AS SUPPLIED BY THE DEPARTMENT OF WATER SUPPLY, BOROUGH OF BROOKLYN. LOCATIONS OF WATER SUPPLY MANHOLES, HYDRANTS AND WATER GATES ARE NOT SHOWN. CONSULT WITH THE DEPARTMENT.
4. SIZES AND TYPES OF SEWERS SHOWN HEREON AS OBTAINED FROM THE BOROUGH OF BROOKLYN SEWER DEPARTMENT RECORDS. SEWER MANHOLE RIM AND INVERT ELEVATIONS SHOWN HEREON OBTAINED BY FIELD MEASUREMENTS UNLESS INDICATED (*) WHICH DENOTES INVERT INACCESSIBLE OR MANHOLE NOT FOUND IN FIELD. INFORMATION SHOWN IN THIS MANNER IS AS OBTAINED FROM THE BOROUGH OF BROOKLYN SEWER DEPARTMENT RECORDS.
5. LOCATIONS OF ALL UTILITIES AND SUBSTRUCTURES ARE APPROXIMATE ONLY. THE INFORMATION GIVEN ON THE SURVEY PERTAINING TO UTILITIES AND SUBSTRUCTURES IS NOT CERTIFIED AS TO ACCURACY OR COMPLETENESS. CONSULT WITH THE APPROPRIATE COMPANY OR AGENCY BEFORE DESIGNING IMPROVEMENTS.
6. THE OWNER, CONTRACTOR AND/OR HIS AGENTS MUST NOTIFY THE UTILITY COMPANIES AND DIG SAFE NEW YORK AT LEAST 48 TO 72 HOURS PRIOR TO ANY CONSTRUCTION, IN ACCORDANCE WITH INDUSTRIAL CODE RULE 753.
7. NO EVIDENCE OF EXISTING STREAMS, CREEKS, DITCHES OR WATER COURSES ON/OR CROSSING PROPERTY SURVEYED.
8. NOT ALL SUBSURFACE INFORMATION PLOTTED.

FLOOD HAZARD NOTE

THE PARCEL SURVEYED IS COMPRISED OF AREAS DESIGNATED AS ZONE X (LESS THAN 0.2% CHANCE OF FLOODING)
FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
COMMUNITY PANEL NUMBER 3604970204 F
EFFECTIVE DATE SEPTEMBER 5, 2007

LEGEND

ASPH.....ASPHALT
BK.....BRICK
BSMT.....BASEMENT
CC.....CURB CUT
CCR.....CONCRETE CURB ROUND
CD.....CELLAR DOOR
CLF.....CHAIN LINK FENCE
CO.....CATCH BASIN CLEAN OUT
CONC.....CONCRETE
CRF.....CHAIN ROPE FENCE
CWA.....CELLAR WINDOW AREA
DR.....DRAIN
EL.....ELEVATION
FAB.....FIRE ALARM BOX
FC.....FILL CAP
FL EL.....FLOOR ELEVATION
GP.....GUARD POLE
GV.....GAS VALVE
IF.....IRON FENCE
INL.....CATCH BASIN INLET ELEVATION
INV.....SEWER INVERT ELEVATION
.....LIGHT POLE
MB.....MAIL BOX
MHU.....UNKNOWN MANHOLE
OF.....OIL FILL
OHW.....OVERHEAD WIRES
P.....POLE
PAVT.....PAVEMENT
PM.....PARKING METER
PMULT.....POLE, MULTIPLE USAGE
.....SPRINKLER
CATV.....CABLE TV BOX
PR.....PEDESTRIAN RAMP
RET.....RETAINING
RIM.....RIM ELEVATION SEWER MANHOLE
SFCR.....STEEL FACED CURB ROUND
STY.....STORY
TB.....TOP OF BANK ELEVATION
.....TRAFFIC LIGHT
TEL.....TELEPHONE
TP.....TREE PIT
.....TRAFFIC SIGN
TW.....ELEVATION AT TOP OF WALL
UP.....UTILITY POLE
VU.....VALVE UNKNOWN
VLTU.....VAULT UNKNOWN
VP.....VENT PIPE
WV.....WATER VALVE
12"G.....GAS MAIN WITH SIZE
12"S.....SEWER MAIN WITH SIZE
12"W.....WATER MAIN WITH SIZE
.....CATCH BASIN
(E).....ELECTRIC MANHOLE / VAULT
.....FIRE MANHOLE
.....GAS MANHOLE
.....SEWER MANHOLE
.....TELEPHONE MANHOLE
.....WATER MANHOLE
.....TRAFFIC VAULT
.....HYDRANT
14.....TREE WITH SIZE
54.96.....ESTABLISHED/LEGAL GRADE
.....TRAFFIC FLOW
.....SUBWAY MANHOLE

DRAWN: K.OP

ESTABLISHED 1876 * SUCCESSOR TO:
B.G. MEINKHEIM C.S.*C.W. POWELL C.E.,C.S.*,C.L. SMITH C.S.*NATHAN CAMPBELL C.E.,C.S.*A.U. WHITSON C.E.,C.S.*
WILLIAM L. SAVACOOL C.E.,L.S.,C.S.*A.U. WHITSON INC. C.E.,C.S.*G. WEBER L.S.,C.S.*C. STODOLPH R.A.,L.S.*WHITSON & POWELL INC. P.E.,L.S.,C.S.*KELLER & POWELL P.E.,L.S.,C.S.*LOUIS MONTROSE C.E.,L.S.,C.S.*FRED J. POWELL P.E.,L.S.,C.S.*

REV	DATE	DESCRIPTION	ck

REV	DATE	DESCRIPTION	ck
	07-28-15	ARCHITECTURAL SURVEY	

MONTROSE
SURVEYING CO., LLP.
CITY & LAND SURVEYORS
116 20 METROPOLITAN AVE * RICHMOND HILL NY 11418-1080 * (718) 849-0800

CITY OF NEW YORK
COUNTY KINGS
TAX BLOCK 2242
TAX LOT 3

SCALE: 1" = 20'

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

SURVEY

SEAL & SIGNATURE

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE:
SHEET NO: AS NOTED 1 OF
DRAWING NO: C-001.00
NYC DOB NUMBER: NB # XXX XXX XXX

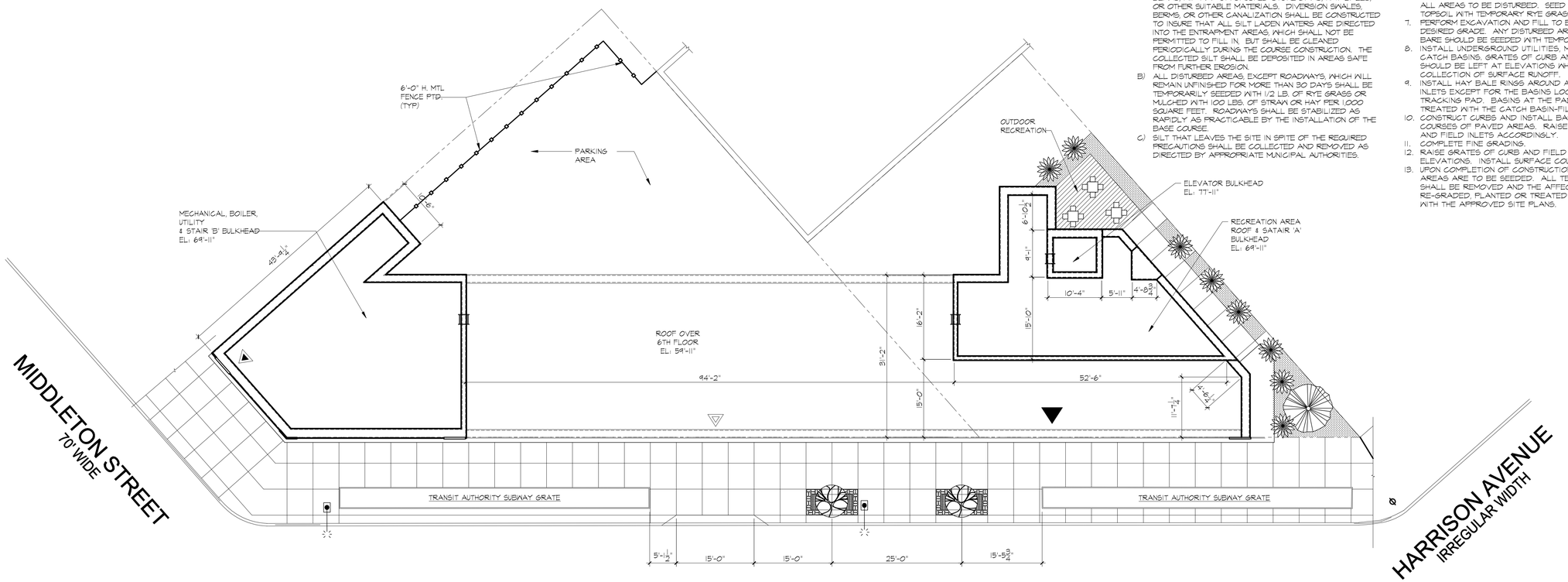
BLOCK: 2242
LOT: 3
NUMBER OF STORIES: 6 STORIES + ROOF
CONSTRUCTION CLASSIFICATION: TYPE IB
OCCUPANCY CLASSIFICATION: RESIDENTIAL
ZONING DISTRICT: C2-4 / R6A
BUILDING HEIGHT: 59'-11"
BULKHEAD HEIGHT: 69'-11"

STREET TREE PLANTING CHECK LIST				
ZR 23-03, 33-03 & 26-41 1 TREE PER 25'	REQUIRED	PROPOSED		
		ON SITE	OFF SITE	TOTAL
TREES	9	2	9	11
STREET TREE FRONTAGE = 206.75' + 21.75 = 228.50' 228.50/25' = 9.14 OR 9 TREES REQUIRED				

NOTES:
THE GENERAL CONTRACTOR SHALL VERIFY THE CONDITIONS OF ALL PROPERTY LINE FOUNDATION WALLS PRIOR TO ANY DEMOLITION WORK. THE ADJACENT PROPERTY SHALL BE LEFT UNDISTURBED.

THIS PROJECT SHALL CONFORM WITH ENTERPRISE GREEN COMMUNITY REQUIREMENTS, THE CONTRACTOR SHALL COORDINATE ALL REQUIRED ITEMS AS PER THE PROJECT'S GREEN COMMUNITIES INTENDED METHODS WORKSHEET.

FOR SIDEWALK ELEVATIONS AND DETAILS SEE B.P.P. PLAN



SCHEMATIC SITE PLAN N

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

LEGEND:

- TRAFFIC DIRECTION
- EXISTING GAS VALVE
- EXISTING HYDRANT
- EXISTING LIGHT POST
- RESIDENTIAL ADDRESS
- RESIDENTIAL EGRESS
- VEHICULAR TRAFFIC
- EXISTING TREE & TREE PIT - SEE NOTE 1.
- PLANTER - SEE NOTE A.
- EXTERIOR LIGHTING
- BENCH
- BOARD WALK
- CATCH BASIN
- A.D. AREA DRAIN

STANDARD EROSION CONTROL NOTES

1. ALL CONTROL MEASURES FOR EROSION AND SEDIMENTATION SHALL COMPLY WITH THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP)
   A) INSPECTIONS OF ALL CONTROL MEASURES PER THE SWPPP.
   B) WEEKLY INSPECTIONS AND DOCUMENTATION OF EROSION CONTROL PRACTICES.
   C) INSPECTIONS OF ALL CONTROL MEASURES BEFORE FORECASTED AND AFTER PERIODS OF HEAVY OR PROLONGED RAIN RESULTING IN MORE THAN 0.5-INCHES
   D) WEEKLY INSPECTIONS OF ON AND OFF-SITE AREAS DOWNSTREAM FROM CONSTRUCTION ACTIVITIES.
2. THE INSPECTIONS SHALL BE CONDUCTED BY THE APPLICANT AND/OR HIS REPRESENTATIVE, I.E. THE SITE ENGINEER, OR THE CONTRACTOR, TO DETERMINE THE FOLLOWING:
   A) THE CONDITIONS OF THE CONTROL MEASURES AND THE NEED FOR REPAIR OR REPLACEMENT
   B) THE NEED FOR MAINTENANCE, E.G. REMOVAL OF SEDIMENT FROM BARRIERS, TRAPS, AND BASINS.
   C) THE NEED FOR ADDITIONAL CONTROL MEASURES.
   D) THE NEED FOR REAPPLICATION OF SEEDING, NETTING AND/OR MULCHING.
   E) THE OVERALL EFFECTIVENESS OF THE CONTROL PLAN.
3. ALL TEMPORARY AND PERMANENT CONTROL DEVICES MUST BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL NECESSARY REPAIRS SHALL BE PERFORMED IMMEDIATELY.
4. THESE PLANS INDICATE THE CONTROL MEASURES TO BE PUT IN PLACE. ADDITIONAL CONTROL MEASURES SHALL BE IMPLEMENTED AS SITE CONDITIONS CHANGE AND UNFORSEEN PROBLEMS OCCUR. IMPLEMENTATION OF THE ADDITIONAL CONTROL MEASURES SHALL BE AT THE DISCRETION OF THE SITE INSPECTOR.
5. AN EROSION CONTROL SYSTEM WILL BE UTILIZED BY THE DEVELOPER TO MINIMIZE THE PRODUCTION OF SEDIMENT FROM THE SITE. METHODS TO BE UTILIZED WILL BE THOSE FOUND MOST EFFECTIVE FOR THE SITE AND SHALL INCLUDE ONE OR MORE OF THE FOLLOWING, AS APPLICABLE:
   A) TEMPORARY SEDIMENTATION ENTRAPMENT AREAS SHALL BE PROVIDED AT KEY LOCATIONS TO INTERCEPT AND CLARIFY SILT LADEN RUNOFF FROM THE SITE. THESE MAY BE EXCAVATED OR MAY BE CREATED UTILIZING EARTHEN BERMS, RIP-RAP OR CRUSHED STONE DAMS, HAY BALES, OR OTHER SUITABLE MATERIALS. DIVERSION SWALES, BERMS, OR OTHER GANALIZATION SHALL BE CONSTRUCTED TO INSURE THAT ALL SILT LADEN WATERS ARE DIRECTED INTO THE ENTRAPMENT AREAS, WHICH SHALL NOT BE PERMITTED TO FILL IN, BUT SHALL BE CLEANED PERIODICALLY DURING THE COURSE CONSTRUCTION. THE COLLECTED SILT SHALL BE DEPOSITED IN AREAS SAFE FROM FURTHER EROSION.
   B) ALL DISTURBED AREAS, EXCEPT ROADWAYS, WHICH WILL REMAIN UNFINISHED FOR MORE THAN 30 DAYS SHALL BE TEMPORARILY SEEDED WITH 1/2 LB. OF RYE GRASS OR MULCHED WITH 100 LBS. OF STRAW OR HAY PER 1,000 SQUARE FEET. ROADWAYS SHALL BE STABILIZED AS RAPIDLY AS PRACTICABLE BY THE INSTALLATION OF THE BASE COURSE.
   C) SILT THAT LEAVES THE SITE IN SPITE OF THE REQUIRED PRECAUTIONS SHALL BE COLLECTED AND REMOVED AS DIRECTED BY APPROPRIATE MUNICIPAL AUTHORITIES.

GENERAL NOTES:

1. ALL FILL USED BELOW SLABS UNDER BUILDINGS AND IN PAVED AREAS SHALL BE QUALITY SANDY MATERIAL AND SHALL BE COMPACTED IN 12" LAYERS TO 95% DENSITY TO PREVENT SETTLEMENT AS PER ASTM D1557, METHOD C.
2. CONTRACTOR MUST ALSO FOLLOW ALL REQUIREMENTS FOR PREPARATION, CLEARING, PROOF ROLLING, AND FILL REPLACEMENT RECOMMENDED BY A REPORT ON SOIL AND FOUNDATION INVESTIGATION.
3. ALL FILL SHALL BE COMPACTED WITH SOIL COMPACTION EQUIPMENT RATHER THAN BY HAND TAMPING (EXCEPT AROUND PIPES, ETC.)
4. THE THICKNESS OF FILL LAYERS PLACED SHALL BE COMPATIBLE WITH THE TYPE OF COMPACTION EQUIPMENT USED.
5. THE ATTAINMENT OF SPECIFIED DENSITIES SHALL BE VERIFIED BY FIELD DENSITY TESTS MADE BY AN INDEPENDENT TESTING LABORATORY ON EACH LAYER OF MATERIAL COMPACTED. ONE TEST PER 5,000 SQ. FT. OF SURFACE AREA SHALL BE MADE ON EACH LAYER WITHIN THE BUILDING.

EROSION AND SEDIMENT CONTROL PLAN - CONSTRUCTION SEQUENCE

1. ALL EROSION AND SEDIMENT CONTROL MEASURES, EXCLUDING CATCH-BASIN MEASURES, SHALL BE IN PLACE PRIOR TO ANY GRADING OPERATIONS AND INSTALLATION OF PROPOSED STRUCTURES AND OR UTILITIES.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE AND BE MAINTAINED UNTIL CONSTRUCTION IS COMPLETED AND/OR STABILIZED.
3. INSTALL STABILIZED CONSTRUCTION ENTRANCE AS INDICATED ON PLAN.
4. INSTALL SILT FENCE AND/OR HAY BALE BARRIERS DOWN SLOPE OF ALL AREAS TO BE DISTURBED AND DOWN SLOPE OF ALL AREAS DESIGNATED FOR TOPSOIL STOCKPILING.
5. CONSTRUCT BERMS, TEMPORARY SWALES AND PIPES AS NECESSARY TO DIRECT RUNOFF TO TEMPORARY SEDIMENTATION ENTRAPMENT AREAS.
6. CLEAR EXISTING TREES, VEGETATION AND EXISTING STRUCTURES FROM AREAS TO BE FILLED OR EXCAVATED. STRIP AND STOCKPILE TOPSOIL FROM ALL AREAS TO BE DISTURBED. SEED STOCKPILED TOPSOIL WITH TEMPORARY RYE GRASS COVER.
7. PERFORM EXCAVATION AND FILL TO BRING LAND TO DESIRED GRADE. ANY DISTURBED AREAS TO REMAIN BARE SHOULD BE SEEDED WITH TEMPORARY RYE GRASS.
8. INSTALL UNDERGROUND UTILITIES, MANHOLES AND CATCH BASINS. GRATES OF CURB AND FIELD INLETS SHOULD BE LEFT AT ELEVATIONS WHICH PERMIT PROPER COLLECTION OF SURFACE RUNOFF.
9. INSTALL HAY BALE RINGS AROUND ALL CURB AND FIELD INLETS EXCEPT FOR THE BASINS LOCATED AT THE ANTI TRACKING PAD. BASINS AT THE PAD SHALL BE TREATED WITH THE CATCH BASIN-FILTER FABRIC DETAIL.
10. CONSTRUCT CURBS AND INSTALL BASE AND BINDER COURSES OF PAVED AREAS. RAISE GRATES OF CURB AND FIELD INLETS ACCORDINGLY.
11. COMPLETE FINE GRADING.
12. RAISE GRATES OF CURB AND FIELD INLETS TO FINAL ELEVATIONS. INSTALL SURFACE COURSE OF PAVEMENT.
13. UPON COMPLETION OF CONSTRUCTION, ALL DISTURBED AREAS ARE TO BE SEEDED. ALL TEMPORARY DEVICES SHALL BE REMOVED AND THE AFFECTED AREAS RE-GRADED, PLANTED OR TREATED IN ACCORDANCE WITH THE APPROVED SITE PLANS.

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

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NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

SCHEMATIC SITE PLAN

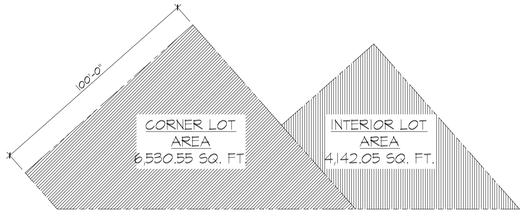
REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE:	PROJECT NO:
09-02-15	#1515
DRAWN BY:	CHECKED BY:
JGT	ERV
SCALE:	SHEET NO:
AS NOTED	1 OF

DRAWING NO:

C-002.00

NYC DOB NUMBER: NB # XXX XXX XXX

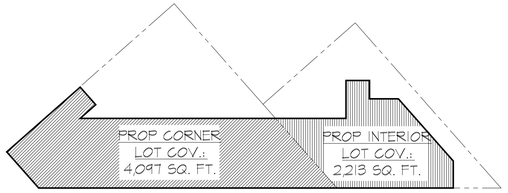


LOT AREA CALCULATIONS:

TOTAL LOT AREA =10,671.9 SQ. FT.
CORNER LOT AREA =6,530.55 SQ. FT.
INTERIOR LOT AREA = 4,142.05 SQ. FT.

LOT DIAGRAM

NOT TO SCALE



LOT AREA CALCULATIONS:

LOT AREA = 10,671.9 SQ. FT.

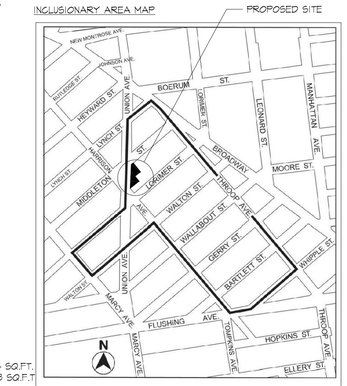
CORNER LOT AREA = 6,530.55 SQ. FT.
INTERIOR LOT AREA = 4,142.05 SQ. FT.
CORNER LOT COVERAGE PERMITTED 80% = 5,224.44 SQ.FT.
INTERIOR LOT COVERAGE PERMITTED 65% = 4,265.23 SQ.FT.

CORNER LOT COVERAGE PROPOSED = 4,097.00 SQ. FT.
INTERIOR LOT COVERAGE PROPOSED = 2,213.00 SQ. FT.

LOT COVERAGE DIAGRAM

NOT TO SCALE

INCLUSIONARY AREA MAP



Portion of Community District 1, Brooklyn

ZONING MAP

NOT TO SCALE

TAX MAP

NOT TO SCALE

ZONING CALCULATION

ZONING CALCULATION						
Block:	2242		CONST. CLASS 1-B 2HR. RATED			
Existing lot designation:	3		BLDG. TO BE FULLY SPRINKLERED			
Zoning	R6A / C2-4		BLDG. TO BE DESIGNED PER			
Map:	13b		2014 NYC B.C.			
	PERMITTED/REQUIRED		PROPOSED		REMARKS	RES.
QUALITY HOUSING - RESIDENTIAL						
ZONING LOT AREA						
TOTAL LOT	10,672.60	SQ. FT.				
CORNER LOT	6,530.55	SQ. FT.				
INTERIOR LOT	4,142.05	SQ. FT.				
FLOOR AREA RATIO						
BASE	2.70		2.70			
					OK	23-145
GROSS FLOOR AREA						
	28,816	SQ. FT.	28,813	SQ. FT.	OK	23-145
LOT COVERAGE						
80% CORNER	5,224.44	SQ. FT.	4,097	SQ. FT.		
65% INTERIOR	2,692.33	SQ. FT.	2,213	SQ. FT.	OK	23-145
NO. OF APARTMENTS						
R6 680	42		34		OK	23-22
HEIGHTS REGULATIONS						
MIN. BASE	40'-0"		59'-11"		OK	23-633
MAX. BASE	60'-0"		59'-11"		OK	23-633
MAX. BUILDING	70'-0"		69'-11"		OK	23-633
YARD REGULATIONS						
FRONT	NONE		NONE		OK	23-45
SIDE	NONE		NONE		OK	23-46
REAR	NONE		NONE		OK	23-47
	PERMITTED/REQUIRED		PROPOSED		REMARKS	RES.
PARKING						
APARTMENT 50% **	21		17		OK	25-23

* BEFORE DEDUCTION

COMMERCIAL PARKING
1 SPACE PER 1000 S.F. OF AREA (AS PER ZR 36-232a)
TOTAL PROPOSED COMMERCIAL AREA = 466 SQ. FT.
466 SQ. FT./ 1,000 S.F. = */2 PARKING SPACES REQUIRED

*COMMERCIAL PARKING REQUIREMENT IS WAIVED AS PER ZR 36-232(a)

RESIDENTIAL PARKING
50% OF TOTAL RESIDENCES REQUIRED PARKING (AS PER ZR 25-32) @
300 SQ FT PER UNATTENDED (SELF PARK) PARKING SPACE (AS PER 25-6).
34 UNITS * 0.5 = 17 PARKING SPACES
17 PARKING SPACES * 300 SQ FT/PARKING SPACES = 5,100 SQ FT.
COVERED & UNCOVERED PARKING SQ FT AVAILABLE = 3,351.24 SQ. FT. + 3,536.73 SQ. FT. = 6,888 SQ. FT.
6,888 SQ FT > 5,100 SQ FT

DENSITY CALCS:
PERMITTED RES. - PROP. COMMERCIAL
AREA = MAX D.U.
33,164 SQ.FT. - 466 SQ.FT. = 32,698 SQ.FT.
32,698 / 680 = 48.0 MAX

FLOOR	GROSS SQ. FT.	CORRIDOR SQ. FT.	% OF DEDUCTION	CORRIDOR DEDUCTION	MECH. 1.5%SQ. FT.	REF. SQ. FT.	COMMUNITY SQ. FT.	TOTAL DEDUCTIONS	TOTAL RES. ZONING
1	1,310	0	0	0		* 12	0	1,310	1,298
2	6,090	1026	100	** 1026	91.35	* 12		6,090	5,052
3	6,303	692	100	** 692	94.55	* 12		6,303	5,599
4	6,303	692	100	** 692	94.55	* 12		6,303	5,599
5	6,303	692	100	** 692	94.55	* 12		6,303	5,599
6	6,303	692	100	** 692	94.55	* 12		6,303	5,599
7	849	0		0		12	731	1,280	837
TOTAL	33161	3794		3794	469.53	84	731	33,892	28,513

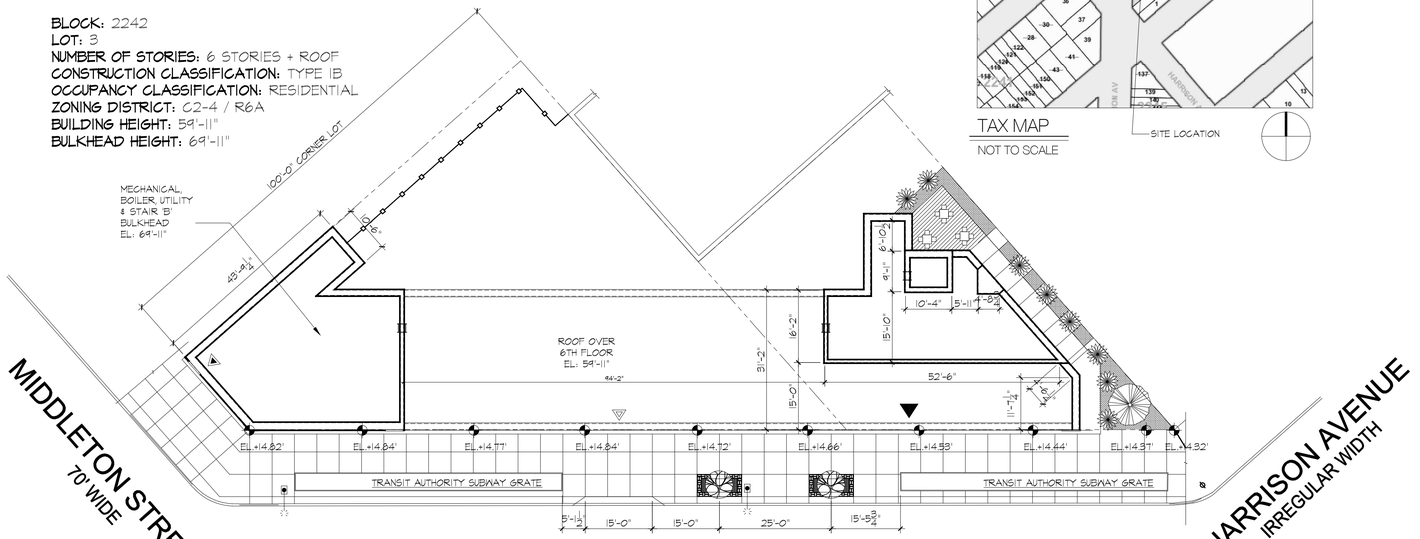
QUALITY HOUSING DEDUCTION CHART
* MAX 12 SQ FT. DEDUCTIBLE REFUSE ROOM
**CORRIDOR COMPLIES WITH 28-41 DENSITY DEDUCTION

APT. DISTRIBUTION

APARTMENT DISTRIBUTION						8/14/2015
	1BR.	2BED	3BED.	TOTAL	GROSS	NET
1ST FLOOR					1,834	
2ND FLOOR	3	2	1	6	6,090	4,362
3RD FLOOR	4	2	1	7	6,303	4,915
4TH FLOOR	4	2	1	7	6,303	4,915
5TH FLOOR	4	2	1	7	6,303	4,915
6TH FLOOR	4	2	1	7	6,303	4,915
ROOF					566	
TOTAL	19	10	5	34	33,702	24,022
PERCENT	56%	29%	15%	100%		

QUALITY HOUSING PROGRAM NOTES (PER ZR 28-00) - 100-118 UNION AVE.

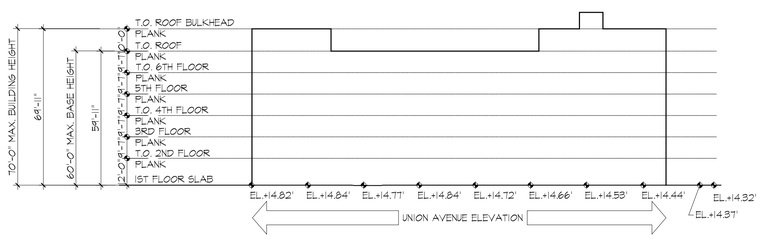
	PERMITTED / REQUIRED	PROPOSED	COMPLY	SECTION	REMARKS
STREET TREE PLANTING (1 PER 25' OF FRONTAGE)	FRONTAGE (FT) 206.5'	EXISTING TREES 0		ZR 26-41	Street trees shall comply with DOT, DCP, and DPR standards.
		TREES ON SITE 2			
		TREES OFF SITE 7			
	TREES REQ. 8	TOTAL 9	YES		
SIZE OF DWELLING UNITS	MIN. SIZE (SQ.FT.) 400	PROVIDED SQ.FT. 447.00	YES	ZR 28-21	
WINDOWS	DOUBLE GLAZED	1" INSUL. DOUBLE GLAZED LOW-E	YES	ZR 28-22	
REFUSE STORAGE & DISPOSAL	LEAST DIM. (FT) 3	PROVIDED DIM. (FT) 5'-0"	YES	ZR 28-23	Maximum refuse room deduction is 12 sq.ft.
	MIN. SIZE (SQ.FT.) 12	PROVIDED SQ.FT. 25.83	YES		
DAYLIGHT IN CORRIDORS	MIN. SIZE (SQ.FT.) 20	WINDOW SIZE (SQ.FT.) 48.00	YES	ZR 28-25	Fifty percent of the square footage of a corridor may be excluded from the definition of floor area if a window with a clear, non-tinted, glazed area of at least 20 square feet is provided
REQUIRED RECREATION SPACE	MIN. REQ. (%) 3.30%	PROVIDED (%) 2.71%	NO	ZR 28-31	Maximum recreation space deduction is 3.3% of total residential gross floor area.
	MIN. REQ. (SQ.FT.) 715.00	TOTAL PROVIDED SQ.FT. 1,850.80			
STANDARDS FOR RECREATION SPACES	MIN SIZE (FT.) 15	PROVIDED FT. 15'-0"	YES	ZR 28-32	The minimum dimension of any recreation space shall be 15 feet. The minimum size of any outdoor recreation space shall be 225 square feet, and the minimum size of any indoor recreation space shall be 300 square feet.
	MIN. OUTDOOR (SQ.FT.) 225	PROVIDED SQ.FT. 1,135.80	YES		
	MIN. INDOOR (SQ.FT.) 300	PROVIDED SQ.FT. 715.00	YES		
PLANTING AREA	BETWEEN BLDG. AND ST. LINE	PROVIDED	YES	ZR 28-33	The area of the zoning lot between the #street line# and the street wall of the building shall be planted at ground level, or in raised planting beds that are permanently affixed to the ground, pursuant to the provisions of Section 23-892 (In R6 through R10 Districts).
DENSITY PER CORRIDOR	ZONE R6 R7	1ST FLOOR 0	NO	ZR 28-41	50% of the sq.ft. of the corridor may be excluded from the floor area if the maximum number of dwelling units does not exceed what is permitted. 2ND-6TH Floor comply
CORRIDOR QUALIFIES FOR DENSITY DEDUCTION		2ND FLOOR 6	YES		
		3RD FLOOR 7	YES		
		4TH FLOOR 7	YES		
		5TH FLOOR 7	YES		
		6TH FLOOR 7	YES		
	MAX DWELLING UNITS 11				



PLOT PLAN

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

UNION AVENUE
IRREGULAR WIDTH



SCHEMATIC HEIGHT PLAN

NOT TO SCALE

BICYCLE PARKING CALCULATION:
AREA REQ PER ZR 25-80 & 36-70:
RESIDENTIAL = ONE BICYCLE FOR EVERY TWO APARTMENTS= 34 APTS / 2 = 17 BICYCLES
15 SQ. FT. x 17 SPACES (34 DWELLINGS) = 255 SQ FT
17 SPACES AND 349 S.F. PROVIDED.
CALCULATION FOR NUMBER OF BICYCLES PER ZR-25-811

AREA REQ PER ZR 36-70:
COMMERCIAL = ONE BICYCLE FOR EVERY 10,000 S.F. OF COMMERCIAL SPACE.
COMMERCIAL #1 = 466 S.F./10,000 = 0.046 < 1 PER 10,000 S.F. = N/A
CALCULATION FOR NUMBER OF BICYCLES PER ZR-36-711

AS PER ZR 25-83 & 36-73:
G.C. SHALL PROVIDE A PLAQUE AT THE EXTERIOR OF THE ENTRY TO THE BICYCLE PARKING AREA WITH LETTERING AT LEAST 3/4" IN HEIGHT, STATING "BICYCLE PARKING".

AVERAGE GRADE / BASE PLANE CALCULATION
14.82 + 14.84 + 14.77 + 14.84 + 14.72 + 14.66 + 14.53 + 14.44 + 14.37' + 14.32'= 146.31
146.31 / 10 = 14.63

BLOCK: 2242
LOT: 3
NUMBER OF STORIES: 6 STORIES + ROOF
CONSTRUCTION CLASSIFICATION: TYPE 1B
OCCUPANCY CLASSIFICATION: RESIDENTIAL
ZONING DISTRICT: C2-4 / R6A
BUILDING HEIGHT: 59'-11"
BULKHEAD HEIGHT: 69'-11"

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.346.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

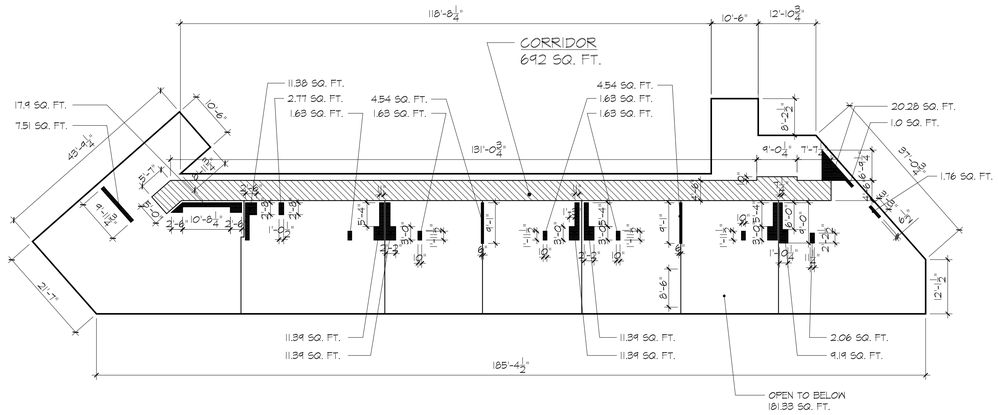
DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

ZONING ANALYSIS

REGISTERED ARCHITECT
ARIEL AUFGANG
032789
STATE OF NEW YORK

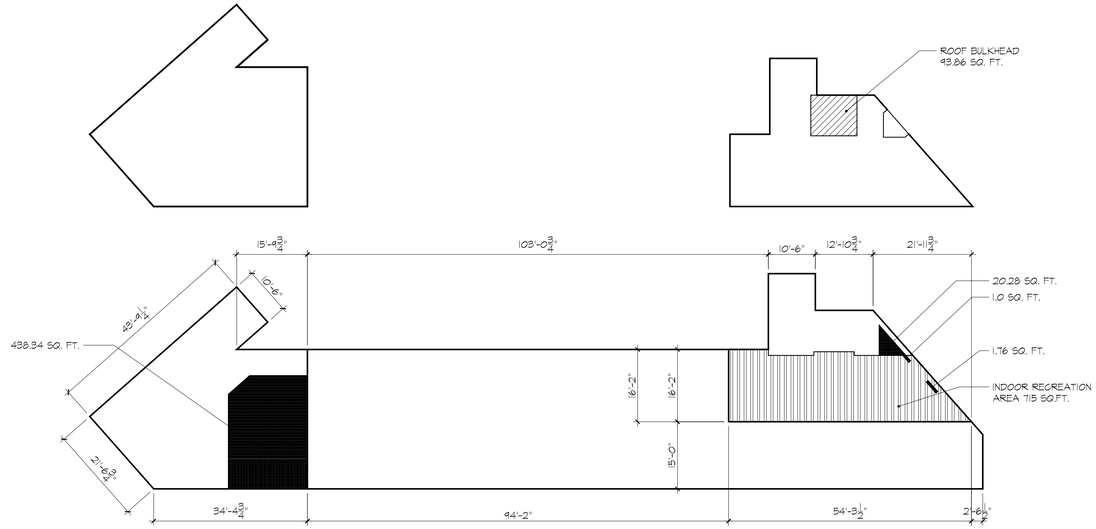
ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: Z-001.00
NYC DOB NUMBER: NB # XXX XXX XXX



3RD TO 6TH FLOOR DIAGRAM

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

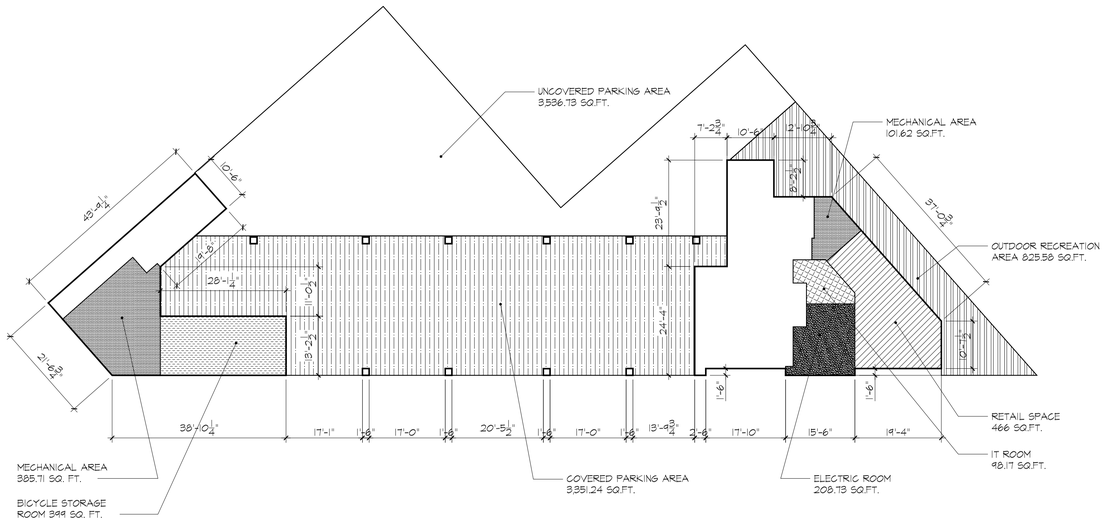
- ☐ GROSS RESIDENTIAL FLOOR AREA = 6,303 SQ. FT.
- ▨ DEDUCTIBLE MECHANICAL AREA = 94.55 SQ.FT.
- ▨ DEDUCTIBLE CORRIDOR AREA = 692 SQ.FT.
- ☐ DEDUCTIBLE REFUSE AREA = 12 SQ.FT. MAX



ROOF DIAGRAM

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

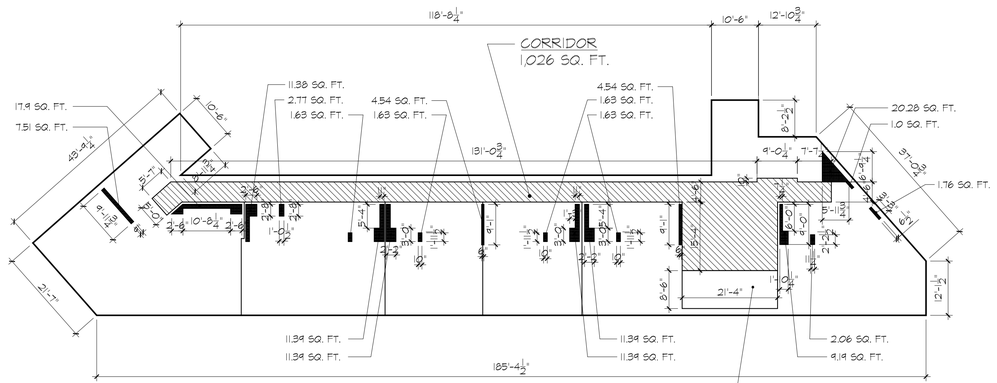
- ☐ GROSS FLOOR AREA = 549 SQ. FT.
- ▨ DEDUCTIBLE MECHANICAL AREA = 461.40 SQ. FT.
- ☐ DEDUCTIBLE REFUSE AREA = 12 SQ.FT. MAX
- ▨ DEDUCTIBLE ROOF BULKHEADS = 93.86 SQ. FT.



1ST FLOOR DIAGRAM

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

- ☐ GROSS FLOOR AREA = 1,310 SQ. FT.
- ▨ GROSS RETAIL FLOOR AREA = 466 SQ. FT.
- ▨ DEDUCTIBLE MECHANICAL AREA = 487.33 SQ. FT.
- ▨ DEDUCTIBLE ELECTRIC ROOM AREA = 208.73 SQ. FT.
- ▨ OUTDOOR RECREATION AREA = 825.58 SQ. FT.
- ▨ DEDUCTIBLE COVERED PARKING AREA = 3,351.24 SQ. FT.
- ▨ BICYCLE STORAGE AREA = 399 SQ. FT.



2ND FLOOR DIAGRAM

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

- ☐ GROSS RESIDENTIAL FLOOR AREA = 6,090 SQ. FT.
- ▨ DEDUCTIBLE MECHANICAL AREA = 91.35 SQ.FT.
- ▨ DEDUCTIBLE CORRIDOR AREA = 1,026 SQ.FT.
- ☐ DEDUCTIBLE REFUSE AREA = 12 SQ.FT. MAX

FLOOR	GROSS SQ. FT.	CORRIDOR SQ. FT.	% OF DEDUCTION	CORRIDOR DEDUCTION	MECH. 1.5%SQ. FT.	REF. SQ. FT.	COMMUNITY SQ. FT.	TOTAL DEDUCTIONS	TOTAL RES. ZONING
1	1,310	0	0	0		12	0	1,310	1,298
2	6,090	1026	100	1026	91.35	12		6,090	5,052
3	6,303	692	100	692	94.55	12		6,303	5,599
4	6,303	692	100	692	94.55	12		6,303	5,599
5	6,303	692	100	692	94.55	12		6,303	5,599
6	6,303	692	100	692	94.55	12		6,303	5,599
7	549	0		0		12	731	1,280	537
TOTAL	33161	3794		3794	469.53	84	731	33,892	28,813

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

AUFGANG ARCHITECTS

9-2-15	ISSUED FOR DOB FILING
DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:

ZONING CALCULATION

REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: Z-002.00
NYC DOB NUMBER: NB # XXX XXX XXX

COMcheck Software Version 4.0.1

Envelope Compliance Certificate

Project Information

Energy Code: 2012 IECC
Project Title:
Location: New York County, New York
Climate Zone: 4a
Project Type: New Construction
Vertical Glazing / Wall Area: 34%

Construction Site:
100-118 UNION AVENUE
Brooklyn, NY 11206

Owner/Agent:
100 UNION OWNER LLC
810 7th AVENUE
NEW YORK, NY 10019

Designer/Contractor:
Aufgang Architects LLC
49 North Airmont Road
Suffern, NY 10901

Building Area	Floor Area
1-Multifamily : Residential	28816

Additional Efficiency Package

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Exterior Wall 1: Concrete Block:12", Partially Grouted, Cells Insulated, Light Density, Furring: None, [Bldg. Use 1 - Multifamily]	14220	---	15.0	0.050	0.090
Window 1: Metal Frame with Thermal Break:Operable, Perf. Specs.: Product ID na, SHGC 0.38, [Bldg. Use 1 - Multifamily] (c)	4778	---	---	0.450	0.450
Door 1: Glass (> 50% glazing):Metal Frame, Entrance Door, Perf. Type: Energy code default, Single Pane, Clear , SHGC 0.80, [Bldg. Use 1 - Multifamily]	92	---	---	1.200	0.770
Roof 1: Insulation Entirely Above Deck, [Bldg. Use 1 - Multifamily]	6150	---	30.0	0.032	0.039
Floor 1: Slab-On-Grade:Unheated, Vertical 3 ft., [Bldg. Use 1 - Multifamily] (d)	2179	---	22.0	0.441	0.550
Floor 2: Other Floor, [Bldg. Use 1 - Multifamily] (b)	39710	---	---	0.032	0.033

(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 6% better than code

Envelope Compliance Statement

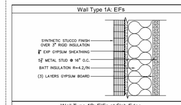
Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 2012 IECC requirements in COMcheck Version 4.0.1 and to comply with the mandatory requirements listed in the Inspection Checklist.

Name - Title | Signature | Date

BUROHAPPOLD ENGINEERING

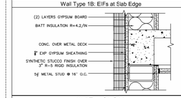
Project:	Project No.:
120 Union Avenue	33553
Design/Check :	Date:
MR	30-Jan-15
Subject:	
Thermal Performance	

Wall Type 1A: EIFs



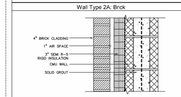
Assembly	R Value	Equivalent U Value	Total Square Footage	Footage of Glazing
Synthetic Stucco over 3" -Rigid Insulation (R=5/inch)	15.000			
5 1/2" Metal Stud @ 16" O.C. with Batt Insulation (R=4.2/inch)	23.100			
Total		0.040	11453	34

Wall Type 1B: EIFs at Slab Edge



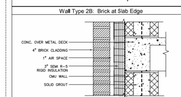
Assembly	R Value	Equivalent U Value	Total Square Footage	Footage of Glazing
Synthetic Stucco over 3" -Rigid Insulation (R=5/inch)	15.000			
9" Concrete Slab -over Metal Deck				
Total		0.059	970	N/A

Wall Type 2A: Brick



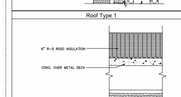
Assembly	R Value	Equivalent U Value	Total Square Footage	Footage of Glazing
4" brick cladding 1" Air Space 3" Rigid Insulation (R=5/inch) 8" CMU Wall	15.000			
Total		0.056	19093	3305

Wall Type 2B: Brick at Slab Edge



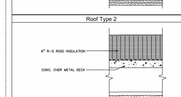
Assembly	R Value	Equivalent U Value	Total Square Footage	Footage of Glazing
4" brick cladding 1" Air Space 3" Rigid Insulation (R=5/inch) 9" Concrete Slab -over Metal Deck	15.000			
Total		0.059	1450	N/A

Roof Type 1



Assembly	R Value	Equivalent U Value	Total Square Footage	Footage of Glazing
6" Rigid Insulation (R=5/inch) 9" Concrete Slab -over Metal Deck	30.000			
Total	30	0.032	5682	0

Roof Type 2



Assembly	R Value	Equivalent U Value	Total Square Footage	Footage of Glazing
6" Rigid Insulation (R=5/inch) 9" Concrete Slab -over Metal Deck	30.000			
Total	30	0.032	8707	N/A

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
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100 UNION OWNER, LLC
810 7TH AVENUE
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DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
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744 BROAD STREET-19TH FL.
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MEP ENGINEER:
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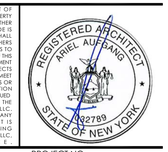
AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:

ENERGY ANALYSIS



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ABBREVIATIONS:

&	AND	K.	KITCHENETTE
@	AT	KIT	KITCHEN
AB	ANCHOR BOLT	KO	KNOCKOUT
A/C	AIR CONDITIONING		
ACT	ACOUSTICAL TILE	L	LONG / LENGTH
ACU	AIR CONDITIONING UNIT	LAM	LAMINATED
ADJ	ADJACENT / ADJOINING	LAV	LAVATORY
ADJUST	ADJUSTABLE	LB(S)	POUND(S)
AFF	ABOVE FINISH FLOOR	LF	LINEAR FEET
AGG	AGGREGATE	LL	LIVE LOAD
AHU	AIR HANDLING UNIT	LP	LOW POINT
ALT	ALTERNATE		
ALUM	ALUMINUM	MACH	MACHINE
APROX	APPROXIMATE	MANUF	MANUFACTURER
ARCH	ARCHITECTURAL	MAX	MAXIMUM
AUTO	AUTOMATIC	MECH	MECHANICAL
AVE	AVENUE	MEP	MECHANICAL, ELECTRICAL
AVG	AVERAGE		& PLUMBING
		MED	MEDIUM
BD	BOARD	MEMB	MEMBRANE
BLDG	BUILDING	MTL	METAL
BLKG	BLOCKING	MEZZ	MEZZANINE
BM	BEAM	MH	MAN-HOLE
BOT	BOTTOM	MIN	MINIMUM
BRG	BEARING	MISC	MISCELLANEOUS
BTW	BETWEEN	MO	MASONRY OPENING
		MTD	MOUNTED
CC	CUBIC CENTIMETER		
C/C	CENTER TO CENTER	N	NORTH
CEM	CEMENT	NIC	NOT IN CONTRACT
CFM	CUBIC FEET PER MINUTE	NOM	NOMINAL
CJ	CONTROL JOINT (SEE EPP JT)	NTS	NOT TO SCALE
CLG	CEILING		
CL	CLOSET	OC	ON CENTER(S)
CLR	CLEAR / CLEARANCE	OD	OUTSIDE DIAMETER
CMU	CONCRETE MASONRY UNIT	OPNG	OPENING
COL	COLUMN	OPP	OPPOSITE
CONC	CONCRETE	OZ	OUNCE
CONN	CONNECTION		
CONST	CONSTRUCT / CONSTRUCTION	PB	PULL BOX
CONT	CONTINUOUS	PCF	POUND PER CUBIC FOOT
CORR	CORRIDOR	PL	PLATE
CPT	CARPET	P.LAM	PLASTIC LAMINATE
CT	CERAMIC TILE	PR	PAIR
CW	COLD WATER	PSF	POUNDS PER SQUARE FEET
		PSI	POUNDS PER SQUARE INCH
DF	DRINKING FOUNTAIN (SEE EWC)	PT	APPRESSURE TREATED
DIA	DIAMETER	PTD	PAINTED
DIM	DIMENSION	PVC	POLYVINYL CHLORIDE
DL	DEAD LOAD		
DN	DOWN	QT	QUARRY TILE
DTL	DETAIL	QTY	QUANTITY
DWG	DRAWING		
		R	RISER
E	EAST	RAD	RADIUS
EA	EACH	REBAR	REINFORCING BAR
EB	EXPANSION BOLT (SEE AB)	REF	REFRIGERATOR
EIFS	EXTERIOR INSULATED FINISH SYSTEM	REINF	REINFORCE / REINFORCING
EJ	EXPANSION JOINT (SEE CJ)	REQ	REQUIRED
EL	ELEVATION	REV	REVISION
ELEC	ELECTRICAL / ELECTRIC	RM	ROOM
ELEV	ELEVATOR	RO	ROUGH OPENING
EMER	EMERGENCY	RUB	RUBBER
ENCL	ENCLOSURE / ENCLOSED		
ENGR	ENGINEER	S	SOUTH
ENTR	ENTRANCE	SCHED	SCHEDULE
EQ	EQUAL	SECT	SECTION
EQUIP	EQUIPMENT	SHT	SHEET
EXIST	EXISTING	SIM	SIMILAR
EXH	EXHAUST	SIN	SINK
EXP	EXPOSED	SPEC	SPECIFICATION
EXPAN	EXPANDED / EXPANSION	SQ	SQUARE
EXT	EXTERIOR	SF	SQUARE FEET
		SS	STAINLESS STEEL
FA	FIRE ALARM	ST	STREET
FAB	FABRICATED	STC	SOUND TRANSMISSION CLASS
FD	FLOOR DRAIN	STD	STANDARD
FE	FIRE EXTINGUISHER	STL	STEEK
FHC	FIRE HOSE CABINET	STL DR	STEEL DOOR
FIN	FINISH	STOR	STORAGE
FIX	FIXTURE	STRUCR	STRUCTURE / STRUCTURAL
FL	FLOOR / FLORING	SUSP	SUSPEND / SUSPENDED
FDN	FOUNDATION	SYM	SYMMETRICAL
FP	FIREPROOF	SYS	SYSTEM
FT	FOOT / FEET		
		T/CONC	TOP OF CONCRETE
GA	GAGE (GAUGE)	T/STL	TOP OF STEEL
GAL	GALLON	T/WALL	TOP OF WALL
GALV	GALVANIZED	T&B	TOP AND BOTTOM
GC	GENERAL CONTRACTOR	T&G	TONGUE AND GROOVE
GL	GLASS	TEL	TELEPHONE
GPM	GALLONS PER MINUTE	TEMP	TEMPERATURE **(IF UNLESS NOTED)**
GYP	GYPSUM	TEMP GL	TEMPERED GLASS
GWB	GYPSUM WALL BOARD	TF	TEMPORARY FIXTURE
		THK	THICK / THICKNESS
H	HIGH	T.O.S.	TOP OF SLAB
HB	HOSE BIB	TV	TELEVISION
HDW	HARDWARE	TYP	TYPICAL
HM	HOLLOW METAL (STEEL)	TBD	TO BE DETERMINED
HOR	HORIZONTAL		
HP	HIGH POINT	UR	URINAL
HR	HOUR	U.O.N.	UNLESS OTHERWISE NOTED
HT	HEIGHT	UL	UNDERWRITERS LABORATORIES
HVAC	HEATING, VENTILATION		
	AND AIR CONDITIONING	VCB	VINYL COVE BASE
HW	HOT WATER	VCT	VINYL COMPOSITION TILE
HWD	HARDWOOD	VERT	VERTICAL,
		VEST	VESTIBULE
ID	INSIDE DIAMETER	VIF	VERIFY IN FIELD
IN	INCHES	VOL	VOLUME
INCL	INCLUDING / INCLUDED		
INSUL	**INSULATE / INSULATED / INSULATION**	W	WEST
INV	INVERTED / INVERT	W/	WITH
		W/O	WITHOUT
JC	JANITORS CLOSET	WC	WATER CLOSET
JT	JOINT	WD	WOOD
		WGL	WIRE GLASS
		WL	WORK LINE
		WP	WORK POINT
		WT	WEIGHT
		WWF	WELDED WIRE FABRIC

GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE 2008 NEW YORK CITY BUILDING CODE, ICC / ANSI A 117.1 - 2003, FIRE DEPARTMENT REGULATIONS, UTILITY COMPANY REQUIREMENTS AND THE BEST TRADE PRACTICES.
2. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FILE ALL REQUIRED CERTIFICATES OF INSURANCE WITH THE DEPARTMENT OF BUILDINGS, OBTAIN ALL REQUIRED PERMITS, AND PAY ALL FEES REQUIRED BY GOVERNING NEW YORK CITY AGENCIES.
3. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE FIELD PRIOR TO COMMENCING WORK, AND SHALL REPORT ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS TO THE ARCHITECT IMMEDIATELY.
4. THE CONTRACTOR IS NOT TO SCALE DRAWINGS OR DETAILS. ONLY WRITTEN DIMENSIONS ARE TO BE UGED.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL CONDITIONS AND MATERIALS WITHIN THE PROPOSED CONSTRUCTION AREA. THE CONTRACTOR SHALL DESIGN AND INSTALL ADEQUATE SHORING AND BRACING FOR ALL STRUCTURAL OR REMOVAL TASKS. THE CONTRACTOR SHALL HAVE SOLE RESPONSIBILITY FOR ANY DAMAGE OR INJURIES CAUSED BY OR DURING THE EXECUTION OF THE WORK.
6. THE CONTRACTOR SHALL LAY OUT HIS OWN WORK, AND SHALL PROVIDE ALL DIMENSIONS REQUIRED FOR OTHER TRADES (PLUMBING, ELECTRICAL, ETC.).
7. PLUMBING AND ELECTRICAL WORK SHALL BE PERFORMED BY PERSONS LICENSED IN THEIR TRADES, WHO SHALL ARRANGE FOR AND OBTAIN INSPECTIONS AND REQUIRED SIGN-OFFS.
8. THE CONTRACTOR SHALL DO ALL CUTTING, PATCHING AND REPAIRING AS REQUIRED TO COMPLETE ALL OF THE WORK INDICATED ON THE DRAWINGS, AND ALL OTHER WORK THAT MAY BE REQUIRED TO COMPLETE THE JOB.
9. TYPES OF CONSTRUCTION SHALL COMPLY WITH THE REQUIREMENTS OF CHAPTER 6 OF N.Y.C. BLDG. CODE. AT LEAST 24 HR. WRITTEN NOTICE SHALL BE GIVEN TO THE COMMISSIONER BEFORE COMMENCEMENT OF WORK.
10. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND SAMPLES ON ALL ITEMS SPECIFIED ON THE CONTRACT DOCUMENTS TO THE ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO PURCHASING AND INSTALLATION.
11. ALL DEBRIS ON THE PROPERTY DUE TO CONSTRUCTION SHALL BE REMOVED.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR ARRANGING AND PAYING FOR ALL CONTROLLED INSPECTIONS REQUIRED BY LAW, AND FOR ARRANGING ALL CONSTRUCTION, PLUMBING, ELECTRICAL, OR OTHER INSPECTIONS RELATED TO THE PROPOSED WORK. A PROPOSED SCHEDULE OF THESE INSPECTIONS SHALL BE INCLUDED IN THE PROPOSED WORK SCHEDULE. CONTRACTOR SHALL PROVIDE INSPECTION SIGN-OFFS TO OWNER AND ARCHITECT.
13. CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS, ALSO HE SHALL NOTIFY THE ARCHITECT OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN ON THESE DRAWINGS PRIOR TO THE START OF WORK. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
14. DIMENSIONS SHOWN ON FLOOR PLANS, SECTIONS, ELEVATIONS, AND DETAILS ARE TO FINISH FACE OF WALLS OR CENTER LINE OF COLUMNS TYPICALLY, UNLESS OTHERWISE NOTED.
15. ABBREVIATIONS THROUGHOUT THE PLANS ARE THOSE IN COMMON USE. NOTIFY THE ARCHITECT OF ANY ABBREVATIONS IN QUESTION.
16. CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS ARE COMPLEMENTARY. ANYTHING SHOWN ON ARCHITECTURAL DRAWINGS AND NOT SHOWN ON CIVIL, STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS, OR SHOWN ON CIVIL, STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS AND NOT SHOWN ON ARCHITECTURAL DRAWINGS SHALL BE INTERPRETED AS BEING SHOWN ON ALL TRADES.
17. FINISH FLOOR ELEVATIONS ARE AS ESTABLISHED DATUM LINE, UNLESS OTHERWISE NOTED. THE CONTRACTOR WILL BE RESPONSIBLE FOR VERIFYING FLOOR-TO-FLOOR ELEVATIONS.
18. IN THE CASE OF A CONFLICT BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, SPECIFICATIONS SHALL TAKE PRECEDENCE. CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY CONFLICT BEFORE PROCEEDING WITH THE WORK.
19. CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS AND EQUIPMENT AS REQUIRED TO PROPERLY AND FULLY COMPLETE THE WORK AS INDICATED BY THE DRAWINGS AND SPECIFICATIONS.
20. CONTRACTOR SHALL REMOVE, CUT, PATCH AND REFRAME WALLS, PARTITIONS, FLOORS, FRAMES, DOORS, MOLDINGS, PIPE FIXTURES AND CONDUIT AS REQUIRED TO PROPERLY EXECUTE THE WORK.
21. CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATELY BRACING AND PROTECTING ALL WORK DURING CONSTRUCTION AGAINST DAMAGE, BREAKS, COLLAPSE, DISTORTIONS, AND OFF-ALIGNMENT ACCORDING TO APPLICABLE STANDARD CODES (INCLUDING CHAPTER 33 OF THE NYC BUILDING CODE) AND GOOD PRACTICE.
22. CONTRACTOR SHALL COORDINATE THE INSTALLATION OF THE VARIOUS TRADE ITEMS WITHIN THE SPACE ABOVE ALL CEILINGS (INCLUDING, BUT NOT LIMITED TO: STRUCTURAL MEMBERS, MECHANICAL DUCTS AND INSTALLATION, CONDUITS, RACEWAYS, SPRINKLER SYSTEM, LIGHTING FIXTURES, CEILING SYSTEMS), AND ANY SPECIAL STRUCTURAL SUPPORTS REQUIRED AND SHALL BE RESPONSIBLE FOR MAINTAINING THE FINISH CEILING HEIGHT ABOVE THE FINISH FLOOR AS INDICATED ON THE DRAWINGS AND THE FINISH SCHEDULE. (CEILING HEIGHT DIMENSIONS ARE TO THE FINISH SURFACE OF CEILING.)
23. CONTRACTOR SHALL FURNISH AND INSTALL ACCESS PANELS WHERE SHOWN ON THE REFLECTED CEILING PLANS AND AS REQUIRED BY BUILDING CODE OR NORMAL GOOD PRACTICE TO PROVIDE ACCESS TO ALL MECHANICAL OR ELECTRICAL EQUIPMENT. NO ACCESS PANEL SHALL BE LOCATED, FRAMED, OR INSTALLED WITHOUT THE EXPRESSED APPROVAL OF THE ARCHITECT.
24. THE CONTRACTOR SHALL PROTECT ALL FINISH WORK SURFACES FROM DAMAGE DURING THE COURSE OF CONSTRUCTION AND SHALL REPLACE AND/OR REPAIR ALL DAMAGED SURFACES CAUSED BY CONTRACTOR OR SUBCONTRACTOR PERSONNEL TO THE SATISFACTION OF THE OWNER AND ARCHITECT.
25. CONTRACTOR SHALL PROPERLY PROTECT AND MAKE SAFE ADJACENT PROPERTY AS JOB CONDITIONS REQUIRE. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO ISOLATE ALL WORK AREAS AND CLEARLY DEFINE PATHS OF ACCESS TO THE WORK FOR WORKMEN IN ORDER TO INSURE PROTECTION OF DUST INFILTRATION OF THE BUILDING AND TO PREVENT DAMAGE TO FLOORS, WALLS AND CEILINGS OF PUBLIC AND/OR FREIGHT ACCESS AREAS. IF SUCH DAMAGE SHOULD OCCUR, CONTRACTOR SHALL CORRECT IT IMMEDIATELY AT HIS OWN COST.
26. ALL PRECAUTIONS ARE TO BE TAKEN TO PREVENT DIRT AND DUST FROM PERMEATING INTO OTHER PARTS OF THE BUILDING DURING THE PROGRESS OF THE WORK. MATERIALS AND EQUIPMENT, IF SO DIRECTED BY THE ARCHITECT OR OWNER, BEFORE BEING TAKEN OUT OF THE IMMEDIATE AREA OF CONSTRUCTION. ALL SUCH BARRELS, BAGS, RUBBISH, RUBBLE, DISCARDED EQUIPMENT, EMPTY PACKING CARTONS AND OTHER MATERIALS WILL BE TAKEN OUT OF THE BUILDING AND PROPERLY REMOVED FROM THE PREMISES AS PART OF THE WORK UNDER THIS CONTRACT.
27. SPECIAL NOTICE TO CONTRACTORS: ALL CONTRACTORS PERFORMING WORK ON THE PREMISES SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING AND SUPERVISING A REASONABLE AND PRUDENT SAFETY PROGRAM INCLUDING BUT NOT LIMITED TO THE ISOLATION OF WORK AREAS AND THE PROMPT REMOVAL OF ANY DEBRIS OR TOOLS WHICH MIGHT ENDANGER VISITORS AND STAFF OF THE OWNER OR ARCHITECT.
28. IF THE CONTRACTOR ASCERTAINS AT ANY TIME THAT REQUIREMENTS OF THIS CONTRACT CONFLICT WITH, OR ARE IN VIOLATION OF, APPLICABLE LAWS, CODES, REGULATIONS AND ORDINANCES, HE SHALL NOT PROCEED WITH WORK IN QUESTION, EXCEPT AT HIS OWN RISK, UNTIL ARCHITECT HAS BEEN NOTIFIED IN WRITING AND WRITTEN DETERMINATION IS MADE BY THE ARCHITECT. WHERE COMPLETED OR PARTIALLY COMPLETED WORK IS DISCOVERED TO BE IN VIOLATION WITH APPLICABLE LAWS, CODES, REGULATIONS AND ORDINANCES, CONTRACTOR SHALL BE REQUIRED TO REMOVE THAT WORK FROM THE PROJECT AND REPLACE SUCH WORK WITH ALL NEW COMPLYING WORK AT NO ADDITIONAL COST TO THE OWNER OR ARCHITECT.
29. ANY WORK INSTALLED IN CONFLICT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT HIS EXPENSE AND AT NO ADDITIONAL EXPENSE TO THE OWNER, ARCHITECT, OR CONSULTANTS.
30. CONTRACTOR SHALL COORDINATE ALL AREAS OF WORK WITH ALL SUB-CONTRACTORS AND OTHER TRADES INVOLVED WITH THE PROJECT.
31. COORDINATE SPACE REQUIREMENTS AND INSTALLATION OF MECHANICAL AND ELECTRICAL WORK INDICATED ON DRAWINGS. VERIFY LOCATION AND REQUIRED OPENING SIZES FOR MECHANICAL EQUIPMENT, LOCATION AND SIZES OF EQUIPMENT FOR PADS AND BASES AND REQUIREMENTS, AND LOCATION OF POWER AND WATER OR DRAIN INSTALLATION WITH EQUIPMENT MANUFACTURERS BEFORE PROCEEDING WITH THE WORK.
32. COMPLY WITH INSTALLATION REQUIREMENTS OF MANUFACTURER'S INSTRUCTIONS AND APPROVED SHOP DRAWINGS.
33. CONTRACTOR SHALL ANALYZE ELECTRICAL REQUIREMENTS OF EQUIPMENT TO BE INSTALLED AND ADVISE ARCHITECT OF THE NEED, IF ANY, TO UPGRADE EXISTING POWER SUPPLY PRIOR TO PROCEEDING WITH ELECTRICAL WORK.
34. CONTRACTOR SHALL PROVIDE OWNER WITH ALL MANUALS, MAINTENANCE SCHEDULES, AND OTHER REQUIREMENTS NECESSARY FOR THE MAINTENANCE OF EQUIPMENT INSTALLED AS PART OF THIS CONTRACT. ALL MANUFACTURER'S WARRANTIES SHALL BE TRANSFERRED TO OWNER UPON COMPLETION OF WORK.
35. CONTRACTOR SHALL IDENTIFY ALL NEW EXPOSED PIPES, VALVES, AND CONDUIT WITH STAMPED METAL TAGS AND SHALL LABEL ELECTRIC PANEL BOXES WITH CIRCUIT DESIGNATIONS UPON COMPLETION OF WORK.
36. CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP IN THIS CONTRACT FOR A PERIOD OF ONE YEAR FOLLOWING ARCHITECT'S CERTIFICATION OF SUBSTANTIAL COMPLETION, AND SHALL REMEDY ANY DEFECTS IN SUCH WORK THAT ARISES DURING THAT TIME AT NO COST TO THE OWNER.
37. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES BELOW GRADE AND RELATED SERVICE CONNECTIONS WITH THE RESPECTIVE UTILITY COMPANIES.
38. THE CONTRACTOR SHALL COORDINATE THE REMOVAL, ABANDONMENT, AND/OR RELOCATION OF EXISTING UTILITIES ABOVE OR BELOW GRADE WITH THE RESPECTIVE UTILITY COMPANIES.
39. TEMPORARY FACILITIES:
    A) THE CONTRACTOR SHALL PROVIDE A STAGING AND MATERIAL STORAGE AREA ADJACENT TO THE AREA OF CONSTRUCTION. LOCATION SHALL BE COORDINATED WITH THE OWNER. IN ACCORDANCE WITH CHAPTER 31 OF THE 2008 NYC BUILDING CODE.
    B) THE CONTRACTOR SHALL MAKE NECESSARY CONNECTIONS TO EXISTING UTILITIES FOR TEMPORARY POWER AND WATER SUPPLIES, AND SHALL COORDINATE SUCH USE WITH THE OWNER PRIOR TO CONNECTION. IN ACCORDANCE WITH CHAPTER 33 OF THE NYC BUILDING CODE)
    C) THE CONTRACTOR SHALL PROVIDE TEMPORARY BARRICADES TO SEPARATE CONSTRUCTION AREAS FOR PUBLIC SAFETY AROUND ENTIRE PERIMETER OF CONSTRUCTION AREA. IN ACCORDANCE WITH CHAPTER 31 & 33 OF THE 2008 NYC BUILDING CODE)
40. FIRE-RATED PARTITION WALLS AND FIRE-RATED OCCUPANCY SEPARATION WALLS SHALL EXTEND FROM CONCRETE FLOOR SLABS UP TO UNDERSIDE OF STRUCTURE ABOVE. ALL OPENINGS SHALL BE PROTECTED IN ACCORDANCE WITH CHAPTER 7 OF THE 2008 NYC BUILDING CODE.
41. **ALL PENETRATIONS THRU FIRE-RATED WALLS, FLOORS AND CEILINGS SHALL BE INSTALLED WITH FIRE DAMPERS, FIRE SEAL, ETC., SO AS TO MAINTAIN THE FIRE RESISTIVE RATING AND STRUCTURAL INTEGRITY OF WALL OR CEILING ASSEMBLY. ALL OPENINGS SHALL BE PROTECTED IN ACCORDANCE WITH CHAPTER 7 OF THE 2008 NYC BUILDING CODE.**
42. **FINAL CLEAN UP AND DISPOSAL: REMOVE DEBRIS, RUBBISH AND WASTE MATERIAL FROM THE OWNER'S PROPERTY TO A LAWFUL DISPOSAL AREA AND PAY ALL HAULING AND DUMPING COSTS. CONFORM TO PERTAINING FEDERAL, STATE AND LOCAL LAWS, REGULATIONS AND ORDERS UPON COMPLETION OF WORK, ALL CONSTRUCTION AREAS SHALL BE LEFT VACUUM-CLEAN AND FREE FROM DEBRIS. CLEAN ALL DUST, DIRT, STAINS, HAND MARKS, PAINT SPOTS, DROPPINGS, AND OTHER BLEMISHES FROM ALL FINISHED SURFACES.**
43. PROVIDE CONC. LINTELS ABOVE ALL MASONRY OPENINGS (TYP) U.O.N. SEE STRUCTURAL DRAWINGS FOR LINTEL SCHEDULE.
44. PROVIDE CONC. LINTELS ABOVE ALL MECHANICAL OPENINGS IN MASONRY WALLS (TYP).
45. **G.C. SHALL COORDINATE SIZE & LOCATION OF ALL HVAC OPENINGS IN CONCRETE FLOOR & ROOF SLAB WITH MECHANICAL DRAWINGS & CONC. SLAB CONTRACTOR. ALL VERTICAL SHAFT WALLS ENCLOSING HVAC DUCTS SHALL BE 2-HR RATED (TYP) WHERE PENETRATES THREE STORIES OR MORE (BC 707.4) IF SHAFT EXTENDS UP TO THE UNDERSIDE OF A NON-COMBUSTIBLE ROOF AND HAVE A FLOOR AREA EXCEEDING 4 SQ.FT., PROVIDE A SMOKE VENT.**
46. ALL DWELLING UNITS ARE HANDICAP ADAPTABLE (BC 1107) (U.O.N. ON PLANS)
47. FOR SIZE & LOCATION OF ALL REQUIRED CONCRETE PADS FOR MECHANICAL EQUIPMENT, SEE MECHANICAL & PLUMBING DRAWINGS.
48. IF A SPRINKLER LINE IS EXPOSED IN A LIVING AREA, ENCLOSE IN A GYP. BD. SOFFIT - SEE SPRINKLER DWGS. AND ARCH SPRINKLER SOFFIT DETAIL.
49. ALL STEEL COLUMNS & BEAMS SHALL BE FIRE PROTECTED W/ SPRAY-ON FIREPROOFING (2 HOUR RATED).
50. ALL EXTERIOR WALLS, INCLUDING ROOF BULKHEADS SHALL BE 2 HR RATED.
51. ALL INTERIOR BEARING WALLS, HOIST WAY, SHAFTS, VERTICAL EXITS AND EXIT PASSAGE WAYS SHALL BE 2 HOUR RATED.
52. PROVIDE NON-COMBUSTIBLE FIRE STOPPING AT THE PERIMETER OF ALL PENETRATIONS THROUGH RATED WALLS, FLOORS, ROOF AND CEILINGS.
53. ALL EXTERIOR CONCRETE BLOCK WALLS ADJACENT TO EXISTING BUILDINGS SHALL HAVE A DRY-BLOCK ADDITIVE (INCLUDING MORTAR) "ACME SHIELD".
54. PROVIDE CONTROL JOINTS IN GYP BD WALLS & CEILING @ 30'-0" O/C MAX. AS MANUF BY U.S.G.
55. PROVIDE CONTROL JOINTS IN BRICK @ 30'-0" O.C. MAX., CONTROL JOINTS IN CMU @ 30'-0" O.C., EXPANSION JOINTS IN CMU @ 60'-0" O/C.
56. MINIMUM ALLOWABLE CEILING HEIGHT IN APARTMENTS (BC 1208.2)
    * HABITABLE ROOMS _ 8'-0"
    * OCCUPIABLE SPACES _ **PUBLIC CORRIDORS & COMMUNITY ROOM** 7'-6"
    * BATHROOMS, KITCHENS, SOFFITS, ARPIT FOYER _ 7'-0"
57. PROVIDE MIN. STC 50 RATING AT PERIMETER WALLS, FLOORS & CEILING OF RESIDENTIAL APARTMENTS (BC 1207)
58. MECHANICAL & PLUMBING CONTRACTORS TO COORDINATE WITH G.C. & CONCRETE SLAB MANUFACTURER PENETRATION SIZE & LOCATIONS PRIOR TO DRILLING HOLES IN SLABS.
59. ALL WORK TO BE PERFORMED ON THIS PROJECT SHALL BE IN A WORKMEN LIKE MANNER.
60. ENCAPSULATED HORIZONTAL DUCTWORK WITH FYREWRAP EZ 1.5 2 HOUR RATED . NONCOMBUSTIBLE DUCT BLANKET INSULATION (SEE MECHANICAL DRAWINGS)
61. PROVIDE FIRE EXTINGUISHER PER NYC BUILDING CODE.
62. THIS PROJECT DOES NOT INCLUDE MODULAR CONSTRUCTION.

NEW YORK CITY MULTIPLE DWELLING LAW:

1. IN MULTIPLE DWELLINGS BUILDINGS, WALLS, FLOORS, ROOF, STAIRS AND PUBLIC HALLS SHALL BE FIRE PROOFED. (CHAPTER 7)
2. ALL PARTITIONS BETWEEN APARTMENTS SHALL BE FIRE STOPPED AS PER SECTION BC 708
3. **SOUND PROOFING BETWEEN APARTMENTS SHALL COMPLY WITH BC 1207.**
4. PARTITIONS AND CEILING ENCLOSING KITCHENS & KITCHENETTES SHALL BE FIRE-RETARDED AS PER CHAPTER 7 OF NYC BC & SECTION 83 OF NEW YORK STATE MULTIPLE DWELLING LAW.
5. ALL COMBUSTIBLE MATERIALS UNDER OR WITHIN 1'-0" OF COOKING APPLIANCES SHALL BE FIRE RETARDED. THERE SHALL ALWAYS BE AT LEAST 2 FEET OF CLEAR SPACE ABOVE ANY EXPOSED COOKING SURFACES AS PER SECTION 33 OF NEW YORK STATE MULTIPLE DWELLING LAW.
6. NUMBER OF EXITS REQUIRED ACCORDING TO TABLE 1018.1 - STAIRS SHALL EXTEND FROM THE ENTRANCE STORY UP TO THE ROOF AND BE EQUIPPED WITH FIREPROOF SELF-CLOSING DOORS GLAZED WITH WIRE GLASS AND WITHOUT TRANSOMS. THE DOORS GIVING ACCESS TO SUCH STAIRS SHALL NOT BE HELD OPEN BY ANY DEVICE WHATEVER. (CHAPTER 10).
7. PROVIDE MIRROR IN SELF-SERVICE PASSENGER ELEVATORS AS PER CHAPTER 30, SECTION BC 3001.6.
8. THE FLOOR OF EVERY BATHROOM OR PUBLIC TOILET SHALL HAVE A SMOOTH, HARD, NONABSORBENT SURFACE THAT EXTENDS UPWARD ONTO THE WALLS AT LEASE 6" OR MORE ABOVE THE FLOOR, EXCEPT AT DOORS, AS PER SECTION BC 1210.
9. EVERY BATHROOM SHALL BE PROVIDED WITH NATURAL VENTILATION IN ACCORDANCE WITH SECTION 1203.4.1.3, UNLESS PROVIDED WITH EXHAUST VENTILATION IN ACCORDANCE WITH THE NEW YORK CITY MECHANICAL CODE , (SECTION 1203.4.1.3).
10. EVERY MULTIPLE DWELLING SHALL COMPLY WITH CHAPTERS 11 & 12 (LIGHTING, GAS METERS, AND GAS APPLIANCES).
11. PROVIDE USPS APPROVED MAILBOXES.
12. PROVIDE INTERCOMMUNICATION SYSTEM IN ENTRANCE LOBBY AS PER CHAPTER 1008.4.4.
13. PROVIDE AND MAINTAIN A PEEPHOLE IN THE ENTRANCE DOOR OF EACH HOUSING UNIT. SUCH PEEPHOLE SHALL BE SO LOCATED AS TO ENABLE A PERSON TO VIEW FROM INSIDE OF THE ENTRANCE DOOR.
14. PROVIDE FRONT, INTERIOR COURT AND REAR YARD LIGHTING AS PER SECTION BC 1206.4
15. PROVIDE LIGHTING AND VENTILATION OF PUBLIC HALLS AND STAIRS AS PER SECTION BC 1203 & SECTION BC 1205.
16. ANY HABITABLE ROOM IN BASEMENT OR CELLAR SHALL COMPLY WITH CHAPTER 12.
17. ALL STAIRS SHALL COMPLY WITH CHAPTER 10, SECTION BC 1009.
18. EVERY STAIR SHALL BE VENTILATED BY A WINDOW OR BY MOVABLE LOUVERS IN THE SKYLIGHT HAVING AN OPENING OF AT LEAST 3.5% OF THE MAX. SHAFT AREA AT ANY FLOOR, BUT NOT LESS THAN 72 SQ. IN. OF THE TOTAL REQUIRED VENT AREA. AT LEAST 1/3 SHALL BE CLEAR OPENING TO THE EXTERIOR 10'-0" MIN. AWAY FROM ANY OPENING)

ENERGY CONSERVATION NOTES:

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2011 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE, AS NOTED IN 2008 NEW YORK CITY BUILDING CODE - SECTION BC 1301 -

PLANS MEET ALL APPLICABLE CODES INCLUDING THE FOLLOWING:

- NEW YORK CITY OFFICIAL COMPILATION OF CODES, RULES AND REGULATIONS.
- N.F.P.A. - NATIONAL FIRE PROTECTION ASSOCIATION.
- A.D.A - ICC/ANSI A-117.1-2003
- U.F.A.S. - UNIFORM FEDERAL ACCESSIBILITY STANDARDS. (IF APPLICABLE)

IF TWO OR MORE OF THESE BUILDING CODES DIFFER ON A PARTICULAR SUBJECT MATTER, THE MORE STRINGENT OF THE TWO SHALL GOVERN.

NEW YORK CITY HOUSING MAINTENANCE CODE:

1. BUILDING SHALL COMPLY WITH SECTION 27-2027 - DRAINAGE OF ROOFS AND COURT YARDS.
2. BUILDING SHALL COMPLY WITH SECTION 27-2028 - CENTRAL HEATING.
3. BUILDING SHALL COMPLY WITH SECTION 27-2031 - SUPPLY OF HOT WATER.
4. BUILDING SHALL COMPLY WITH SECTION 27-2040 - LIGHTS NEAR ENTRANCE WAYS AND IN YARDS AND COURTS.
5. BUILDING SHALL COMPLY WITH SECTION 27-2038 & BC 1006 - LIGHTING PUBLIC HALLS AND STAIRS.
6. BUILDING SHALL COMPLY WITH SECTION 27-2041 - PEEPHOLES IN ENTRANCE DOORS TO APARTMENTS.
7. BUILDING SHALL COMPLY WITH SECTION 27-2047 - MAIL SERVICE.
8. BUILDING SHALL COMPLY WITH SECTION 27-2048 - FLOOR SIGNS.
9. BUILDING SHALL COMPLY WITH SECTION 27-2049 - STREET NUMBERS.
10. BUILDING SHALL COMPLY WITH SECTION 27-2050 - INSPECTION OF SPRINKLERS.
11. BUILDING SHALL COMPLY WITH ARTICLE 13 - JANITORIAL SERVICES.
12. BUILDING SHALL COMPLY WITH H.P.D. DESIGN GUIDELINES DATED MAY 1998, REVISED AUGUST 1, 2000 FOR ROOM SIZES.
13. BUILDING SHALL COMPLY WITH SECTION 27-2097 - REGISTRATION: TIME TO FILE.
14. BUILDING SHALL COMPLY WITH SECTION 27-2104 - POSTING OF SERAL NUMBER.
15. BUILDING SHALL COMPLY WITH SECTION 27-2105 - IDENTIFICATION OF MANAGING AGENT OR OWNER
16. BUILDING SHALL COMPLY WITH SECTION 27-2021 - RECEPTACLES FOR WASTE MATTER.
17. BUILDING SHALL COMPLY WITH SECTION 27-2022 - FREQUENCY OF COLLECTION OF WASTE MATTER.
18. PROVIDE A HEAVY DUTY LATCH SET AND A HEAVY DUTY DEAD BOLT OPERABLE BY A KEY FROM THE OUTSIDE AND A THUMB-TURN FROM THE INSIDE AT EVERY APARTMENT ENTRANCE (SECTION 27-2043)

FINISH NOTES:

1. INTERIOR FINISHES SHALL BE CLASSIFIED IN ACCORDANCE WITH SURFACE FLAME SPREAD RATINGS AS NOTED IN CHAPTER 8.
2. INTERIOR WALL AND CEILING FINISHES SHALL BE CLASSIFIED IN ACCORDANCE WITH ASTM E 84 AS PER SECTION BC 803.
3. ATTACHMENT AND FURRED CONSTRUCTION FOR INTERIOR FINISH SHALL BE IN ACCORDANCE WITH BC 803.4.1
4. NO MATERIAL OTHER THAN TEXTILES, SHALL BE USED IN ANY INTERIOR LOCATION WHICH WILL PRODUCE PRODUCTS MORE TOXIC THAN THOSE GIVEN OFF BY WOOD OR PAPER WHEN DECOMPOSING OR BURNING AS PER SECTION BC 803.
5. INSTALLATION OF ALL REQUIRED SPRAYED-ON FIRE PROTECTION SHALL BE SUBJECT TO THE SPECIAL INS

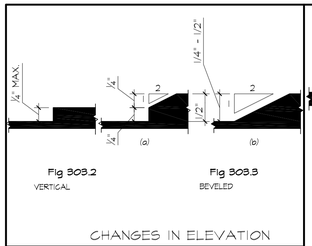
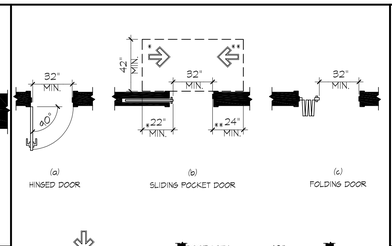


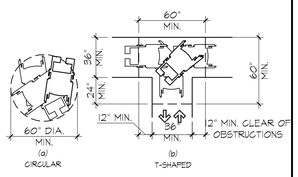
Fig 303.2
VERTICAL

Fig 303.3
BEVELED

CHANGES IN ELEVATION

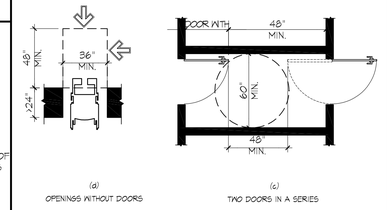


(a) HINGED DOOR
(b) SLIDING POCKET DOOR
(c) FOLDING DOOR



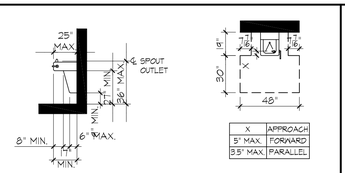
(a) CIRCULAR
(b) T-SHAPED

Fig 304.3
SIZE OF TURNING SPACE



(a) OPENINGS WITHOUT DOORS
(c) TWO DOORS IN A SERIES

Fig 404.2.2 & 404.2.3
CLEAR WIDTH OF DOORWAYS



KNEE CLEARANCE
Fig 306.2 & 306.3

DRINKING FOUNTAIN
Fig 602.5

DRINKING FOUNTAIN

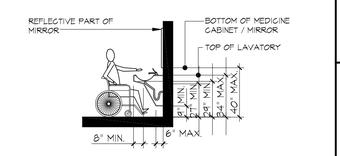
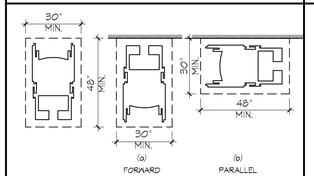


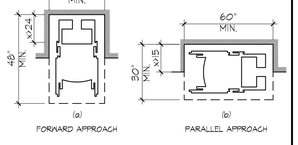
Fig 606.3
HEIGHT OF LAVATORIES & SINKS



(a) FORWARD
(b) PARALLEL

Fig 305.3
SIZE OF CLEAR FLOOR SPACE

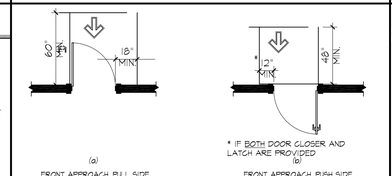
Fig 305.5
APPROACH



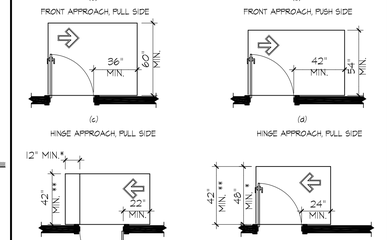
(a) FORWARD APPROACH
(b) PARALLEL APPROACH

MANEUVERING CLEARANCE IN AN ALCOVE

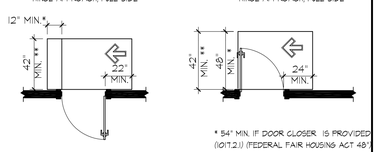
Fig 305.7
CLEAR FLOOR SPACES AND APPROACH



(a) FRONT APPROACH, PULL SIDE
(b) FRONT APPROACH, PUSH SIDE
* IF BOTH DOOR CLOSER AND LATCH ARE PROVIDED



(c) HINGE APPROACH, PULL SIDE
(a) HINGE APPROACH, PUSH SIDE

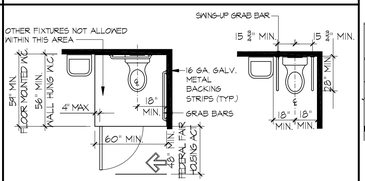


* IF BOTH DOOR CLOSER AND LATCH ARE PROVIDED
** 48" MIN. IF BOTH DOOR CLOSER AND LATCH PROVIDED
(e) HINGE APPROACH, PUSH SIDE

* 54" MIN. IF DOOR CLOSER IS PROVIDED (1017.2.1) (FEDERAL FAIR HOUSING ACT 48")
** 42" MIN. @ TOILET COMP. STALLS (1107.2.1) 4'-0" FAIR HOUSING ACT
(f) LATCH APPROACH, PULL SIDE

* 48" MIN. IF DOOR CLOSER IS PROVIDED
(g) LATCH APPROACH, PUSH SIDE

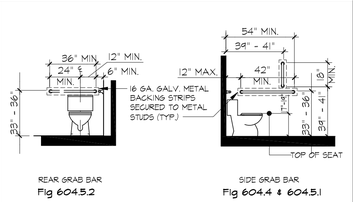
Fig 404.2.3.1
MANEUVERING CLEARANCE AT MANUAL SWINGING DOORS



WATER CLOSET CLEARANCE PUBLIC TOILETS 5'-0" X 7'-1" MIN.
Fig 604.3

SWING-UP GRAB BAR
Fig 604.5.3

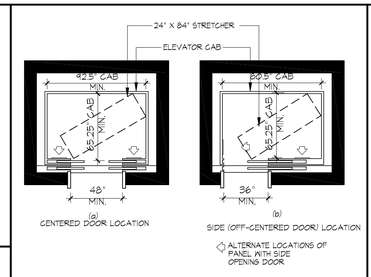
WATER CLOSET CLEARANCE



REAR GRAB BAR
Fig 604.5.2

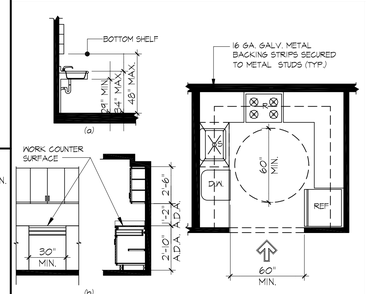
SIDE GRAB BAR
Fig 604.4 & 604.5.1

GRAB BAR FOR WATER CLOSET



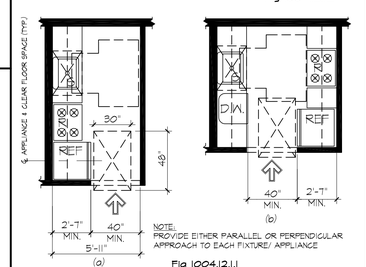
(a) CENTERED DOOR LOCATION
(b) SIDE (OFF-CENTERED DOOR) LOCATION
◇ ALTERNATE LOCATIONS OF PANEL WITH SIDE OPENING DOOR

Fig 407.4.1
DIMENSIONS OF ELEVATOR CAB AND PANEL



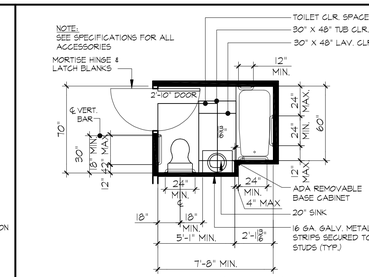
CABINETS AND BASE REMOVED AND HEIGHT ALTERNATIVES

Fig 1004.12.1.2



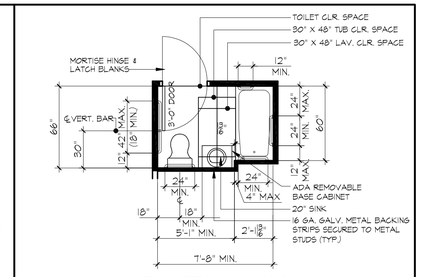
NOTE:
PROVIDE EITHER PARALLEL OR PERPENDICULAR APPROACH TO EACH FIXTURE/ APPLIANCE

Fig 1004.12.1.1
KITCHEN HEIGHT REQUIREMENTS & MINIMUM KITCHEN CLEARANCE



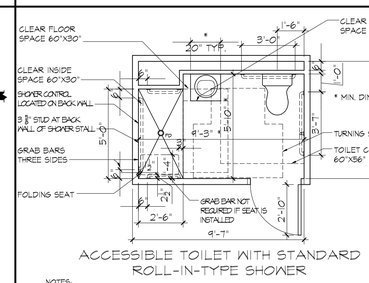
SIDE APPROACH (2'-10" DOOR)
(FEDERAL FAIR HOUSING ACT)
EXHIBIT 30 (APPENDIX P)

RESIDENTIAL H/C ADAPTABLE BATHROOM

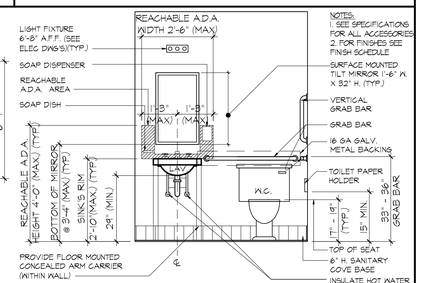


FRONT APPROACH (3'-0" DOOR)
(FEDERAL FAIR HOUSING ACT)
EXHIBIT 31 (APPENDIX P)

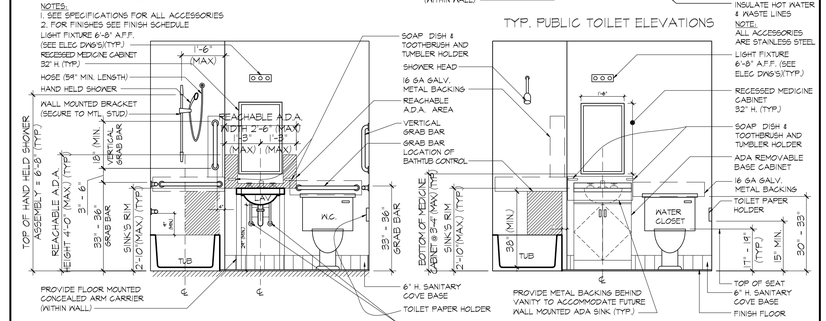
RESIDENTIAL H/C ADAPTABLE BATHROOM



ACCESSIBLE TOILET WITH STANDARD ROLL-IN-TYPE SHOWER



TYP. PUBLIC TOILET ELEVATIONS



TYPICAL APARTMENT ACCESSIBLE BATHROOM ELEVATION

TYPICAL APARTMENT ADAPTABLE BATHROOM ELEVATION

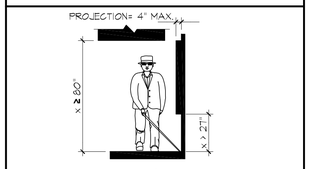
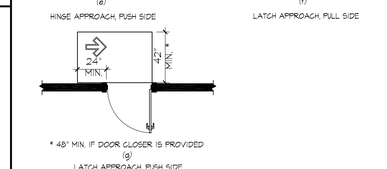
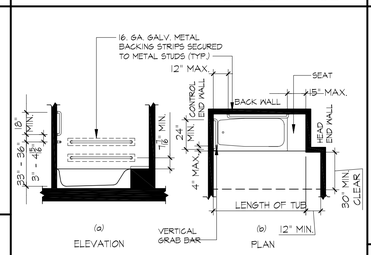


Fig 307.2
LIMITS OF PROTRUDING OBJECTS



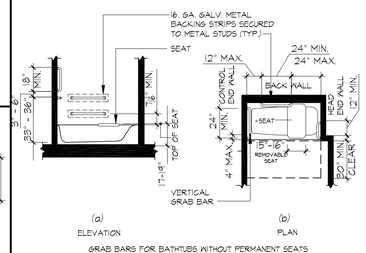
(a) BELOW GRAB BAR
(b) ABOVE GRAB BAR

Fig 604.7
DISPENSER LOCATION



ELEVATION
VERTICAL GRAB BAR
PLAN

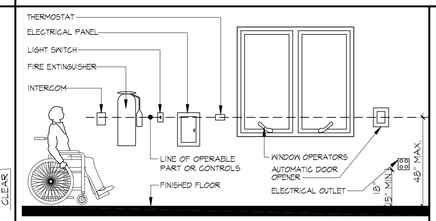
Fig 607.4.1
GRAB BARS FOR BATHTUBS WITH PERMANENT SEATS



ELEVATION
PLAN

GRAB BARS FOR BATHTUBS WITHOUT PERMANENT SEATS

Fig 607.4.2/610.2
BATHTUB SEATS & GRAB BARS

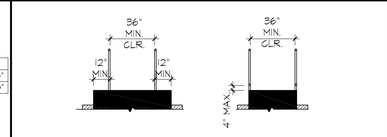


TYPICAL HANDICAP INSTALLATION HEIGHTS

ICC/ANSI A117.1-2009

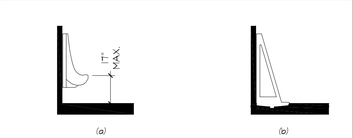
PROPOSED WORK TO COMPLY WITH APPLICABLE REQUIREMENTS OF ICC / ANSI A 117.1 - 2009

* PROTRUDING OBJECTS SHALL NOT REDUCE THE CLEAR WIDTH REQUIRED FOR ACCESSIBLE ROUTES. (307.5)
* RAMPS RUN SHALL HAVE A SLOPE NOT STEEPER THAN 1:12 (405.2) & A CROSS SLOPE SHALL NOT BE STEEPER THAN 1:48 (405.3)
* ALL ELEVATOR REQUIREMENTS (CALL BUTTONS, VISIBLE & AUDIBLE SIGNALS, ETC.) SHALL COMPLY WITH SECTION 407 THRU 410.
* CAR PARKING SPACES SHALL BE 96" MIN. & VAN PARKING SPACES SHALL BE 132" MIN. IN WIDTH. (502.2)
* ACCESS AISLE SERVING CAR OR VAN SHALL BE 60" MIN. IN WIDTH (502.4.2)
* VERTICAL CLEARENCE FOR VAN PARKING SPACES, ACCESS AISLES SERVING THEM AND VEHICULAR ROUTES SHALL BE 98" MIN. (502.6)
* TREADS AND RISERS SHALL BE UNIFORM ON A STAIR FLIGHT. RISERS 4" MIN. & 7" MAX. - TREADS 11" MIN. (504.2)
* TOP GRIPPING SURFACE OF HANDRAILS SHALL BE AT 34" MIN. & 38" MAX. AFF (505.4) - SHALL HAVE A CLEAR DISTANCE OF 1½" MIN. FROM THE ADJACENT WALL (505.5) - SHALL HAVE AN OUTSIDE DIAMETER OF 1¼" MIN. & 2" MAX. (505.7.1)
* PROVIDE A HAND HELD SHOWER WITH A HOSE 59" MIN. IN LENGTH (607.6)
* FOR WASHING MACHINES AND CLOTHES DRYERS PROVIDE A 30" X 42" CLEAR FLOOR SPACE FOR PARALLEL APPROACH WHICH SHALL BE CENTERED ON THE APPLIANCE (611.2)
* TOP LOADING MACHINES SHALL HAVE THE DOOR COMPARTMENT 36" AFF & FRONT LOADING MACHINES SHALL HAVE THE BOTTOM OF THE OPENING COMPARTMENT 15" MIN. & 34" MAX. AFF. (611.4)
* TOP OF DINING OR WORK SURFACES SHALL BE 28" MIN. & 34" MAX. IN HEIGHT AFF. (902.3)
* ACCESSIBLE STORAGE ELEMENTS SHALL COMPLY WITH AT LEAST ONE OF THE REACH RANGES SPECIFIED IN SECTION 308 (905.3)
* THE ACCESSIBLE PRIMARY ENTRANCE SHALL BE ON AN ACCESSIBLE ROUTE FROM PUBLIC AND COMMON AREAS (1004.2) - DOORWAYS SHALL HAVE A CLEAR OPENING OF 32" MIN. (1004.5.2.1)
* THE LATERAL DISTANCE FROM THE CENTERLINE OR THE WATER CLOSET TO A BATHTUB OR A LAVATORY SHALL BE 18" MIN. ON THE OPPOSITE SIDE OF APPROACH & 15" MIN. ON THE OTHER SIDE. (1004.11.3.1.2)



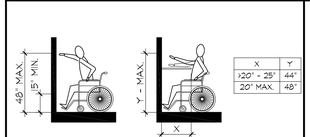
(a) EXTENDED SURFACE
(b) CURB OR BARRIER

Fig 405.9
RAMP EDGE PROTECTION



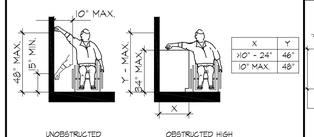
(a) WALL HUNG TYPE
(b) STALL TYPE

Fig 605.2
HEIGHT OF URINALS



UNOBSTRUCTED FORWARD REACH
Fig 308.2.1

OBSTRUCTED HIGH FORWARD REACH
Fig 308.2.2



UNOBSTRUCTED SIDE REACH
Fig 308.3.1

OBSTRUCTED HIGH SIDE REACH
Fig 308.3.2

UNOBSTRUCTED & OBSTRUCTED REACHES

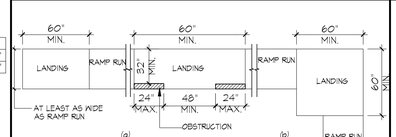
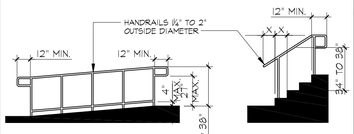


Fig 405.7
RAMP LANDINGS



TOP & BOTTOM HANDRAIL EXTENSIONS AT RAMPS
Fig 505.10.1

TOP & BOTTOM HANDRAIL EXTENSIONS AT STAIRS
Fig 505.10.2 & 505.10.3

HANDRAIL EXTENSION

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.346.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

AUFGANG ARCHITECTS

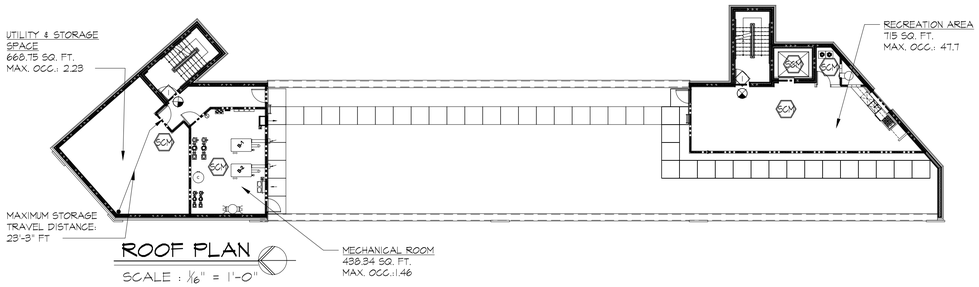
DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

ACCESSIBILITY DIAGRAMS

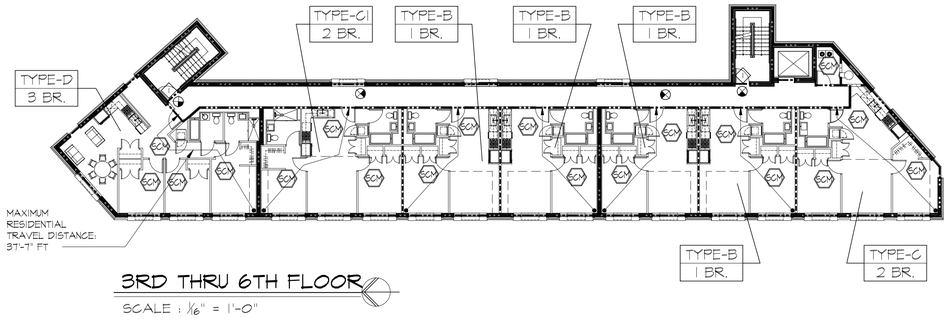
REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: A-002.00
NYC DOB NUMBER: NB # XXX XXX XXX



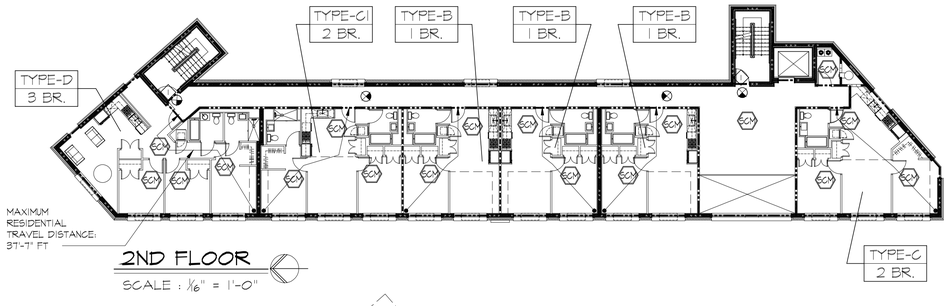
ROOF PLAN

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



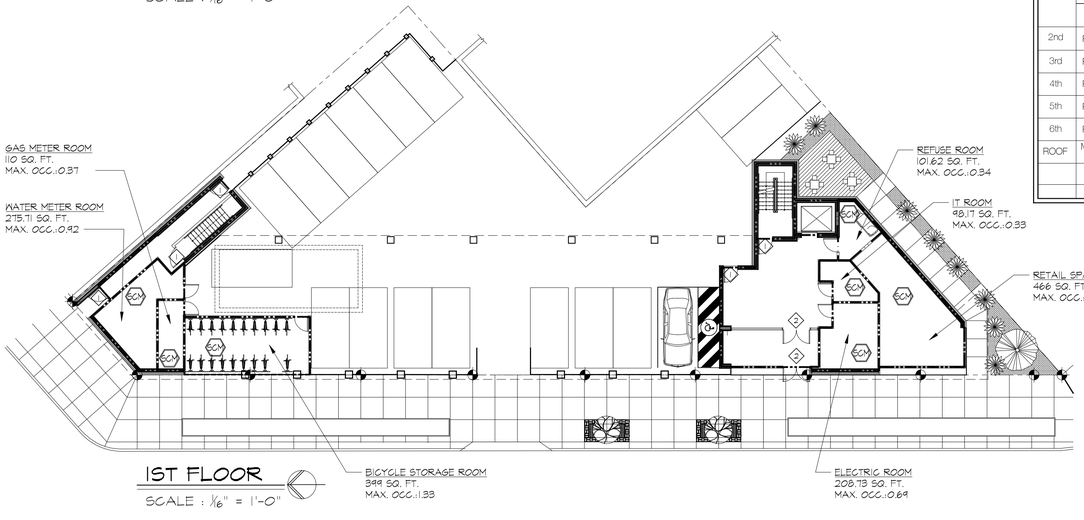
3RD THRU 6TH FLOOR

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



2ND FLOOR

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



1ST FLOOR

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

SYMBOL LEGEND

	3 HR RATED WALL
	2 HR RATED WALL
	1 HR RATED WALL
	CEILING MOUNTED EXIT SIGN
	WALL MOUNTED EXIT SIGN
SIGN	SIGN AT ELEVATOR LANDING
2	3'-0" WIDE DOOR (2 LEAFS) EXIT CAPACITY = 68" / 0.2 = 340
1	3'-0" WIDE DOOR (1 LEAF) EXIT CAPACITY = 34" / 0.2 = 170
S	SMOKE DETECTOR
ECM	HEAT DETECTOR
ECM	SMOKE / CARBON MONOXIDE DETECTOR

MINIMUM WIDTH OF EGRESS

	NYC BUILDING CODE SECTION	MIN. REQUIRED (in.)	PROVIDED (in.)
STAIRWAYS	1009.1	44"	44"
CORRIDOR	1016.2	44"	44"

SPACES WITH ONE MEANS OF EGRESS TABLE 1014.1

OCCUPANCY GROUP		MAXIMUM OCCUPANT LOAD	PROPOSED OCCUPANCY LOAD	REMARKS
ASSEMBLY	A-3	74	47	(2) M.O.E. HAVE BEEN PROVIDED
RESIDENTIAL	R-2	20	28	(4) M.O.E. HAVE BEEN PROVIDED
PARKING	S-2	30	23	(3) M.O.E. HAVE BEEN PROVIDED

MAXIMUM TRAVEL DISTANCE (W/ SPRINKLERS) TABLE 1015.1 (*)

OCCUPANCY GROUP		MAX. PERMITTED (Ft.)	PROVIDED (Ft.)
RESIDENTIAL	R-2	200'-0"	37'-7"
STORAGE	S-2	250'-0"	23'-3"

* DEAD END IN R-2 OCCUPANCY SHALL NOT EXCEED 80'
ALL FLOORS COMPLY - BC 1016.3

MAXIMUM BUILDING OCCUPANCY TABLE 1004.1

FLOOR	OCCUPANCY GROUP		NET FLOOR AREA PER OCCUPANT (Sq.Ft.)	NET FLOOR AREA (Sq.Ft.)	MAXIMUM NUMBER OF OCCUPANTS
1st	PARKING	S-2	300	6,888	23
	BICYCLE STG	S-2	300	399	1
	RETAIL	M	30	466	15
2nd	RESIDENTIAL	R-2	200	5,064	25
3rd	RESIDENTIAL	R-2	200	5,611	28
4th	RESIDENTIAL	R-2	200	5,611	28
5th	RESIDENTIAL	R-2	200	5,611	28
6th	RESIDENTIAL	R-2	200	5,611	28
ROOF	MECHANICAL / STORAGE	U	300	1,107	3
	ASSEMBLY	A-3	15	715	47

FIRE PROTECTION:

BUILDING IS FULLY SPRINKLERED AND EQUIPPED WITH AN ALTERNATIVE FIRE EXTINGUISHING SYSTEM, A STAND PIPE SYSTEM, SMOKE VENTS, A FIRE ALARM AND DETECTION SYSTEM & A FIRE COMMAND CENTER, IN COMPLIANCE WITH THE NYC BUILDING CODE, NYC FIRE CODE & LOCAL FIRE DEPARTMENT REQUIREMENTS .

EGRESS NOTES: CHAPTER 10

1. MEANS OF EGRESS SHALL HAVE A CEILING HEIGHT NOT LESS THAN 7'-6" (BC 1003.2)
2. OCCUPANT LOAD AS DETERMINED ON TABLE 1004.1.1
3. EXIT AND ACCESS REQUIREMENTS ARE TO BE CALCULATED AS PER SECTION BC 1005.1
4. EXITS, EXIT DISCHARGES AND PUBLIC CORRIDORS SHALL BE ILLUMINATED AT ALL TIMES, AS PER BC 1006.

A. PUBLIC CORRIDORS AND EXITS SHALL BE PROVIDED WITH ARTIFICIAL LIGHT FIXTURES SUPPLYING AT LEAST ONE FOOT CANDLE (11 LUX) MEASURED AT THE FLOOR LEVEL, TO BE MAINTAINED CONTINUOUSLY THROUGHOUT EXITS AND THEIR ACCESS FACILITIES FOR THEIR FULL LENGTH (BC 1006.2)

B. EXIT LIGHTING, EXIT SIGNS & THE PORTION OF THE EXTERIOR EXIT DISCHARGE IMMEDIATELY ADJACENT TO EXIT DISCHARGE DOORWAYS SHALL BE CONNECTED TO AN EMERGENCY POWER SYSTEM FOR A DURATION NOT LESS THAN 90 MINUTES & SHALL CONSIST OF STORAGE BATTERIES, UNIT EQUIPMENT OR AN ON-SITE GENERATOR. (BC 1006.3)

5. ALL EXITS SHALL BE KEPT READILY ACCESSIBLE AND UNOBSTRUCTED AT ALL TIMES AS PER SECTION BC 1007.
6. DOORS ARE TO COMPLY WITH ALL APPLICABLE REQUIREMENTS OF SECTION BC 1008 INCLUDING, BUT NOT LIMITED TO THE FOLLOWING:

A. CLEAR OPENING OF 32"(MIN.) IS REQUIRED AND SHALL BE MEASURED BETWEEN THE FACE OF THE DOOR AND THE STOP, WITH THE DOOR OPEN 90 DEGREES. (SECTION BC 1008.1.1)

B. DOOR HEIGHT NOT TO BE LESS THAN 6'-8" (BC 1008.1.1.3)

C. ALL EXIT DOORS ARE TO OPEN IN THE DIRECTION OF EGRESS (1008.1.2.2) FLOOR LEVELS ON BOTH SIDES OF ALL EXIT AND CORRIDOR DOORS ARE TO BE LEVEL AND AT THE SAME ELEVATION FOR A DISTANCE AT LEAST EQUAL TO THE WIDTH OF THE DOOR (1008.1.5)

D. EXIT DOORS SHALL BE READILY OPENABLE AT ALL TIMES FROM THE SIDE FROM WHICH EGRESS IS TO BE MADE. DOORS OPENING ONTO INTERIOR ENCLOSED STAIRS SHALL NOT BE LOCKED FROM EITHER SIDE EXCEPT THAT DOORS MAY BE LOCKED TO PREVENT ACCESS TO THE STAIR FROM THE OUTSIDE AT STREET LEVEL AS PER SECTION 1008.1.9

E. PANIC AND FIRE EXIT HARDWARE SHALL BE INSTALLED ON ALL EGRESS DOORS FROM OCCUPANCY GROUP "A" OR "E" HAVING AN OCCUPANT LOAD OF 50 PEOPLE OR MORE AS PER SECTION 1008.1.10

F. REQUIRED EXITS & SMOKE DOORS ARE TO BE SELF-CLOSING (BC 715.4.8) WITH A 1-1/2 HOUR FIRE PROTECTION RATING (TABLE 715.5), EXCEPT IN THE FIRST STORY OF EXTERIOR WALLS FACING A STREET THAT HAVE A FIRE SEPARATION DISTANCE OF GREATER THAN 15'-0" (BC 1015.2.1) THEN DOORS NEED NOT TO BE RATED.

7. STAIRWAYS SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS STATED IN SECTIONS BC 1009 INCLUDING, BUT NOT LIMITED TO THE FOLLOWING:

A. STAIR WIDTH SHALL BE DETERMINED AS SPECIFIED IN SECTION 1005.1, BUT SUCH WIDTH SHALL NOT BE LESS THAN 44" (BC 1009.1) OR 36" (BC 1008.1.1.1)

B. AREA OF RESCUE ASSISTANCE SHALL BE 30" X 48" FOR EACH 200 OCCUPANTS, AS PER SECTION 1007.6.1

C. THE CLEAR HEADROOM SHALL BE AT LEAST 6'-8" MINIMUM, AS SPECIFIED IN SECTION 1009.2 (R-2 OCCUPANCY)

D. LANDINGS AND PLATFORMS PROVIDED AT THE HEAD AND FOOT OF EACH FLIGHT OF STAIRS SHALL HAVE A MINIMUM WIDTH, PERPENDICULAR TO THE DIRECTION OF TRAVEL, OF AT LEAST THE WIDTH OF THE STAIR. IN STRAIGHT RUN STAIRS, THE DISTANCE BETWEEN STAIRS WITHIN THE RUN SHALL NEED NOT BE MORE THAN 48". NO DOOR SHALL SWING ONTO A LANDING AND REDUCE THE EGRESS REQUIRED CLEAR WIDTH OF THE STAIR OR STAIR PLATFORM TO BE LESS THAN 75% OF THE REQUIRED WIDTH, OR WHEN FULLY OPEN, THE DOOR SHALL NOT PROJECT MORE THAN 7" INTO THE LANDING AS PER SECTION 1009.5

E. RISERS, TREADS, STRINGERS, LANDINGS, PLATFORMS AND GUARDS EXCLUSIVE OF HANDRAILS, SHALL BE BUILT OF NONCOMBUSTIBLE MATERIALS. WHEN TWO STAIRS ARE CONTAINED WITHIN THE SAME ENCLOSURE, EACH STAIR SHALL BE SEPARATED FROM THE OTHER BY NONCOMBUSTIBLE CONSTRUCTION HAVING A FIRE RESISTANCE RATING EQUAL TO THAT REQUIRED FOR THE STAIR ENCLOSURE (BC 1009.6)

F. STAIRS SHALL HAVE HANDRAILS ON EACH SIDE (EXCEPT STAIRS LESS THAN 44" IN WIDTH) HAVING FINGER CLEARANCE OF 1-1/2" MIN., PROJECTING NOT MORE THAN 4-1/2" INTO THE REQUIRED STAIR WIDTH. HEIGHT OF HANDRAIL SHALL BE UNIFORM, NOT LESS THAN 34" AND NOT MORE THAN 38" MEASURED ABOVE THE STAIR TREAD NOSING. HANDRAILS SHALL BE DESIGNED IN COMPLIANCE WITH SECTION 1009.12

G. THE MAXIMUM VERTICAL RISE OF A SINGLE FLIGHT OF STAIRS BETWEEN FLOORS IS NOT TO EXCEED 12' (SECTION 1009.7)

H. ALL INTERIOR STAIRS SHALL EXTEND UP TO THE ROOF (BC 1009.13.1)

I. INTERIOR REQUIRED STAIRS EXTENDING TO THE ROOF SHALL BE VENTED AS PER THE REQUIREMENTS OF SECTION 909.20

J. STAIR EXIT DOORS SHALL BE PLACED A DISTANCE APART EQUAL TO NO LESS THAN 15'-0" IN R2 OCCUPANCY (SECTION 1015.2.1)

8. EGRESS CORRIDORS SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS STATED IN SECTIONS BC 1011, 1013 THRU 1018, 1020 THRU 1023, 1024 & 1026 INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

A. PROTRUDING OBJECTS ARE PERMITTED TO EXTEND BELOW THE MIN. CEILING HEIGHT REQUIRED PROVIDE THAT A MIN. HEADROOM OF 7'-0" IN HEIGHT IS REQUIRED OVER ANY WALKING SURFACE NOT MORE THAN 50% OF THE CEILING AREA CAN BE REDUCED IN HEIGHT BY PROTRUDING OBJECTS SO AS TO OBSTRUCT FULL VIEW OF EXIT SIGNS. (SECTION 1003.3.1)

B. CORRIDOR WIDTH SHALL BE DETERMINED AS PER SECTION 1005.1, BUT NOT LESS THAN 44".

C. DEAD END CORRIDORS SHALL NOT EXCEEDED 80'-0" IN LENGTH (BC 1018.4)

D. DOORS WHEN THEY FULLY OPEN & HANDRAILS SHALL NOT REDUCE THE REQUIRED WIDTH BY MORE THAN 7". DOORS IN ANY POSITION SHALL NOT REDUCE THE REQUIRED WIDTH BY MORE THAN 1/2. OTHER NONSTRUCTURAL PROJECTIONS ARE PERMITTED TO PROJECT INTO THE REQUIRED WIDTH 1.5" ON EACH SIDE (BC 1005.2)

E. THE FINISHES IN ALL EXITS SHALL BE OF NONCOMBUSTIBLE MATERIALS AS PER CHAPTER 8 AND SUB-SECTION 1003.4 OF SECTION BC 1003.

F. THE LOCATION OF EVERY EXIT ON EVERY FLOOR SHALL BE CLEARLY INDICATED BY EXIT SIGNS, (SECTION BC 1011) EXIT SIGN SHALL BE PLACED APART, SO THAT NO POINT IN THE EXIT CORRIDOR IS MORE THAN 100'-0"

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

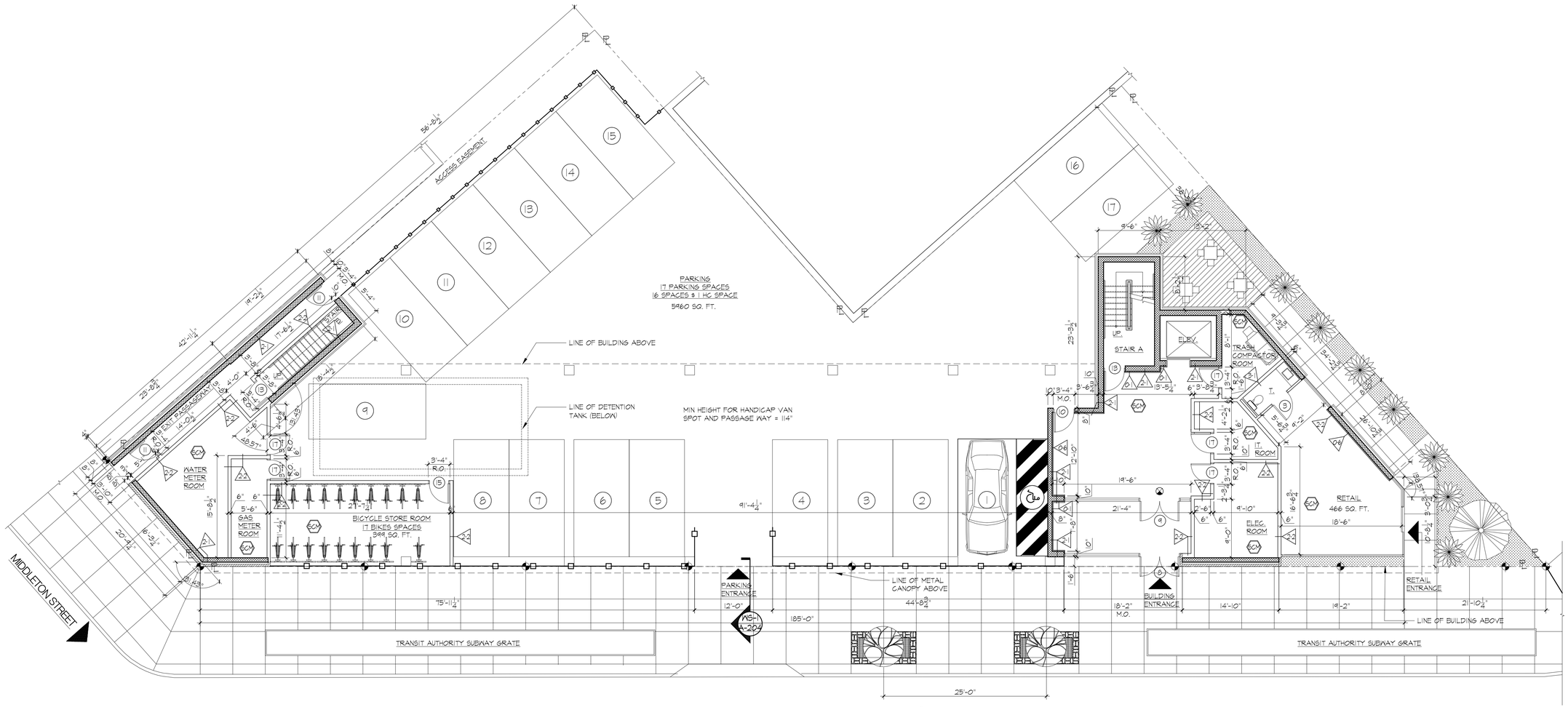
SHEET TITLE:

EGRESS PLANS

REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: VF
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: A-003.00

NYC DOB NUMBER: NB # XXX XXX XXX



IST FLOOR

SCALE : 1/8" = 1'-0"

N

WALL TYPE LEGEND:

NON RATED

- **0-1** FURRING AT INTERIOR CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 7/8" "Z" METAL FURRING CHANNELS @ 16" O.C.
- **0-2** FURRING AT CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 1 1/2" "Z" METAL FURRING @ 16" O.C.
- **0-3** FURRING AT CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 1 5/8" "Z" METAL FURRING @ 16" O.C. WITH 2" SEMI RIGID INSULATION UNFACED BETWEEN STUDS.
- **0-4** FURRING - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C.
- **0-5** FURRING - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16 O.C. WITH 2" RIGID INSULATION BETWEEN STUDS.
- **0-6** FURRING AT EXT. CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON 1/2" GALV. METAL STUDS @ 16 O.C. WITH 2" SEMI-RIGID INSULATION UNFACED BETWEEN STUDS.
- **0-7** FURRING AT EXT. CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON 3 5/8" GALV. METAL STUDS @ 16 O.C. WITH 3 1/2" (R-15) BATT INSULATION WITH VAPOR BARRIER BETWEEN STUDS.
- **0-8** TYPICAL NON RATED PARTITION - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 2 1/2" METAL STUDS @ 16 O.C.
- **0-9** TYPICAL NON RATED PARTITION - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3 5/8" METAL STUDS @ 16 O.C.
- **0** NON RATED CHASE WALL - (1) LAYER 5/8" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF A 2 1/2" METAL STUDS @ 16 O.C. - WITH 2" BATT INSULATION AT BATHROOMS.

1 HOUR RATED

- **1-1** 1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON THE OTHER SIDE OF 3 5/8" METAL STUDS @ 16" O.C. WITH 3 1/2" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE SLAB & SEAL TIGHT TO UNDERSIDE OF CONCRETE SLAB AND/OR ROOF SLAB W/ CONT. FIRESTOP SEALANT& FIRESAFING INSULATION (GA FILE #AP-1522) (STC 50-54)
- **1-2** 1 HOUR RATED CHASEWALL - (1) LAYER 5/8" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB. SEAL TIGHT TO UNDERSIDE OF SLAB W/ CONT. FIRESTOP SEALANT. (UL #U442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)

2 HOUR RATED

- **2-1** 2 HOUR RATED CMU WALL - CMU WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE BLOCK COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB OR DECK ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE GAP EXIST BETWEEN TOP OF WALL AND BOTTOM OF SLAB (UL #U906)
- **2-2** 2 HOUR RATED INTERIOR PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE 3 5/8" METAL STUDS @ 16" O.C. WITH 3 1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB SEAL TIGHT TO UNDERSIDE OF DECK W/ CONT. FIRESTOP SEALANT & FIRESAFING. (GA FILE #AP-1522 STC 55-54).
- **2-3** 2 HOUR RATED EXTERIOR PARTITION - (2) LAYERS OF 3/4" TYPE "X" GYPSUM BOARD, ON INTERIOR SIDE AND 1/2" EXP EXTERIOR GYPSUM BOARD SHEATHING OVER 3 5/8" GA 18 GALV. METAL STUDS @ 16" O.C. WITH 3 1/2" UNFACED BATT INSULATION (R-15) (UL #U424)
- **2-4** 2 HOUR RATED CHASEWALL - (2 RONS) (2) LAYER 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF DECK. SEAL TIGHT TO DECK WITH CONT. FIRESTOP SEALANT. SEAL ALL PENETRATIONS THRU CHASEWALL WITH FIRESAFING INSULATION AND CONT. FIRESTOP SEALANT AS REQ'D (UL #V442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)
- **2-5** 2 HOUR, RATED MECHANICAL SHAFT WALL - (2) LAYERS OF 1/2" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL C-H STUDS @ 24" O.C. WITH (1) LAYER OF 1" TYPE "X" GYPSUM LINER PANEL ON SHAFT SIDE. W/ 1" MINERAL FIBER INSULATION IN CAVITY. SEAL TOP OF WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB W/ CONT. FIRESTOP SEALANT. GA FILE #4095 (STC-45-49)

3 HOUR RATED

- **3-1** 3 HOUR RATED WALL - (1) LAYER 1/2" TYPE "X" GYPSUM BOARD OVER 7/8" METAL HAT CHANNELS @ 24" O.C. OVER 2 HR RATED CONCRETE BLOCK WALL WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE FLOOR SLAB ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE A GAP EXISTS BETWEEN TOP OF WALL AND BOTTOM OF CONCRETE PLANK (UL #U814) (PROVIDE STC RATING OF 50-54 COMPACTOR CHUTE FOR SHAFT ADJACENT TO DWELLING UNITS)

LEGEND:

- CONCRETE FOUNDATION WALL - SEE STRUCTURAL DWG'S
- CONCRETE BLOCK WALL - SEE PLAN FOR SIZE.
- GYPSUM BOARD PARTITION - SEE PLAN FOR SIZE.
- FACE BRICK AND CAST STONE
- FIRE RATED SHAFT WALL.
- VISUAL SIGNALING DEVICE / STROBE LIGHT - SEE ELEC. DWG'S FOR LOCATIONS
- DOORS SHOWN DOTTED SHALL BE PROVIDED WITH REVERSIBLE SWING HARDWARE TO MEET ACCESSIBILITY REQUIREMENTS.
- EXIT LIGHT AND SIGN - CEILING MOUNTED
- EXIT LIGHT AND SIGN - WALL MOUNTED
- REMOVABLE KITCHEN BASE CABINET
- ELECTRICAL PANEL UNIT
- PLANK DIRECTION
- HANDICAP ADAPTABLE APARTMENT UNIT
- FULLY ACCESSIBLE HANDICAP APARTMENT UNIT (TOTAL 7 UNITS)
- HANDICAP ADAPTABLE APARTMENT UNIT - OUTFITTED AS FULLY ACCESSIBLE FOR PEOPLE W/ HEARING OR VISUAL IMPAIRMENTS (TOTAL 3 UNITS)
- 5'-0" CLEAR HANDICAP SPACE
- SCM SMOKE & CARBON MONOXIDE DETECTOR - SEE ELEC'T. DWG'S
- SUSPENDED GYP.BD. CEILING/GYP. BD SOFFIT

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

FIRST FLOOR PLAN

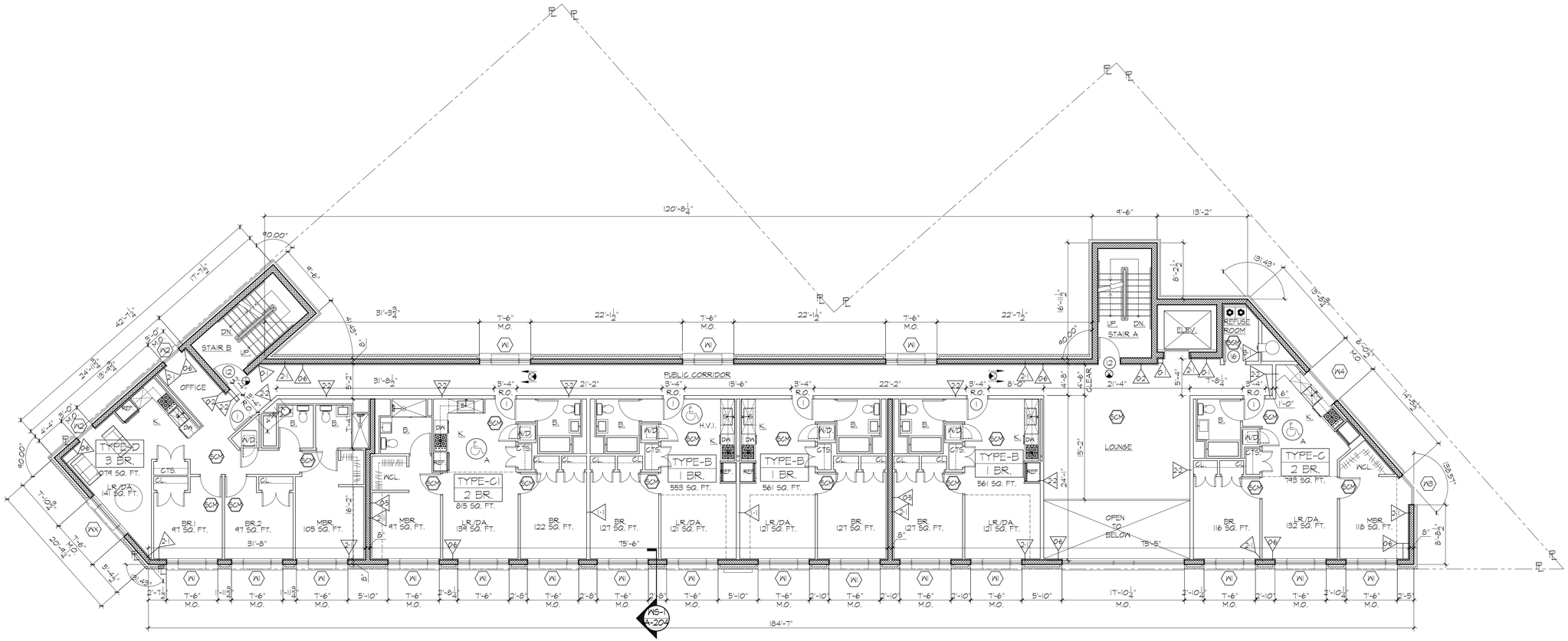
REGISTERED ARCHITECT ARIEL AUFGANG STATE OF NEW YORK 032789

ISSUE DATE:	PROJECT NO:
09-02-15	#1515
DRAWN BY:	CHECKED BY:
VF	ERV
SCALE:	SHEET NO:
AS NOTED	1 OF

DRAWING NO:

A-100.00

NYC DOB NUMBER: NB # XXX XXX XXX



2ND FLOOR

SCALE : 1/8" = 1'-0"

N

WALL TYPE LEGEND:

NON RATED

0-1 FURRING AT INTERIOR CMU WALL - (1) LAYER 5/8 " TYPE "X" GYPSUM BOARD OVER 7/8 " "Z" METAL FURRING CHANNELS @ 16" O.C.

0-2 FURRING AT CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 1 1/2" "Z" METAL FURRING @ 16" O.C.

0-3 FURRING AT CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 1 1/2" "Z" METAL FURRING @ 16" O.C. WITH 2" SEMI RIGID INSULATION UNFACED BETWEEN STUDS.

0-4 FURRING - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C.

0-5 FURRING - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16 O.C. WITH 2" RIGID INSULATION BETWEEN STUDS.

0-6 FURRING AT EXT. CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON 1/2" GALV. METAL STUDS @ 16 O.C. WITH 2" SEMI-RIGID INSULATION UNFACED BETWEEN STUDS.

0-7 FURRING AT EXT. CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON 3 5/8" GALV. METAL STUDS @ 16 O.C. WITH 3 1/2" (R-15) BATT INSULATION WITH VAPOR BARRIER BETWEEN STUDS.

0-8 TYPICAL NON RATED PARTITION - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 2 1/2" METAL STUDS @ 16 O.C.

0-9 TYPICAL NON RATED PARTITION - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3 5/8" METAL STUDS @ 16 O.C.

0-10 NON RATED CHASE WALL - (1) LAYER 5/8" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF A 2 1/2" METAL STUDS @ 16 O.C. - WITH 2" BATT INSULATION AT BATHROOMS.

1 HOUR RATED

1-H 1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON THE OTHER SIDE OF 3 5/8" METAL STUDS @ 16" O.C. WITH 3 1/2" SOUND ATTENUATION INSULATION, EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE SLAB & SEAL TIGHT TO UNDERSIDE OF CONCRETE SLAB AND/OR ROOF SLAB W/ CONT. FIRESTOP SEALANT& FIRESAFING INSULATION
(GA FILE #AP-1522) (STC 50-54)

1-2 1 HOUR RATED CHASEWALL - (1) LAYER 5/8" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB. SEAL TIGHT TO UNDERSIDE OF SLAB W/ CONT. FIRESTOP SEALANT. (UL #U442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)

2 HOUR RATED

2-1 2 HOUR RATED CMU WALL - CMU WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE BLOCK COURSES, SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB OR DECK ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE GAP EXIST BETWEEN TOP OF WALL AND BOTTOM OF SLAB (UL #U906)

2-2 2 HOUR RATED INTERIOR PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE 3 5/8" METAL STUDS @ 16" O.C. WITH 3 1/2" SOUND ATTENUATION INSULATION, EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB SEAL TIGHT TO UNDERSIDE OF DECK W/ CONT. FIRESTOP SEALANT & FIRESAFING. (GA FILE #AP-1522 STC 55-54).

2-3 2 HOUR RATED EXTERIOR PARTITION - (2) LAYERS OF 3/4" TYPE "X" GYPSUM BOARD, ON INTERIOR SIDE AND 1/2" EXP EXTERIOR GYPSUM BOARD SHEATHING OVER 3 5/8" GA 18 GALV. METAL STUDS @ 16" O.C. WITH 3 1/2" UNFACED BATT INSULATION (R-15) (UL #U424)

2-4 2 HOUR RATED CHASEWALL - (2 RONS) (2) LAYER 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF DECK. SEAL TIGHT TO DECK WITH CONT. FIRESTOP SEALANT. SEAL ALL PENETRATIONS THRU CHASEWALL WITH FIRESAFING INSULATION AND CONT. FIRESTOP SEALANT AS REQ'D (UL #V442)
(PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)

2-5 2 HOUR. RATED MECHANICAL SHAFT WALL - (2) LAYERS OF 1/2" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL C-H STUDS @ 24" O.C. WITH (1) LAYER OF 1" TYPE "X" GYPSUM LINER PANEL ON SHAFT SIDE. W/ 1" MINERAL FIBER INSULATION IN GAVITY SEAL TOP OF WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB W/ CONT. FIRESTOP SEALANT. GA FILE #4095 (STC-45-49)

3 HOUR RATED

3-1 3 HOUR RATED WALL - (1) LAYER 1/2" TYPE "X" GYPSUM BOARD OVER 7/8" METAL HAT CHANNELS @ 24" O.C. OVER 2 HR RATED CONCRETE BLOCK WALL WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES, SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE FLOOR SLAB ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE A GAP EXISTS BETWEEN TOP OF WALL AND BOTTOM OF CONCRETE PLANK (UL #U814) (PROVIDE STC RATING OF 50-54 COMPACTOR CHUTE FOR SHAFT ADJACENT TO DWELLING UNITS)

LEGEND:

- CONCRETE FOUNDATION WALL - SEE STRUCTURAL DWG'S
- CONCRETE BLOCK WALL - SEE PLAN FOR SIZE.
- GYPSUM BOARD PARTITION - SEE PLAN FOR SIZE.
- FACE BRICK AND CAST STONE
- FIRE RATED SHAFT WALL.
- VISUAL SIGNALING DEVICE / STROBE LIGHT - SEE ELEC. DWG'S FOR LOCATIONS
- DOORS SHOWN DOTTED SHALL BE PROVIDED WITH REVERSIBLE SWING HARDWARE TO MEET ACCESSIBILITY REQUIREMENTS.
- EXIT LIGHT AND SIGN - CEILING MOUNTED
- EXIT LIGHT AND SIGN - WALL MOUNTED
- REMOVABLE KITCHEN BASE CABINET
- ELECTRICAL PANEL UNIT
- PLANK DIRECTION
- HANDICAP ADAPTABLE APARTMENT UNIT
- FULLY ACCESSIBLE HANDICAP APARTMENT UNIT (TOTAL 7 UNITS)
- HANDICAP ADAPTABLE APARTMENT UNIT - OUTFITTED AS FULLY ACCESSIBLE FOR PEOPLE W/ HEARING OR VISUAL IMPAIRMENTS (TOTAL 3 UNITS)
- 5'-0" CLEAR HANDICAP SPACE
- SCM SMOKE & CARBON MONOXIDE DETECTOR - SEE ELEC. DWG'S
- SUSPENDED GYP.BD. CEILING/GYP. BD SOFFIT

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

SECOND FLOOR PLAN

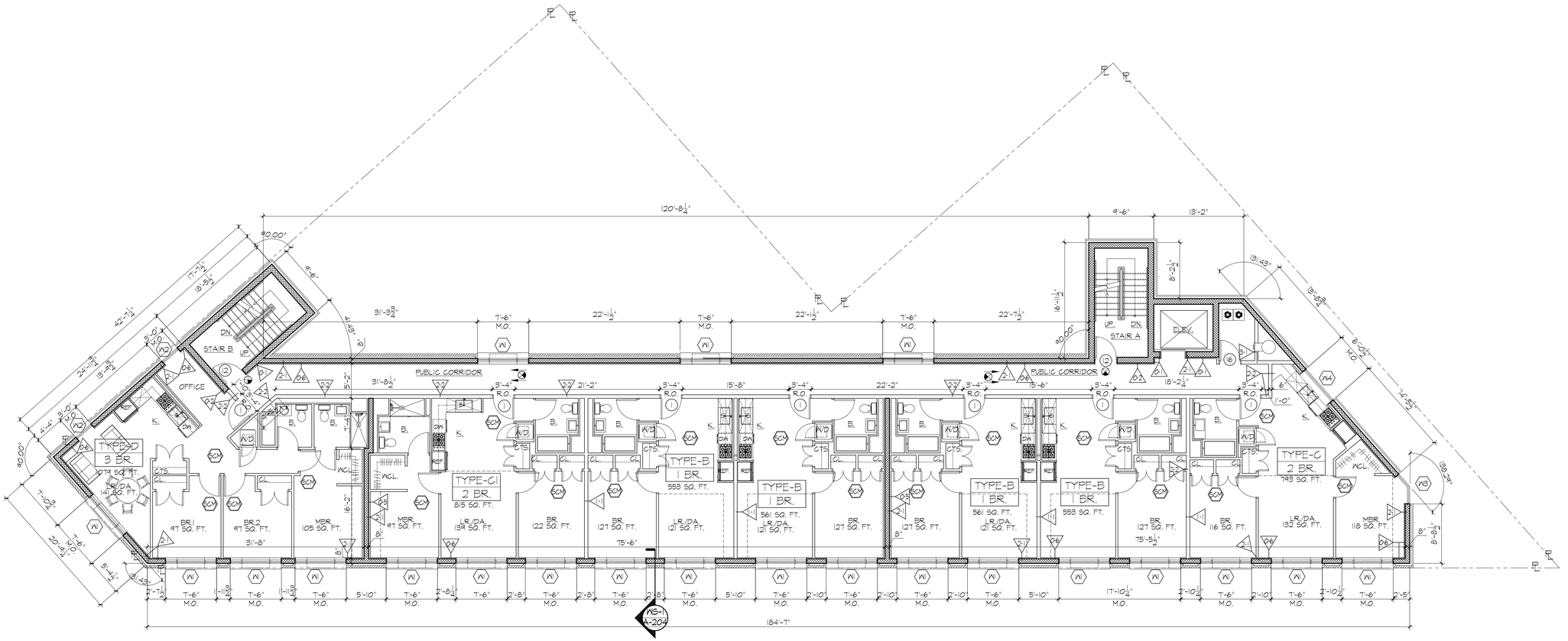
REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE:	PROJECT NO:
09-02-15	#1515
DRAWN BY:	CHECKED BY:
VF	ERV
SCALE:	SHEET NO:
AS NOTED	1 OF

DRAWING NO:

A-101.00

NYC DOB NUMBER: NB # XXX XXX XXX



3RD THRU 6TH FLOOR

SCALE : 1/8" = 1'-0"

N

WALL TYPE LEGEND:

NON RATED

- (0.1) FURRING AT INTERIOR CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 7/8" "Z" METAL FURRING CHANNELS @ 16" O.C.
- (0.2) FURRING AT CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 1 1/2" "Z" METAL FURRING @ 16" O.C.
- (0.3) FURRING AT CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD OVER 1 1/2" "Z" METAL FURRING @ 16" O.C. WITH 2" SEMI RIGID INSULATION UNFACED BETWEEN STUDS.
- (0.4) FURRING - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C.
- (0.5) FURRING - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16 O.C. WITH 2" RIGID INSULATION BETWEEN STUDS.
- (0.6) FURRING AT EXT. CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON 1 1/2" GALV. METAL STUDS @ 16" O.C. WITH 2" SEMI-RIGID INSULATION UNFACED BETWEEN STUDS.
- (0.7) FURRING AT EXT. CMU WALL - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON 3 5/8" GALV. METAL STUDS @ 16 O.C. WITH 3 1/2" (R-15) BATT INSULATION WITH VAPOR BARRIER BETWEEN STUDS.
- (0.8) TYPICAL NON RATED PARTITION - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 2 1/2" METAL STUDS @ 16 O.C.
- (0.9) TYPICAL NON RATED PARTITION - (1) LAYER 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3 5/8" METAL STUDS @ 16 O.C.
- (0) NON RATED CHASE WALL - (1) LAYER 5/8" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF A 2 1/2" METAL STUDS @ 16 O.C. - WITH 2" BATT INSULATION AT BATHROOMS.

1 HOUR RATED

- (1) 1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF 5/8" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF 5/8" TYPE "X" GYPSUM BOARD ON THE OTHER SIDE OF 3 5/8" METAL STUDS @ 16" O.C. WITH 3 1/2" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE SLAB & SEAL TIGHT TO UNDERSIDE OF CONCRETE SLAB AND/OR ROOF SLAB W/ CONT. FIRESTOP SEALANT& FIRESAFING INSULATION (GA FILE #AP-1522) (STC 50-54)
- (1.1) 1 HOUR RATED CHASEWALL - (1) LAYER 5/8" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB. SEAL TIGHT TO UNDERSIDE OF SLAB W/ CONT. FIRESTOP SEALANT. (UL #V442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)

2 HOUR RATED

- (2) 2 HOUR RATED CMU WALL - CMU WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE BLOCK COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB OR DECK ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE GAP EXIST BETWEEN TOP OF WALL AND BOTTOM OF SLAB (UL #U906)
- (2.1) 2 HOUR RATED INTERIOR PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE 3 5/8" METAL STUDS @ 16" O.C. WITH 3 1/2" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB SEAL TIGHT TO UNDERSIDE OF DECK W/ CONT. FIRESTOP SEALANT & FIRESAFING. (GA FILE #AP-1522 STC 55-54).
- (2.2) 2 HOUR RATED EXTERIOR PARTITION - (2) LAYERS OF 3/4" TYPE "X" GYPSUM BOARD, ON INTERIOR SIDE AND 1/2" EXP EXTERIOR GYPSUM BOARD SHEATHING OVER 3 5/8" GA 18 GALV. METAL STUDS @ 16" O.C. WITH 3 1/2" UNFACED BATT INSULATION (R-15) (UL #U424)
- (2.3) 2 HOUR RATED CHASEWALL - (2 RONS) (2) LAYER 5/8" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF DECK. SEAL TIGHT TO DECK WITH CONT. FIRESTOP SEALANT. SEAL ALL PENETRATIONS THRU CHASEWALL WITH FIRESAFING INSULATION AND CONT. FIRESTOP SEALANT AS REQ'D (UL #V442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)
- (2.5) 2 HOUR, RATED MECHANICAL SHAFT WALL - (2) LAYERS OF 1/2" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 1/2" METAL C-H STUDS @ 24" O.C. WITH (1) LAYER OF 1" TYPE "X" GYPSUM LINER PANEL ON SHAFT SIDE, W/ 1" MINERAL FIBER INSULATION IN CAVITY SEAL TOP OF WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB W/ CONT. FIRESTOP SEALANT. GA FILE #4095 (STC-45-49)

3 HOUR RATED

- (3) 3 HOUR RATED WALL - (1) LAYER 1/2" TYPE "X" GYPSUM BOARD OVER 7/8" METAL HAT CHANNELS @ 24" O.C. OVER 2 HR RATED CONCRETE BLOCK WALL WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE FLOOR SLAB ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE A GAP EXISTS BETWEEN TOP OF WALL AND BOTTOM OF CONCRETE PLANK (UL #U914) (PROVIDE STC RATING OF 50-54 COMPACTOR CHUTE FOR SHAFT ADJACENT TO DWELLING UNITS)

LEGEND:

- CONCRETE FOUNDATION WALL - SEE STRUCTURAL DWG'S
- CONCRETE BLOCK WALL - SEE PLAN FOR SIZE.
- GYPSUM BOARD PARTITION - SEE PLAN FOR SIZE.
- FACE BRICK AND CAST STONE
- FIRE RATED SHAFT WALL.
- VISUAL SIGNALING DEVICE / STROBE LIGHT - SEE ELEC. DWG'S FOR LOCATIONS
- DOORS SHOWN DOTTED SHALL BE PROVIDED WITH REVERSIBLE SWING HARDWARE TO MEET ACCESSIBILITY REQUIREMENTS.
- EXIT LIGHT AND SIGN - CEILING MOUNTED
- EXIT LIGHT AND SIGN - WALL MOUNTED
- REMOVABLE KITCHEN BASE CABINET
- ELECTRICAL PANEL UNIT
- PLANK DIRECTION
- HANDICAP ADAPTABLE APARTMENT UNIT
- FULLY ACCESSIBLE HANDICAP APARTMENT UNIT (TOTAL 7 UNITS)
- HANDICAP ADAPTABLE APARTMENT UNIT - OUTFITTED AS FULLY ACCESSIBLE FOR PEOPLE W/ HEARING OR VISUAL IMPAIRMENTS (TOTAL 3 UNITS)
- 5'-0" CLEAR HANDICAP SPACE
- SCM SMOKE & CARBON MONOXIDE DETECTOR - SEE ELECT. DWG'S
- SUSPENDED GYP.BD. CEILING/GYP. BD SOFFIT

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
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810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

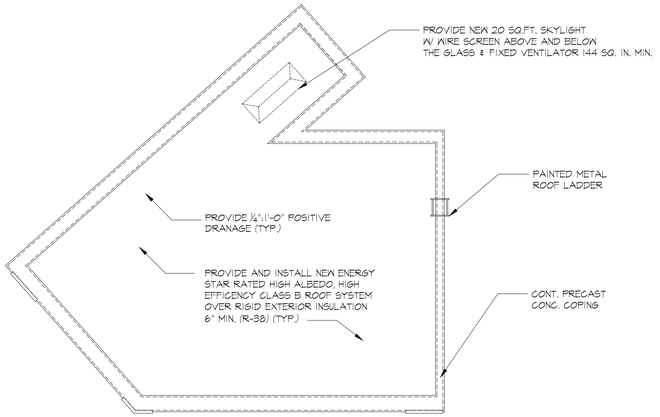
TYPICAL FLOOR PLAN 3RD THRU 6TH FLOOR

REGISTERED ARCHITECT ARIEL AUFGANG STATE OF NEW YORK 032789

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: VF
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO:

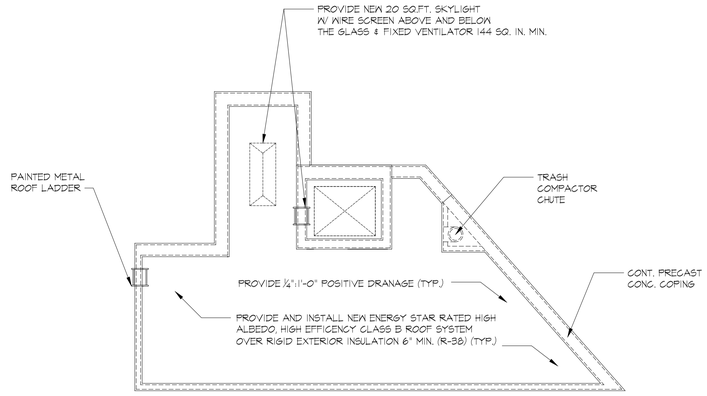
A-102.00

NYC DOB NUMBER: NB # XXX XXX XXX



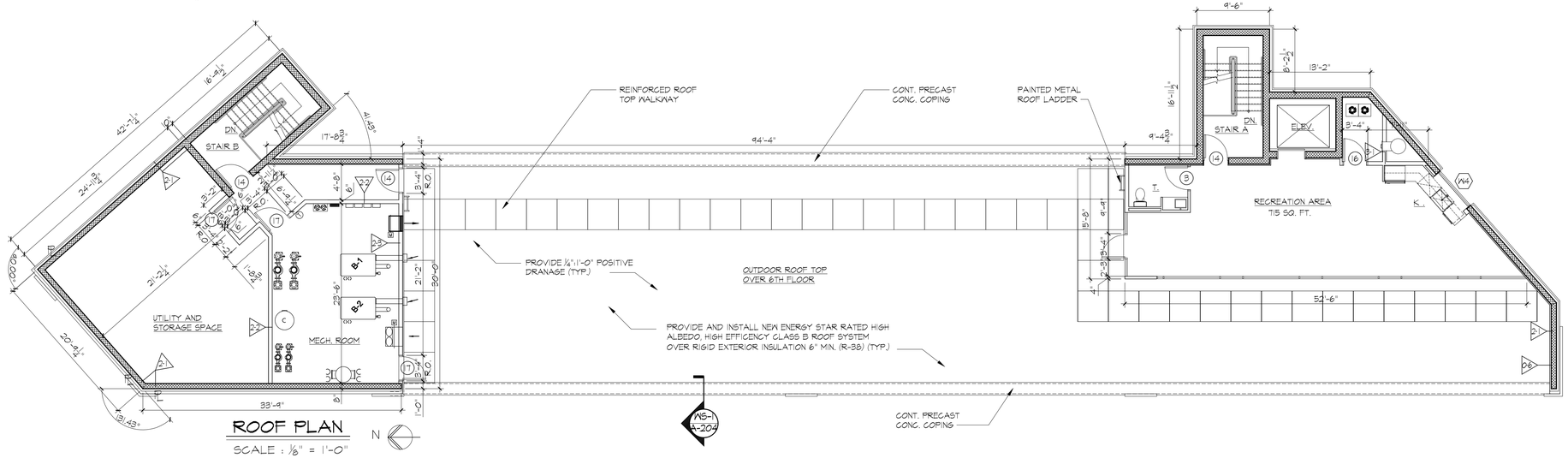
MECHANICAL BOILER ROOM AND STAIR BULKHEAD ROOF PLAN

SCALE : ⅛" = 1'-0"



RECREATION AREA ROOF, STAIR BULKHEAD AND ELEVATOR PENTHOUSE ROOF PLAN

SCALE : ⅛" = 1'-0"



ROOF PLAN

SCALE : ⅛" = 1'-0"

WALL TYPE LEGEND:

NON RATED

- /0.1 FURRING AT INTERIOR CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD OVER ⅞" "Z" METAL FURRING CHANNELS @ 16" O.C.
- /0.2 FURRING AT CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD OVER 1½" "Z" METAL FURRING @ 16" O.C.
- /0.3 FURRING AT CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD OVER 1½" "Z" METAL FURRING @ 16" O.C. WITH 2" SEMI RIGID INSULATION UNFACED BETWEEN STUDS.
- /0.4 FURRING - (1) LAYER OF ⅝" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2½" METAL STUDS @ 16" O.C.
- /0.5 FURRING - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2½" METAL STUDS @ 16 O.C. WITH 2" RIGID INSULATION BETWEEN STUDS.
- /0.6 FURRING AT EXT. CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON 1½" GALV. METAL STUDS @ 16 O.C. WITH 2" SEMI-RIGID INSULATION UNFACED BETWEEN STUDS.
- /0.7 FURRING AT EXT. CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON 3 ⅝" GALV. METAL STUDS @ 16 O.C. WITH 3½" (R-15) BATT INSULATION WITH VAPOR BARRIER BETWEEN STUDS.
- /0.8 TYPICAL NON RATED PARTITION - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 2½" METAL STUDS @ 16 O.C.
- /0.9 TYPICAL NON RATED PARTITION - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3 ⅝" METAL STUDS @ 16 O.C.
- /0 NON RATED CHASE WALL - (1) LAYER ⅝" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF A 2½" METAL STUDS @ 16 O.C. - WITH 2" BATT INSULATION AT BATHROOMS.

1 HOUR RATED

- /1.1 1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF ⅝" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF ⅝" TYPE "X" GYPSUM BOARD ON THE OTHER SIDE OF 3 ⅝" METAL STUDS @ 16" O.C. WITH 3½" SOUND ATTENUATION INSULATION, EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE SLAB & SEAL TIGHT TO UNDERSIDE OF CONCRETE SLAB AND/OR ROOF SLAB W/ CONT. FIRESTOP SEALANT& FIRESAFING INSULATION (GA FILE #WP-1522) (STC 50-54)
- /1.2 1 HOUR RATED CHASEWALL - (1) LAYER ⅝" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF 2½" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB, SEAL TIGHT TO UNDERSIDE OF SLAB W/ CONT. FIRESTOP SEALANT. (UL #V442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)

2 HOUR RATED

- /2.1 2 HOUR RATED CMU WALL - CMU WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORGING AT ALTERNATE BLOCK COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB OR DECK ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE GAP EXIST BETWEEN TOP OF WALL AND BOTTOM OF SLAB (UL #U906)
- /2.2 2 HOUR RATED INTERIOR PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE 3⅝" METAL STUDS @ 16" O.C. WITH 3½" SOUND ATTENUATION INSULATION, EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB SEAL TIGHT TO UNDERSIDE OF DECK W/ CONT. FIRESTOP SEALANT & FIRESAFING. (GA FILE #WP-1522 STC 55-54).
- /2.3 2 HOUR RATED EXTERIOR PARTITION - (2) LAYERS OF 3/4" TYPE "X" GYPSUM BOARD, ON INTERIOR SIDE AND ½" EXP EXTERIOR GYPSUM BOARD SHEATHING OVER 3⅝" GA 18 GALV. METAL STUDS @ 16" O.C. WITH 3½" UNFACED BATT INSULATION (R-15) (UL #U424)
- /2.4 2 HOUR RATED CHASEWALL - (2 ROWS) (2) LAYER ⅝" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2½" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF DECK, SEAL TIGHT TO DECK WITH CONT. FIRESTOP SEALANT. SEAL ALL PENETRATIONS THRU CHASEWALL WITH FIRESAFING INSULATION AND CONT. FIRESTOP SEALANT AS REQ'D (UL #V442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)
- /2.5 2 HOUR, RATED MECHANICAL SHAFT WALL - (2) LAYERS OF ½" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2½" METAL C-H STUDS @ 24" O.C. WITH (1) LAYER OF 1" TYPE "X" GYPSUM LINER PANEL ON SHAFT SIDE. W/ 1" MINERAL FIBER INSULATION IN CAVITY SEAL TOP OF WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB W/ CONT. FIRESTOP SEALANT. GA FILE #4095 (STC-45-49)

3 HOUR RATED

- /3.1 3 HOUR RATED WALL - (1) LAYER ½" TYPE "X" GYPSUM BOARD OVER ⅞" METAL HAT CHANNELS @ 24" O.C. OVER 2 HR RATED CONCRETE BLOCK WALL WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORGING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE FLOOR SLAB ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE A GAP EXISTS BETWEEN TOP OF WALL AND BOTTOM OF CONCRETE PLANK (UL #U914) (PROVIDE STC RATING OF 50-54 COMPACTOR CHUTE FOR SHAFT ADJACENT TO DWELLING UNITS)

LEGEND:

- CONCRETE FOUNDATION WALL - SEE STRUCTURAL DWG'S
- CONCRETE BLOCK WALL - SEE PLAN FOR SIZE.
- GYPSUM BOARD PARTITION - SEE PLAN FOR SIZE.
- FACE BRICK AND CAST STONE
- FIRE RATED SHAFT WALL.
- VISUAL SIGNALING DEVICE / STROBE LIGHT - SEE ELEC. DWG'S FOR LOCATIONS
- DOORS SHOWN DOTTED SHALL BE PROVIDED WITH REVERSIBLE SWING HARDWARE TO MEET ACCESSIBILITY REQUIREMENTS.
- EXIT LIGHT AND SIGN - CEILING MOUNTED
- EXIT LIGHT AND SIGN - WALL MOUNTED
- REMOVABLE KITCHEN BASE CABINET
- ELECTRICAL PANEL UNIT
- PLANK DIRECTION
- HANDICAP ADAPTABLE APARTMENT UNIT
- FULLY ACCESSIBLE HANDICAP APARTMENT UNIT (TOTAL 7 UNITS)
- HANDICAP ADAPTABLE APARTMENT UNIT - OUTFITTED AS FULLY ACCESSIBLE FOR PEOPLE W/ HEARING OR VISUAL IMPAIRMENTS (TOTAL 3 UNITS)
- 5'-0" CLEAR HANDICAP SPACE
- SCM SMOKE & CARBON MONOXIDE DETECTOR - SEE ELECT. DWG'S
- SUSPENDED GYP.BD. CEILING/GYP. BD SOFFIT

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

ROOF AND BULKHEAD PLANS

REGISTERED ARCHITECT ARIEL AUFGANG STATE OF NEW YORK 032789

ISSUE DATE: PROJECT NO:
09-02-15 #1515

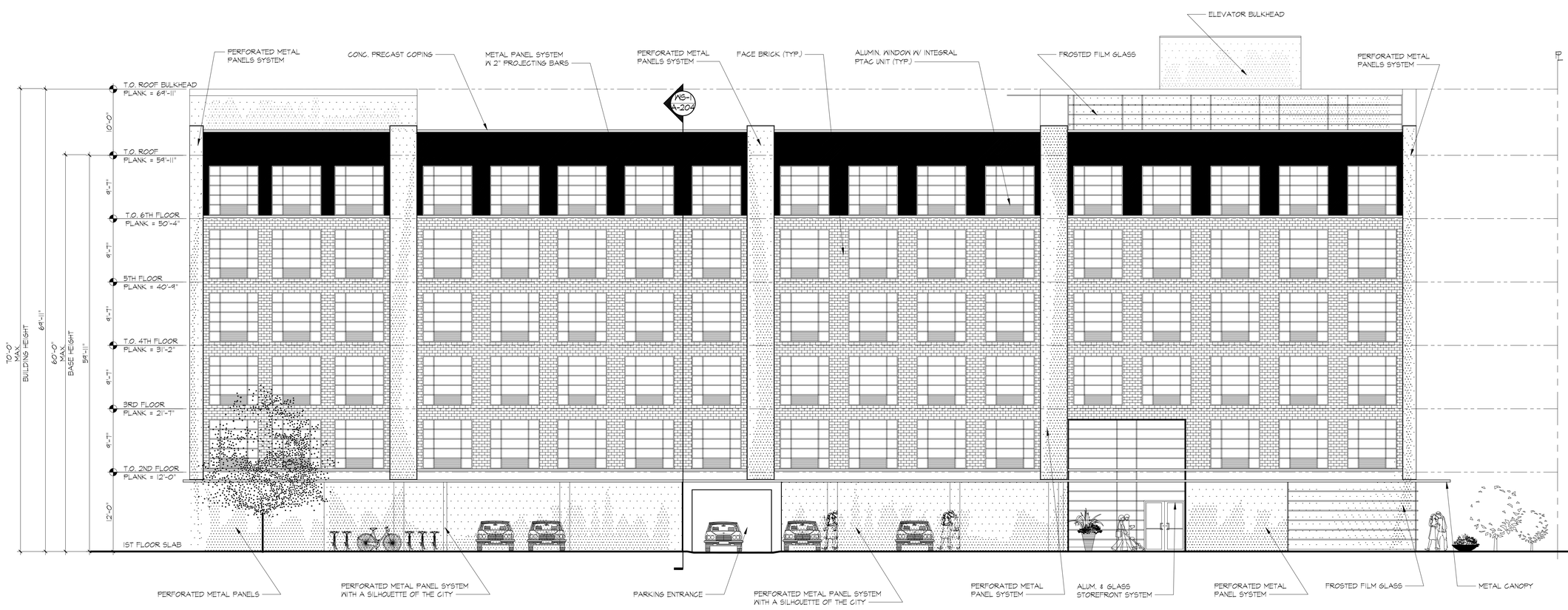
DRAWN BY: CHECKED BY:
VF ERV

SCALE: SHEET NO:
AS NOTED 1 OF

DRAWING NO:

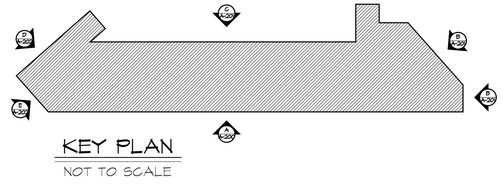
A-103.00

NYC DOB NUMBER: NB # XXX XXX XXX



A / A-200 FRONT ELEVATION

SCALE : 1/8" = 1'-0"



KEY PLAN

NOT TO SCALE

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

EXTERIOR ELEVATIONS

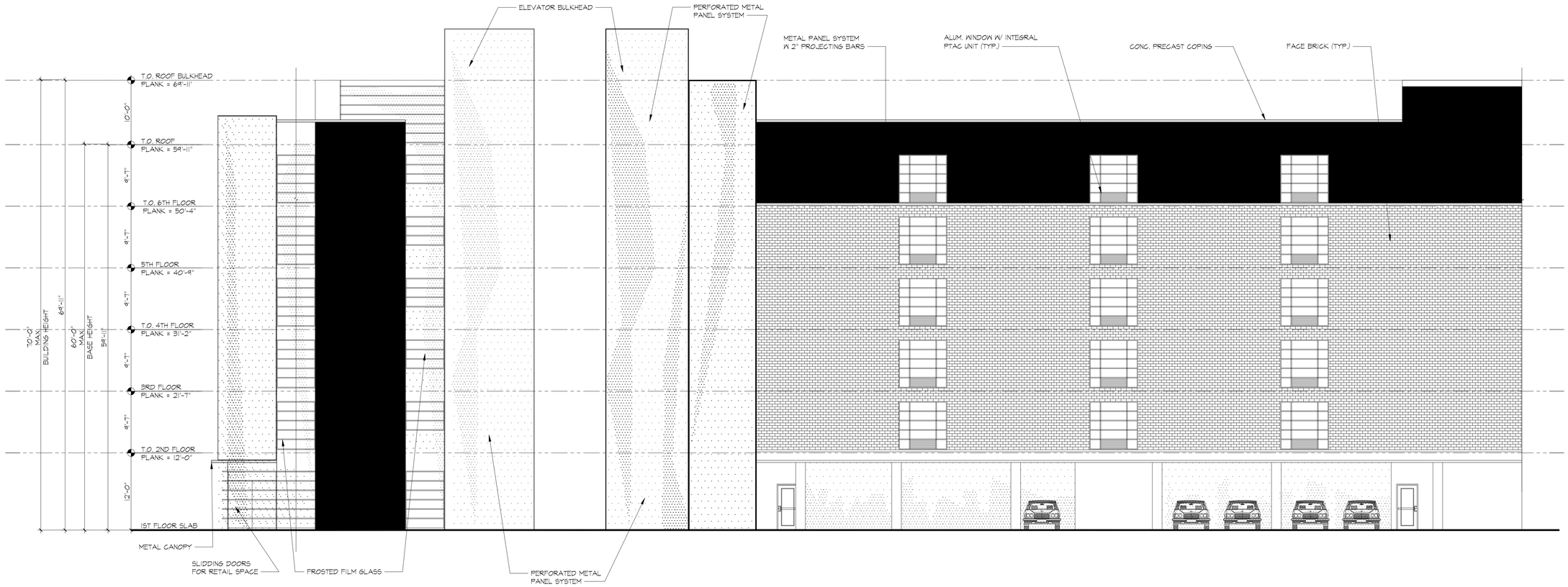
REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE:	PROJECT NO:
09-02-15	#1515
DRAWN BY:	CHECKED BY:
VF	ERV
SCALE:	SHEET NO:
AS NOTED	1 OF

DRAWING NO:

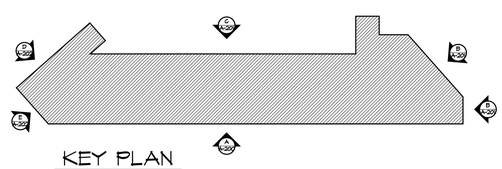
A-200.00

NYC DOB NUMBER: NB # XXX XXX XXX



B / A-201 RIGHT SIDE ELEVATION
SCALE : 1/8" = 1'-0"

C / A-201 REAR ELEVATION
SCALE : 1/8" = 1'-0"



KEY PLAN
NOT TO SCALE

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
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744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
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NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

EXTERIOR ELEVATIONS

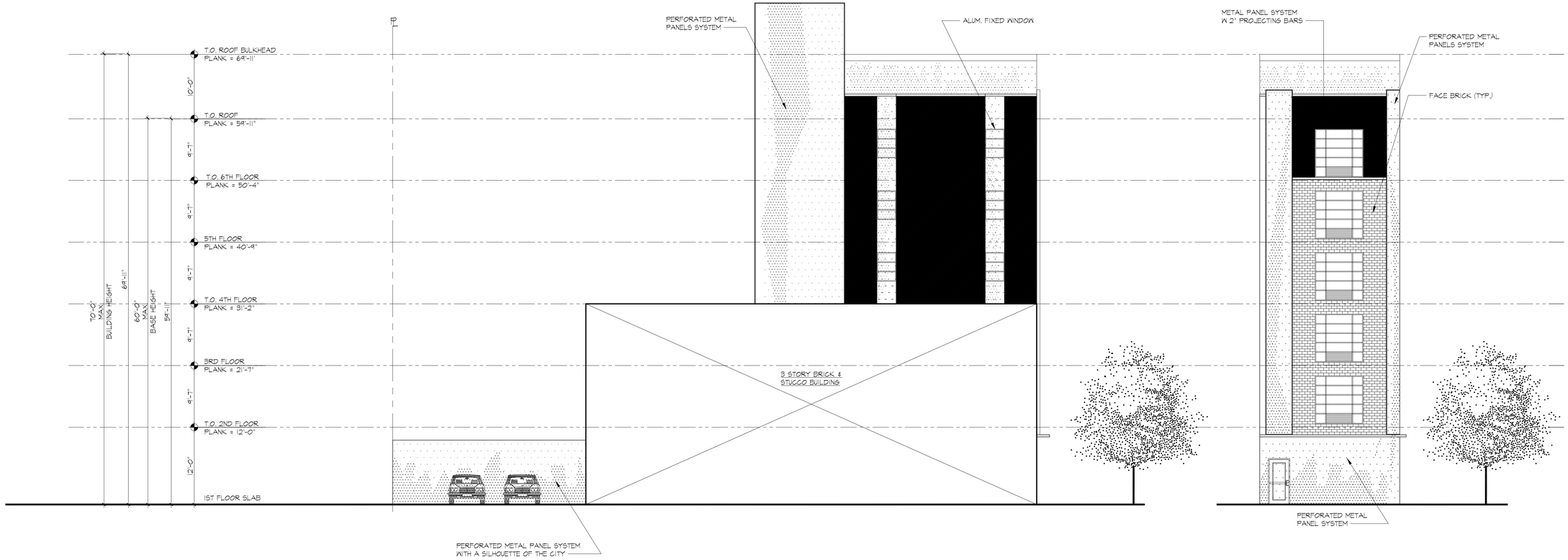
REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE:	PROJECT NO:
09-02-15	#1515
DRAWN BY: VF	CHECKED BY: ERV
SCALE: AS NOTED	SHEET NO: 1 OF

DRAWING NO:

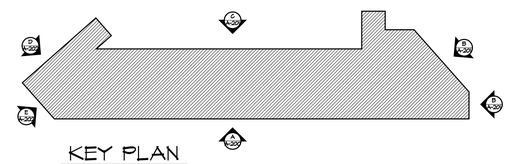
A-201.00

NYC DOB NUMBER: NB # XXX XXX XXX



D A-202 LEFT SIDE ELEVATION
SCALE : 1/8" = 1'-0"

E A-202 LEFT FRONT ELEVATION
SCALE : 1/8" = 1'-0"



KEY PLAN
NOT TO SCALE

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
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INFO@AUFGANG.COM 845.368.0004

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NEW YORK, NY 10019

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NEWARK N.J. 07102

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SHEET TITLE:

EXTERIOR ELEVATIONS

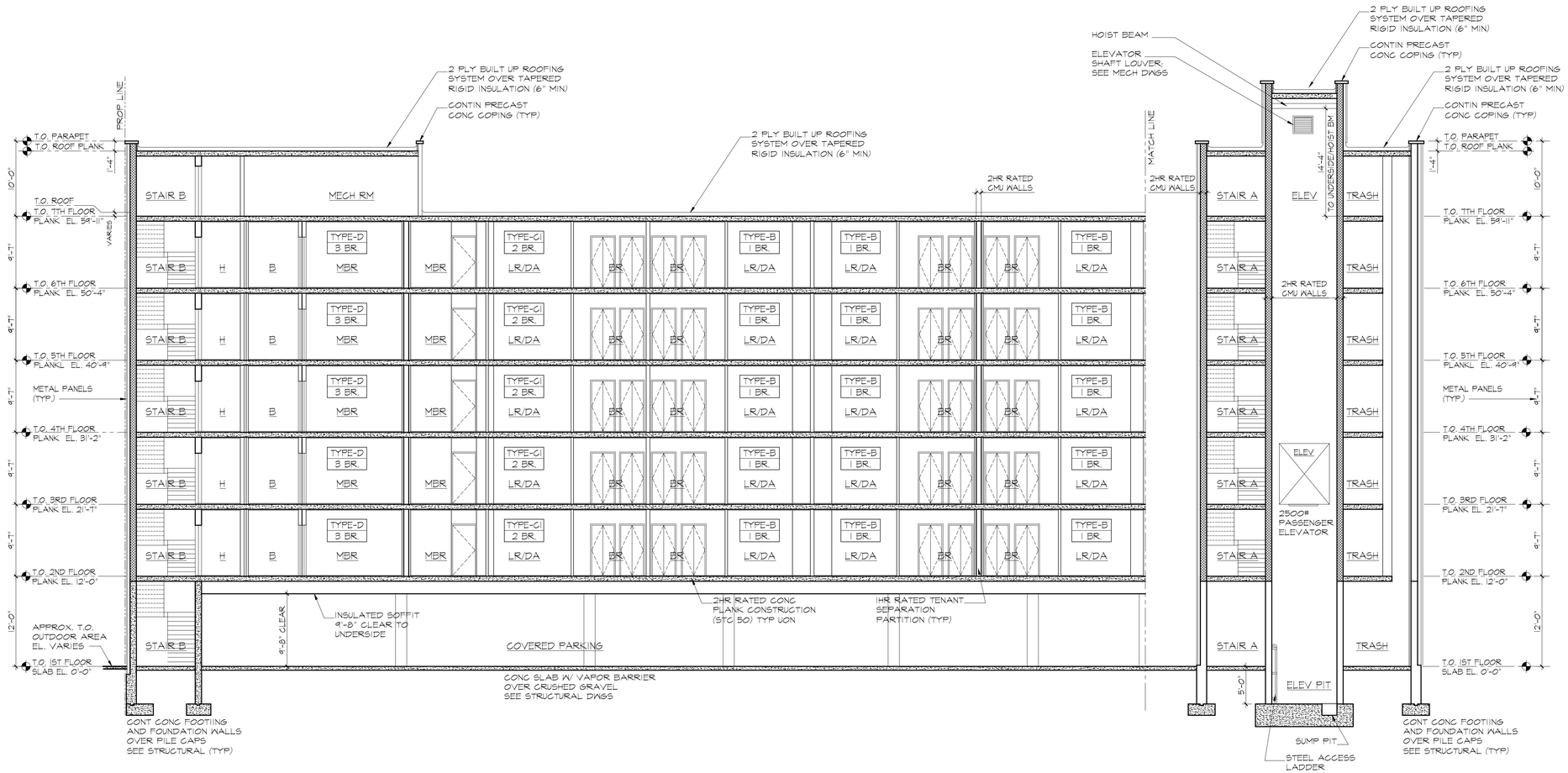
REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE:	PROJECT NO:
09-02-15	#1515
DRAWN BY:	CHECKED BY:
VF	ERV
SCALE:	SHEET NO:
AS NOTED	1 OF

DRAWING NO:

A-202.00

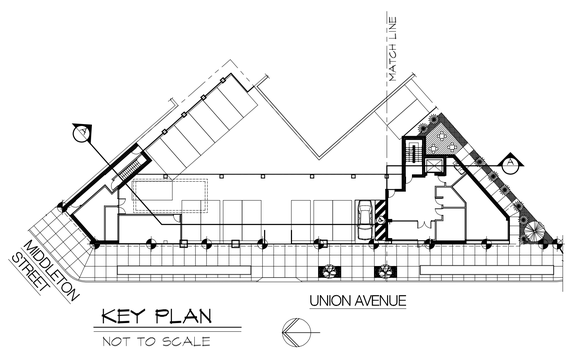
NYC DOB NUMBER: NB # XXX XXX XXX



A BUILDING LONGITUDINAL CROSS SECTION

SCALE : 1/8" = 1'-0"

A-100, 101, 102, 103



KEY PLAN

NOT TO SCALE

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

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NEW YORK, NY 10019

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NEWARK N.J. 07102

MEP ENGINEER:
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NEW YORK, N.Y.10001
PH: (212) 239-1892

DATE	SUBMISSIONS / REVISIONS
~~9-2-15~~	~~ISSUED FOR DOB REVIEW~~

SHEET TITLE:

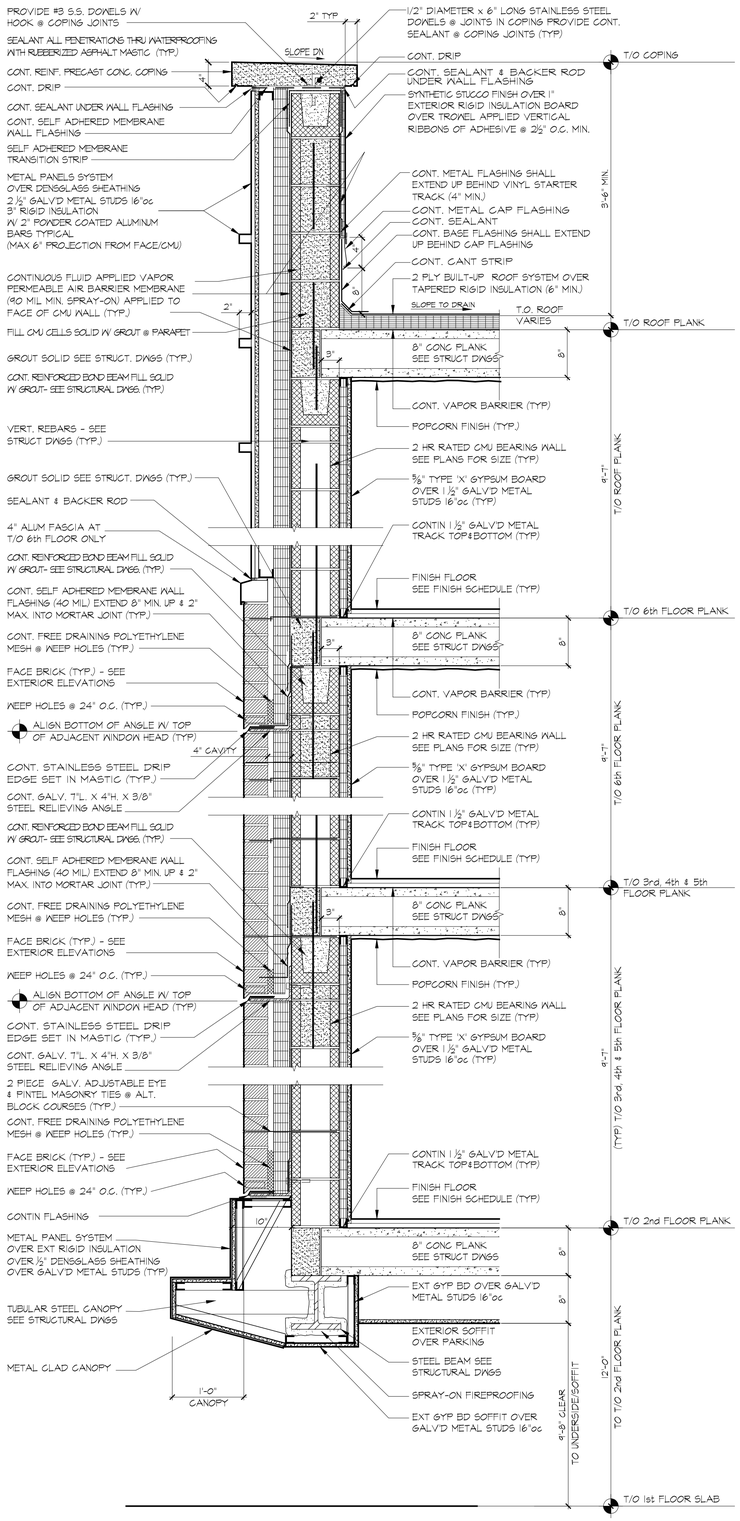
BUILDING SECTION

REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO:

A-203.00

NYC DOB NUMBER: NB # XXX XXX XXX



1 TYPICAL WALL SECTION

SCALE : 1" = 1'-0"

A-100, 101, 102, 103 & A-200

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE 10TH FL.
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE ,PC
224 WEST 29TH STREET-4TH FL.
NEW YORK, N.Y.10001
PH: (212) 239-1892

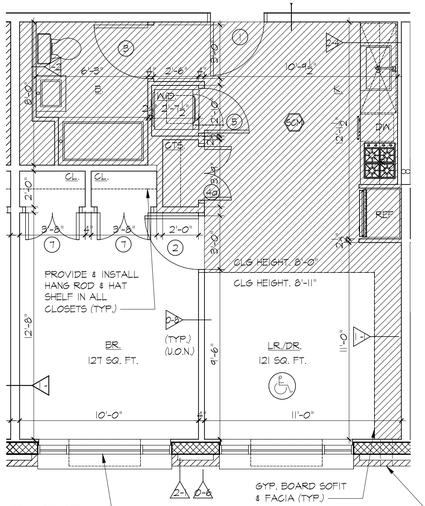
DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:

WALL SECTION

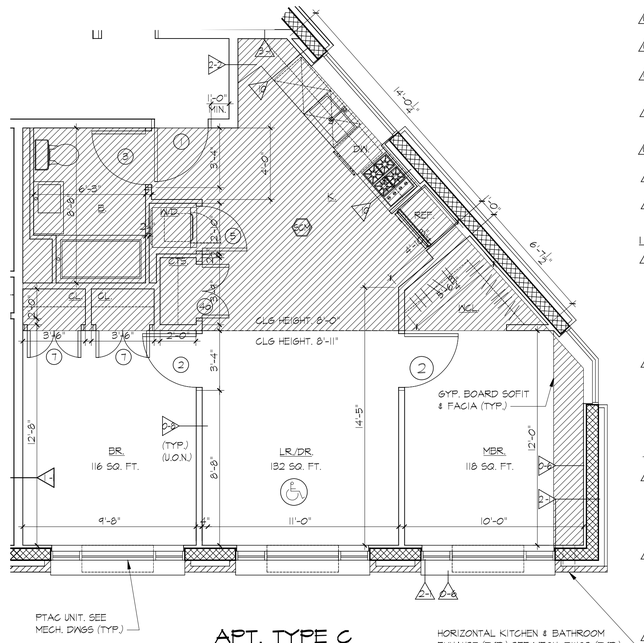
REGISTERED ARCHITECT ARIEL AUFGANG 022789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: A-400.00
NYC DOB NUMBER: NB # XXX XXX XXX



APT. TYPE B LAYOUT PLAN

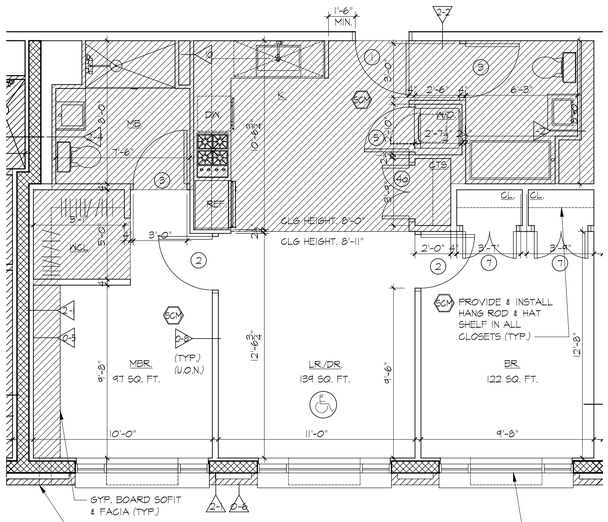
SCALE : ¼" = 1'-0"



APT. TYPE C LAYOUT PLAN

SCALE : ¼" = 1'-0"

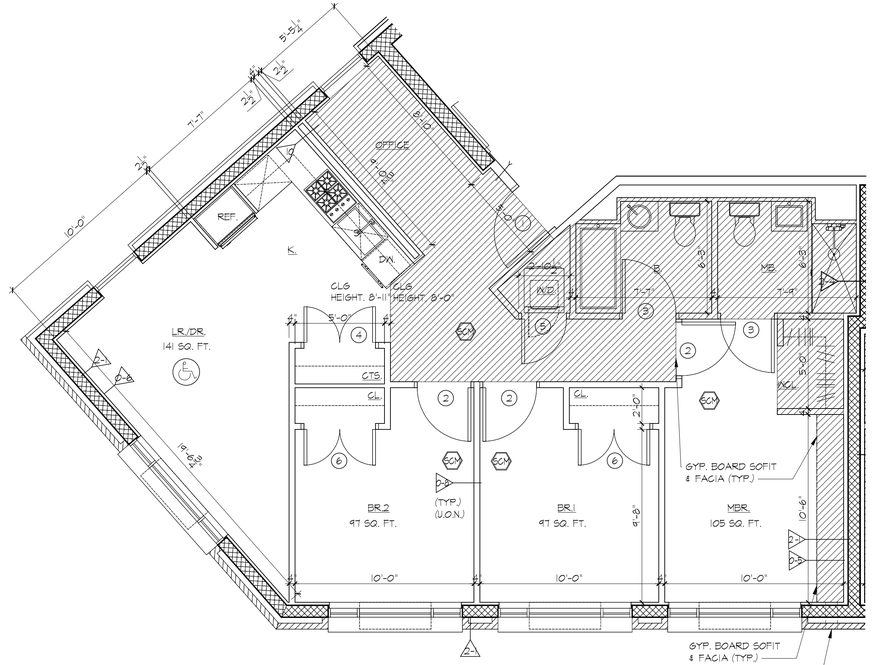
793 SQ. FT.



APT. TYPE C1 LAYOUT PLAN

SCALE : ¼" = 1'-0"

809 SQ. FT.



APT. TYPE D LAYOUT PLAN

SCALE : ¼" = 1'-0"

1084 SQ. FT.

WALL TYPE LEGEND:

NON RATED

0A FURRING AT INTERIOR CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD OVER ⅞" "Z" METAL FURRING CHANNELS @ 16" O.C.

0B FURRING AT CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD OVER 1½" "Z" METAL FURRING @ 16" O.C.

0C FURRING AT CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD OVER 1½" "F" METAL FURRING @ 16" O.C. WITH 2" SEMI RIGID INSULATION UNFACED BETWEEN STUDS.

0D FURRING - (1) LAYER OF ⅝" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 ½" METAL STUDS @ 16" O.C.

0E FURRING - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2 ½" METAL STUDS @ 16 O.C. WITH 2" RIGID INSULATION BETWEEN STUDS.

0F FURRING AT EXT. CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON 1½" GALV. METAL STUDS @ 16 O.C. WITH 2" SEMI-RIGID INSULATION UNFACED BETWEEN STUDS.

0G FURRING AT EXT. CMU WALL - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON 3 ⅝" GALV. METAL STUDS @ 16 O.C. WITH 3 ½" (R-15) BATT INSULATION WITH VAPOR BARRIER BETWEEN STUDS.

0H TYPICAL NON RATED PARTITION - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 2 ½" METAL STUDS @ 16 O.C.

0I TYPICAL NON RATED PARTITION - (1) LAYER ⅝" TYPE "X" GYPSUM BOARD ON EACH SIDE OF 3 ⅝" METAL STUDS @ 16 O.C.

0J NON RATED CHASE WALL - (1) LAYER ⅝" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF A 2 ½" METAL STUDS @ 16 O.C. - WITH 2" BATT INSULATION AT BATHROOMS.

1 HOUR RATED

1A 1 HOUR RATED TENANT SEPARATION PARTITION - (1) LAYER OF ⅝" TYPE "X" GYPSUM BOARD ON (1) SIDE, (2) LAYERS OF ⅝" TYPE "X" GYPSUM BOARD ON THE OTHER SIDE OF 3 ⅝" METAL STUDS @ 16" O.C. WITH 3 ½" SOUND ATTENUATION INSULATION. EXTEND STUDS & GYPSUM BOARD UP TO UNDERSIDE OF CONCRETE SLAB & SEAL TIGHT TO UNDERSIDE OF CONCRETE SLAB AND/OR ROOF SLAB W/ CONT. FIRESTOP SEALANT& FIRESAFING INSULATION (GA FILE #WP-1522) (STC 50-54)

1B 1 HOUR RATED CHASEWALL - (1) LAYER ⅝" TYPE "X" WATER RESISTANT GYPSUM BOARD ON ONE SIDE OF 2½" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB. SEAL TIGHT TO UNDERSIDE OF SLAB W/ CONT. FIRESTOP SEALANT. (UL #V442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)

2 HOUR RATED

2A 2 HOUR RATED CMU WALL - CMU WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE BLOCK COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB OR DECK ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE GAP EXIST BETWEEN TOP OF WALL AND BOTTOM OF SLAB (UL #U906)

2B 2 HOUR RATED INTERIOR PARTITION - (2) LAYERS 5/8" TYPE "X" GYPSUM BOARD ON EACH SIDE 3⅝" METAL STUDS @ 16" O.C. WITH 3½" SOUND ATTENUATION INSULATION. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF SLAB SEAL TIGHT TO UNDERSIDE OF DECK W/ CONT. FIRESTOP SEALANT & FIRESAFING. (GA FILE #WP-1522 STC 55-59).

2C 2 HOUR RATED EXTERIOR PARTITION - (2) LAYERS OF 3/4" TYPE "X" GYPSUM BOARD ON INTERIOR SIDE AND ½" EXP EXTERIOR GYPSUM BOARD SHEATHING OVER 3⅝" GA 18 GALV. METAL STUDS @ 16" O.C. WITH 3½" UNFACED BATT INSULATION (R-15) (UL #U424)

2D 2 HOUR RATED CHASEWALL - (2 ROWS) (2) LAYER ⅝" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2½" METAL STUDS @ 16" O.C. EXTEND GYPSUM BOARD & STUDS UP TO UNDERSIDE OF FLOOR SLAB OR ROOF DECK. SEAL TIGHT TO DECK WITH CONT. FIRESTOP SEALANT. SEAL ALL PENETRATIONS THRU CHASEWALL WITH FIRESAFING INSULATION AND CONT. FIRESTOP SEALANT AS REQ'D (UL #V442) (PROVIDE INSUL. AS REQ'D TO ACHIEVE A MIN STC RATING OF 50)

2E 2 HOUR RATED MECHANICAL SHAFT WALL - (2) LAYERS OF ½" TYPE "X" GYPSUM BOARD ON ONE SIDE OF 2½" METAL C-H STUDS @ 24" O.C. WITH (1) LAYER OF 1" TYPE "X" GYPSUM LINER PANEL ON SHAFT SIDE. W/ 1" MINERAL FIBER INSULATION IN CAVITY. SEAL TOP OF WALL TIGHT TO UNDERSIDE OF CONCRETE SLAB W/ CONT. FIRESTOP SEALANT. GA FILE #4085 (STC-45-49)

3 HOUR RATED

3A 3 HOUR RATED WALL - (1) LAYER ½" TYPE "X" GYPSUM BOARD OVER ⅞" METAL HAT CHANNELS @ 24" O.C. OVER 2 HR RATED CONCRETE BLOCK WALL WITH CONT. GALVANIZED HORIZONTAL TRUSS TYPE REINFORCING AT ALTERNATE COURSES. SEAL TOP OF CONCRETE BLOCK WALL TIGHT TO UNDERSIDE OF CONCRETE FLOOR SLAB ABOVE WITH CONT. FIRESTOP SEALANT AND FIRESAFING INSULATION WHERE A GAP EXISTS BETWEEN TOP OF WALL AND BOTTOM OF CONCRETE PLANK. (UL #U814) (PROVIDE STC RATING OF 50-54 COMPACTOR CHUTE FOR SHAFT ADJACENT TO DWELLING UNITS)

LEGEND:

- CONCRETE FOUNDATION WALL - SEE STRUCTURAL DWG'S
- CONCRETE BLOCK WALL - SEE PLAN FOR SIZE.
- GYPSUM BOARD PARTITION - SEE PLAN FOR SIZE.
- FACE BRICK AND CAST STONE
- FIRE RATED SHAFT WALL.
- VISUAL SIGNALING DEVICE / STROBE LIGHT - SEE ELEC. DWG'S FOR LOCATIONS
- DOORS SHOWN DOTTED SHALL BE PROVIDED WITH REVERSIBLE SWING HARDWARE TO MEET ACCESSIBILITY REQUIREMENTS.
- EXIT LIGHT AND SIGN - CEILING MOUNTED
- EXIT LIGHT AND SIGN - WALL MOUNTED
- REMOVABLE KITCHEN BASE CABINET
- ELECTRICAL PANEL UNIT
- PLANK DIRECTION
- HANDICAP ADAPTABLE APARTMENT UNIT
- A — FULLY ACCESSIBLE HANDICAP APARTMENT UNIT (TOTAL 7 UNITS)
- H.V.I. — HANDICAP ADAPTABLE APARTMENT UNIT - OUTFITTED AS FULLY ACCESSIBLE FOR PEOPLE W/ HEARING OR VISUAL IMPAIRMENTS (TOTAL 3 UNITS)
- 5'-0" CLEAR HANDICAP SPACE
- SCM — SMOKE & CARBON MONOXIDE DETECTOR - SEE ELEC'T. DWG'S
- SUSPENDED GYP.BD. CEILING/GYP. BD SOFFIT

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
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INFO@AUFGANG.COM 845.368.0004

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DATE	SUBMISSIONS / REVISIONS
9-2-15	ISSUED FOR DOB FILING

SHEET TITLE:
APT. LAYOUT PLANS
TYP. TYPE B
TYP. TYPE C
TYP. TYPE C1
TYP. TYPE D

REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: VF
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: A-500
NYC DOB NUMBER: NB # XXX XXX XXX

LIST OF ABBREVIATIONS

ALUM. - ALUMINUM
FL. - FLUSH PANEL
GL. - GLASS
H.C. - HOLLOW CORE
H.M. - HOLLOW METAL
K.D. - KNOCK DOWN FRAME
MAR. - MARBLE SADDLE
PTD. - PAINTED
S.C. - SOLID CORE
STL. - STEEL
TEMP. - TEMPERED
W.G. - WIRE GLASS
WD. - WOOD

DOOR SCHEDULE

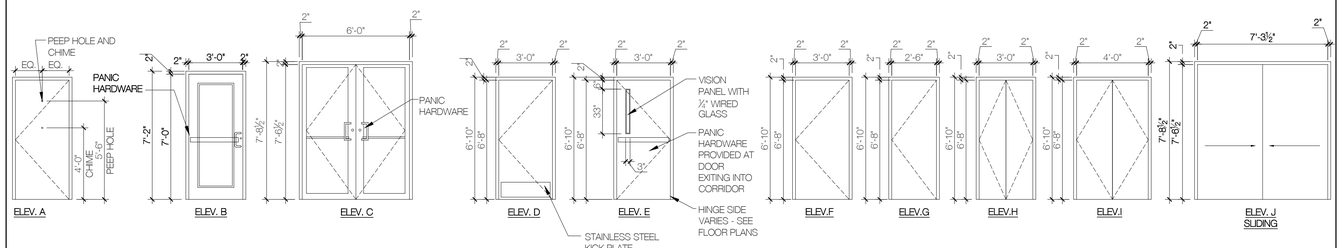
ROOM DESIGNATION		DOOR DESIGNATION	DOOR ELEVATION	DOOR WIDTH	DOOR HEIGHT	DOOR THICKNESS	DOOR TYPE	DOOR MATERIAL	DOOR FINISH	FRAME FIRE RATING	FRAME STC RATING	FRAME MATERIAL	FRAME FINISH	FRAME FIRE RATING	SADDLE MATERIAL	HARDWARE SET	REMARKS
APARTMENTS	APARTMENT ENTRY	1	A	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	35	STL.	PTD.	1½ HR.	ALUM.		SEE NOTE #6, PROVIDE LATCH SET AND CHAIN GUARD
	BEDROOM	2	F	3'-0"	6'-8"	1 3/8"	FL./H.C.	WD.	PTD.	-	-	H.M.	PTD.	-	MAR		DOOR 1" UNDERCUT
	BATHROOM	3	F	3'-0"	6'-8"	1 3/8"	FL./H.C.	WD.	PTD.	-	-	H.M.	PTD.	-	MAR		SEE NOTE #8
	CLOSET/CTS	4	H	(2) 1'-6"	6'-8"	1 3/8"	FL./H.C.	WD.	PTD.	-	-	H.M.	PTD.	-	-		SEE NOTE #8
	CLOSET/WD	5	G	2'-6"	6'-8"	1 3/8"	FL./H.C.	WD.	PTD.	-	-	H.M.	PTD.	-	-		SEE NOTE #8
	CLOSET BR	6	H	(2) 1'-6"	6'-8"	1 3/8"	FL./H.C.	WD.	PTD.	-	-	H.M.	PTD.	-	-		SEE NOTE #8
	CLOSET BR	7	I	(2) 2'-0"	6'-8"	1 3/8"	FL./H.C.	WD.	PTD.	-	-	H.M.	PTD.	-	-		SEE NOTE #8
P.B.I.C SPACES	BUILDING ENTRY	8	C	6'-0"	6'-8"	1 3/4"	GLASS	ALUM.	PTD.	1½ HR.	-	ALUM.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
	VESTIBULE	9	C	6'-0"	6'-8"	1 3/4"	GLASS	ALUM.	PTD.		-	ALUM.	PTD.		ALUM.		SEE NOTE #8
	PARKING AREA	10	E	3'-0"	6'-8"	1 3/4"	GLASS	ALUM.	PTD.		-	ALUM.	PTD.		ALUM.		SEE NOTE #8
	BUILDING EGRESS	11	F	3'-0"	6'-8"	1 3/4"	FL.	ALUM.	PTD.	1½ HR.	-	ALUM.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
RETAIL	STOREFRONT SLIDING	20	J	7'-3½"	7'-6½"	1 3/4"	GLASS	ALUM.	PTD.	1½ HR.	-	ALUM.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
SERVICE AREAS	STAIR A & B	12	D	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.		ALUM.		SEE NOTE #8
	STAIR A & B (2ND FLOOR +)	13	E	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
	STAIR A& B @ ROOF	14	F	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.	1½ HR.	STL.		SEE NOTE #8
	BICYCLE STORAGE	15	B	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
	JANITORS CL. / REFUSE ROOM	16	D	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
	MECH. AREAS	17	D	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
	MECH. AREAS	18	D	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.	1½ HR.	ALUM.		SEE NOTE #8
	REQ. SPARE TOILET	19	F	3'-0"	6'-8"	1 3/4"	FL.	STL.	PTD.	1½ HR.	-	STL.	PTD.	1½ HR.	ALUM.		SEE NOTE #8

DOOR NOTES:

1. FOR DOOR HARDWARE SCHEDULE SEE SPECIFICATIONS.
2. ALL HARDWARE SHALL BE LEVER HANDLE AS PER A.D.A. REQUIREMENTS (U.O.N.).
3. FOR DOOR HEAD AND JAMB DETAILS SEE DWG. A-520
4. PROVIDE MARBLE ADA SADDLES AT ALL FLOOR TO TILE TRANSITIONS (U.O.N.)
5. ALL EXTERIOR DOORS SHALL BE INSULATED AND PROVIDED WITH WEATHER STRIPPING AT ALL SIDES.
6. ALL EXIT ACCESS DOORS SHALL BE PROVIDED WITH SELF CLOSER AND ADA SMOKE PROOF SADDLE.
7. ALL EXIT AND EXIT DISCHARGE DOORS SHALL BE PROVIDED WITH PANIC HARDWARE, SELF CLOSER, AND ADA SMOKE PROOF SADDLE.
8. ALL FIRE RESISTANT RATED DOORS SHALL SELF CLOSING.
9. ALL DOORS IN CURTAIN WALL SHALL BE COORDINATED WITH CURTAIN WALL MANUFACTURER.

NOTE : FOR ADITIONAL INFO SEE INTERIOR DESIGN DWG

DOOR ELEVATIONS



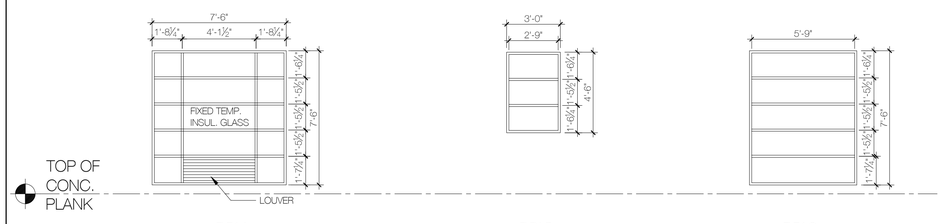
WINDOW SCHEDULE

WINDOW TYPE	WINDOW DESIGNATION	WINDOW ELEVATION	UNIT WIDTH	UNIT HEIGHT	FRAME MATERIAL	FINISH	FIRE RATING (HOUR)	STC RATING	ROUGH OPENING WIDTH	ROUGH OPENING HEIGHT	INSECT SCREEN	ENERGY REQ. U-FACTOR	ENERGY REQ. S.H.G.C.	REMARKS
CASEMENT / CASEMENT FIXED	W1	A	7'-6"	7'-6"	ALUM.	PTD.	-	35	7'-1"	7'-4"	YES	0.45	0.38	SEE NOTE #1 TO 8
CASEMENT / FIXED / CASEMENT	W2	B	8'-0"	7'-2"	ALUM.	PTD.	-	35	8'-1"	7'-3"	YES	0.45	0.38	SEE NOTE #1 TO 8
CASEMENT / FIXED / CASEMENT	W3	C	6'-0"	7'-6"	ALUM.	PTD.	-	35	6'-1"	7'-7"	YES	0.45	0.38	SEE NOTE #1 TO 8
CASEMENT / FIXED / CASEMENT	W4		6'-0"	7'-6"	ALUM.	PTD.	-	35	6'-1"	7'-7"	YES	0.45	0.38	SEE NOTE #1 TO 8
CASEMENT / FIXED / CASEMENT	WX	A	7'-6"	7'-6"	ALUM.	PTD.	-	35	7'-1"	7'-4"	YES	0.45	0.38	SEE NOTE #1 TO 8

WINDOW NOTES:

1. ALL WINDOW UNITS SHALL HAVE 1" INSULATED GLASS (U.O.N.).
2. ALL WINDOWS SHALL BE DOUBLE GLAZED
3. ALL WINDOW UNITS SHALL HAVE AN EXTRUDED ALUMINUM FRAME (CW50 MIN) (U.O.N.).
4. CONTRACTOR SHALL PROVIDE FULL ALUMINUM MESH INSECT SCREENS AT ALL OPERABLE WINDOW UNITS.
5. CONTRACTOR SHALL PROVIDE SUPPORT MULLION TRIM BETWEEN WINDOW UNITS AS PER MANUFACTURER SPECIFICATION.
6. PROVIDE OPERATING HARDWARE FOR WINDOWS WITHIN ACCESSIBLE REACH HEIGHT IN ALL ACCESSIBLE AND H.V.I. UNITS.
7. WINDOWS REQUIRING PUSHING, PULLING, OR LIFTING TO OPEN (FOR EXAMPLE, DOUBLE HUNG, SLIDING, OR CASEMENT AND CASEMENT UNITS WITHOUT CRANKS) SHOULD REQUIRE NO MORE THAN 5 lbf. (22.2. N) TO OPEN OR CLOSE.
8. ALL WINDOW UNITS SHALL HAVE AN OITC RATING OF 35 db MAX.

GENERAL NOTES:
1008.4.1 ENTRANCE DOORS,BUILDING ENTRANCE DOORS AND OTHER EXTERIOR EXIT DOORS SHALL BE EQUIPPED WITH HEAVY DUTY LOCK SETS WITH AUXILIARY LATCH BOLTS TO PREVENT THE LATCH FROM BEING MANIPULATED BY MEANS OTHER THAN A KEY. LATCH SETS SHALL HAVE STOP-WORK IN THE INSIDE CYLINDER CONTROLLED BY A MASTER KEY ONLY. OUTSIDE CYLINDERS OF MAIN ENTRANCE DOOR LOCKS SHALL BE OPERATED BY THE TENANTS' KEY, WHICH SHALL NOT BE KEYED TO ALSO OPEN THE TENANTS' APARTMENT DOOR. A LIGHT OR LIGHTS SHALL BE PROVIDED AT OR NEAR THE OUTSIDE OF THE FRONT ENTRANCEWAY OF THE BUILDING PROVIDING NOT LESS THAN 5-FOOT CANDLES (53.82 LUX) INTENSITY MEASURED AT THE FLOOR LEVEL FOR THE FULL WIDTH OF THE ENTRANCEWAY.
1008.4.2 DOORS TO DWELLING UNITS.DOORS TO DWELLING UNITS SHALL BE EQUIPPED WITH A HEAVY DUTY LATCH SET AND A HEAVY DUTY DEAD BOLT OPERABLE BY A KEY FROM THE OUTSIDE AND A THUMB-TURN FROM THE INSIDE. THOSE DOORS SHALL ALSO BE EQUIPPED WITH A CHAIN GUARD SO AS TO PERMIT PARTIAL OPENING OF THE DOOR. DWELLING UNIT ENTRANCE DOORS SHALL ALSO BE EQUIPPED WITH A VIEWING DEVICE LOCATED SO AS TO ENABLE A PERSON ON THE INSIDE OF THE ENTRANCE DOOR TO VIEW A PERSON IMMEDIATELY OUTSIDE.
1008.4.3 WINDOWS.ALL OPENABLE WINDOWS SHALL BE EQUIPPED WITH SASH LOCKS DESIGNED TO BE OPENABLE FROM THE INSIDE ONLY. GRILLES LOCKABLE FROM THE INSIDE ONLY MAY BE PLACED ON THE INSIDE OR OUTSIDE OF WINDOWS THAT ARE ACCESSIBLE FROM GRADE BUT THAT DO NOT SERVE TO PROVIDE ACCESS TO EXITS.



WINDOW ENERGY PERFORMANCE NOTES (ECC502.4):

- AIR LEAKAGE (MANDATORY).502.4.1 WINDOW AND DOOR ASSEMBLIES.THE AIR LEAKAGE OF WINDOW AND SLIDING OR SWINGING DOOR ASSEMBLIES THAT ARE PART OF THE BUILDING ENVELOPE SHALL BE DETERMINED IN ACCORDANCE WITH AAMA/WDMA/CSA W11M.S.2/A440, OR NFRC 400 BY AN ACCREDITED, INDEPENDENT LABORATORY, AND LABELED AND CERTIFIED BY THE MANUFACTURER AND SHALL NOT EXCEED 0.3 CFM PER SQUARE FOOT (1.5 L/S/M2), AND SWINGING DOORS NO MORE THAN 0.5 CFM PER SQUARE FOOT (2.6 L/S/M2).EXCEPTION:SITE-CONSTRUCTED WINDOWS AND DOORS THAT ARE WEATHERSTRIPPED OR SEALED IN ACCORDANCE WITH SECTION 502.4.3.502.4.2 CURTAIN WALL, STOREFRONT GLAZING AND COMMERCIAL ENTRANCE DOORS.

- CURTAIN WALL, STOREFRONT GLAZING AND COMMERCIAL-GLAZED SWINGING ENTRANCE DOORS AND REVOLVING DOORS SHALL BE TESTED FOR AIR LEAKAGE AT 1.57 POUNDS PER SQUARE FOOT (PSF) (75 PA) IN ACCORDANCE WITH ASTM E 283. FOR CURTAIN WALLS AND STOREFRONT GLAZING, THE MAXIMUM AIR LEAKAGE RATE SHALL BE 0.3 CUBIC FOOT PER MINUTE PER SQUARE FOOT (CFM/FT2) (5.5 M3/H × M2) OF FENESTRATION AREA. FOR COMMERCIAL GLAZED SWINGING ENTRANCE DOORS AND REVOLVING DOORS, THE MAXIMUM AIR LEAKAGE RATE SHALL BE 1.00 CFM/FT2(18.3 M3/H × M2) OF DOOR AREA WHEN TESTED IN ACCORDANCE WITH ASTM E 283.

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 UNION AVENUE
BROOKLYN , NY 11206

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS

SHEET TITLE:

DOOR SCHEDULE, WINOW SCHEDULE AND FINISH SCHEDULE

REGISTERED ARCHITECT ARIEL AUFGANG 032789 STATE OF NEW YORK

ISSUE DATE: 09-02-15
PROJECT NO: #1515
DRAWN BY: JGT
CHECKED BY: ERV
SCALE: AS NOTED
SHEET NO: 1 OF
DRAWING NO: A-600.00
NYC DOB NUMBER: NB # XXX XXX XXX

GENERAL NOTES

1. WORK NOT INDICATED ON A PART OF THE DRAWINGS BUT REASONABLY IMPLIED TO BE SIMILAR TO THAT SHOWN AT CORRESPONDING PLACES SHALL BE REPEATED.

2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE STRUCTURAL DRAWING WITH THE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS. IN CASE OF CONFLICT BETWEEN THE STRUCTURAL DRAWINGS AND DRAWINGS RELATED TO OTHER TRADES, THE CONTRACTOR SHALL MAKE ALLOWANCE IN HIS BID FOR THE MORE STRINGENT REQUIREMENTS. CONFLICTS BETWEEN THE STRUCTURAL DRAWINGS AND THE DRAWINGS OF OTHER TRADES SHALL NOT BE REASON FOR ANY EXTRA COST OR DELAY IN THE EXECUTION OF THE WORK.

3. IN ANY CASE OF CONFLICT BETWEEN THE NOTES, DETAILS AND SPECIFICATIONS, THE MOST RIGID REQUIREMENTS SHALL GOVERN.

4. CONTRACTOR SHALL MAKE NO DEVIATION FROM DESIGN DRAWINGS WITHOUT WRITTEN APPROVAL OF THE ARCHITECT AND/OR STRUCTURAL ENGINEER.

5. ALL DIMENSIONS INDICATED ON THE DRAWINGS ARE BASED UPON THE AVAILABLE INFORMATION AND SHALL NOT BE USED FOR ORDERING AND/OR FABRICATING MATERIALS. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING DIMENSIONS PRIOR TO ORDERING AND/OR FABRICATING MATERIALS.

6. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS BY MEASUREMENTS AT THE JOB SITE AND SHALL TAKE ANY AND ALL OTHER MEASUREMENTS NECESSARY TO VERIFY THE DRAWINGS AND TO PERFORM HIS WORK PROPERLY.

7. MATERIALS AND EQUIPMENT SHALL BE STORED AND TRANSPORTED IN A MANNER COMPATIBLE WITH THE ALLOWABLE FLOOR LOADINGS.

8. FOR WATERPROOFING DETAILS AND LOCATIONS, SEE ARCHITECTURAL DRAWINGS.

9. FOR LOCATION OF FLOOR DRAINS, CURBS, CONCRETE PADS AND FLOOR DEPRESSIONS, ETC. SEE ARCHITECTURAL AND MECHANICAL DRAWINGS.

10. ALL CONSTRUCTION SHALL BE PERFORMED IN CONFORMANCE WITH THE REQUIREMENTS OF THE BUILDING CODE OF THE CITY OF NEW YORK, LATEST EDITION AND REVISIONS.

11. THE CONTRACTOR SHALL PERFORM ALL WORK (INCLUDING DEMOLITION & ERECTION) WITH DUE REGARD TO LIFE AND PROPERTY IN THE VICINITY OF THE WORK AREA. CONTRACTOR ALONE SHALL BE RESPONSIBLE FOR PROTECTION OF SAME FROM ANY HARM OR DAMAGE DURING THE ENTIRE CONSTRUCTION AND/OR ALTERATION. ANY HARM OR DAMAGE SHALL BE RECTIFIED TO THE ENTIRE SATISFACTION OF OWNER AT NO ADDITIONAL COST TO OWNER.

12. CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF ALL CONSTRUCTION DEBRIS IN THE VICINITY OF WORK.

13. CONTRACTOR MUST PROVIDE ADEQUATE SHORING AND/OR TEMPORARY SUPPORT WHEREVER REQUIRED TO THE EXISTING AND NEW STRUCTURES DURING THE ENTIRE CONSTRUCTION PERIOD.

14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE INTERIOR OF THE BUILDING AND ALL CONTENTS FROM WEATHER OR ANY OTHER ELEMENTS THAT COULD CAUSE DAMAGE.

15. THE CONTRACTOR SHALL BE COMPLETELY RESPONSIBLE FOR THE SAFETY OF ADJACENT STRUCTURES.

16. ALL WORK SHALL HAVE CONTROLLED INSPECTION CONFORMING TO LATEST EDITION BUILDING CODE OF THE CITY OF NEW YOR REQUIREMENTS. CONTROLLED INSPECTION SHALL BE BY AN INDEPENDENT TESTING AGENCY HIRED BY THE OWNER.

17. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING THE COMPLETE LAYOUT AND DETAILS OF ALL STRUCTURAL WORK TO BE PERFORMED. THE CONTRACTOR MAY NOT PERFORM WORK UNTIL THE SHOP DRAWINGS HAVE BEEN APPROVED.

18. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE LANDLORDS RULES AND REGULATIONS.

19. ALL CONTRACTORS ARE REQUIRED TO EXAMINE THE DRAWINGS AND SPECIFICATIONS CAREFULLY, VISIT THE JOB SITE AND FULLY INFORM THEMSELVES TO ALL EXISTING CONDITIONS AND LIMITATIONS PRIOR TO SUBMITTING THEIR PROPOSAL. FAILURE TO VISIT THE SITE AND NOT BEING FAMILIAR WITH THE EXISTING CONDITIONS AND LIMITATIONS WILL IN NO WAY RELIEVE THE SUCCESSFUL BIDDER FROM FURNISHING ANY MATERIALS OR PERFORMING ANY WORK THAT MAY BE REQUIRED TO COMPLETE WORK IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS WITHOUT ADDITIONAL COST TO THE OWNER.

CODES

1. BUILDING CODE OF THE CITY OF NEW YORK, INCLUDING LATEST AMENDMENTS.

2. AMERICAN CONCRETE INSTITUTE " BUILDING CODE REQUIRMENTS FOR STRUCTURAL CONCRETE" ACI 318-99 ("ACI") AS MODIFIED BY SURCHAPTER 10 ARTICLE 5 OF THE N.Y.C. BUILDING CODE.

3. AMERICAN CONCRETE INSTITUTE " BUILDING CODE REQUIRMENTS FOR MASONRY STRUCTURES" ACI 530-99 ("ACI 530") AS MODIFIED BY REFERENCE STANDARD SUBCHAPTER 10 ARTICLE 4 OF THE N.Y.C. BUILDING CODE.

NON-STRUCTURAL ITEMS

1. COORDINATE THE EXTENT AND LOCATION OF CURBS; MECHANICAL PADS AND MASONRY DOWELS ARE TO BE COORDINATED WITH THE ARCHITECTURAL AND MECHANICAL DRAWINGS.TYPICAL DETAILS ARE SHOWN ON THE STRUCTURAL DRAWINGS. REINFORCE NON-STRUCTRURAL CONCRETE FILL WITH 6x6-W1.4xW1.4 WWF LOCATED 1" FROM TOP.

FOUNDATION

1. FOUNDATION DESIGN IS BASED ON THE RECOMMENDDATIONS CONTAINED IN THE GEOTECHNICAL REPORT PREPARED BY PILLORI ASSOCIATES PA DATED APRIL 2015.

2. FOUNDATION ELEMENTS SHALL BE SUPPORTED BY 90-TON PILES, U.O.N. ON PLAN.

3. NO BACKFILL SHALL BE PLACED AGAINST FOUNDATION WALLS UNLESS SUPPORTING SLABS ARE IN PLACE AND SET OR THE WALLS ARE ADEQUATELY BRACED.

4. DEWATERING IF REQUIRED OF THE SITE IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL TAKE PRECAUTIONS TO AVOID UNDERMINING EXISTING FOUNDATIONS. METHOD OF DEWATERING AND RELATED CALCULATIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND MUST COMPLY WITH THE SOILS AND GROUNDWATER MANAGEMENT SPECIFICATIONS FOR THIS PROJECT.

5. PROVIDE DOWELS IN FOUNDATIONS FOR ALL WALLS, COLUMNS AND SHEAR WALLS OF SAME NUMBER AND SIZE AS THE VERTICAL REINFORCEMENT ABOVE.

6. PROVIDE WATERSTOPS AT ALL VERTICAL CONSTRUCTION JOINTS IN WALLS BELOW GRADE.

7. CONTRACTOR TO INSTALL ALL PIPE SLEEVES, BOXED OPENINGS, ANCHOR BOLTS, INSERTS ETC. AS REQUIRED FOR THE VARIOUS TRADES. WALL POCKETS AND EMBED PLATES, TO RECEIVE BEAMS AND SLABS, SHALL BE PROVIDED AS REQUIRED FOR THE SUPERSTRUCTURE. SHOP DRAWINGS SHOWING THE POSITION OF THE OPENINGS SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PLACEMENT OF CONCRETE.

8. SLAB ON GROUND SHALL BE PLACED ON SELECT FILL COMPACTED TO 95 PERCENT MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D1557). PROVIDE 6-MIL THICK VAPOR BARRIER AND MIN. 6-INCH THICK GRAVEL BED UNDER THE SLAB.

9. CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE SUBSURFACE AND EXISTING CONDITIONS BEFORE COMMENCING THE WORK.

10. CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION OF ALL EXCAVATION SLOPES. WHERE NECESSARY, SHEETING, SHORING AND UNDERPINNING OF EXCAVATION SHALL BE PROVIDED WITH ALL REQUIRED TIE BACKS AND BRACING.

11. METHODS EMPLOYED IN ALL SHEETING, SHORING AND UNDERPINNING SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER RETAINED BY THE CONTRACTOR AND LICENSED IN THE STATE OF NEW YORK.

12. TEMPORARY BRACING SHALL BE PROVIDED FOR ALL BUTTRESSES. WHERE BUTTRESSES DO NOT EXIST OR SPACING BETWEEN BUTTRESSES EXCEEDS 25 FEET, AND WHERE THE DIFFERENCE IN LEVEL BETWEEN INSIDE AND OUTSIDE GRADE IS MORE THAN 4'-0", INTERMEDIATE BRACING SHALL BE PROVIDED. WHERE RAMPS OCCUR, THE GRADE ELEVATION OUTSIDE OF RAMP WALLS SHALL BE USED IN FIGURING THE DIFFERENCE IN LEVEL. CORNER BUTTRESSES NEED NOT BE BRACED. NO BACKFILLING IS TO BE DONE BEFORE ALL SLABS WHICH PROVIDE BRACING FOR WALLS ARE IN PLACE, UNLESS APPROVED BY THE ENGINEER. PROVIDE TEMPORARY BRACING FOR ALL PIERS AND SUMP PITS.

13. ALL FOUNDATION ELEMENTS ARE TO BE CENTERED ON COLUMNS ABOVE, U.O.N.

14. FOUNDATION ELEVATIONS SHOWN ON THE DRAWINGS HAVE BEEN ESTIMATED USING THE GEOTECHINICAL REPORT. ACTURAL ELEVATIONS OF FOUNDATION ELEMENT BOTTOMS WILL BE DETERMINED BY FIELD CONDITIONS.

REINFORCED CONCRETE

1. PROVIDE THE FOLLOWING MINIMUM 28 DAY CONCRETE COMPRESSIVE STRENGTHS, U.O.N. ON DRAWINGS:
   - I. SLAB & BEAM 5,000 - 6,000 PSI
   - II. PILE CAP 5,000 PSI
   - III. COLUMN & SHEAR WALL 5,000 PSI
   - V. OTHER 4,000 PSI

2. ALL EXPOSED CONCRETE SHALL HAVE AN AIR ENTRAINING AGENT. ALL ARCHITECTURAL EXPOSED CONCRETE TO BE WATERPROOFED BY ADDING HYCRETE OR APPROVED EQUAL.

3. ALL REINFORCING STEEL SHALL CONFORM TO:
   - I. DEFORMED BARS ASTM A615, GRADE 60
   - II. WELDED WIRE FABRIC ASTM A185
   - III. WELDED DEFORMED WIRE FABRIC ASTM A497, GRADE 60

4. REINFORCING STEEL SHALL HAVE A MIN. CLEAR COVER AS FOLLOWS:
   - I. CONCRETE POURED AGAINST EARTH 3"
   - II. CONCRETE EXPOSED TO EARTH OR WEATHER:
     - #5 OR SMALLER 1½"
     - #6 OR LARGER 2"
   - III. CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH EARTH:
     - COLUMNS, BEAMS 1½"
     - SLABS, WALLS AND JOISTS:
       - #14 OR #18 BARS1½"
       - #11 OR SMALLER ¾"

   INDICATE ALL CONCRETE COVER ON THE SHOP DRAWINGS SUBMITTED FOR REVIEW.

5. STRUCTURAL CONCRETE AND CONCRETING PRACTICES SHALL CONFORM WITH ACI-318, "AMERICAN CONCRETE INSTITUTE, BUILDING CODE FOR REINFORCED CONCRETE." DETAILS SHALL BE IN ACCORDANCE WITH ACI-135, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" UNLESS OTHERWISE NOTED ON THE DRAWINGS. CONCRETE TESTS FOR THE PRELIMINARY DESIGN MIX PREPARED BY AN APPROVED LABORATORY MUST BE SUBMITTED TO THE ENGINEER. NO CONCRETE TO BE PLACED BEFORE THIS IS APPROVED BY THE ENGINEER.

6. ALL REINFORCEMENT SHALL BE SECURELY HELD IN PLACE WHILE PLACING CONCRETE. IF REQUIRED, ADDITIONAL BARS OR STIRRUPS SHALL BE PROVIDED BY THE CONTRACTOR TO FURNISH SUPPORT FOR ALL BARS. THE ENGINEER OR HIS FIELD QUALIFIED REPRESENTATIVE MUST CHECK AND APPROVE ALL STEEL REINFORCEMENT PRIOR TO CONCRETE PLACEMENT.

7. NO CONCRETE TEST WILL BE ACCEPTED IF CONCRETE IS TAMPERED WITH IN ANY WAY AFTER SAID TEST IS PERFORMED. REPEAT TEST IF WATER IS ADDED AFTER INITIAL SAMPLING.

8. THE CONTRACTOR SHALL PROVIDE REINFORCING STEEL ERECTOR WITH A SET OF STRUCTURAL PLANS FOR FIELD USE.

9. ALL ADJOINING SURFACES NOT CAST MONOLITHICALLY SHALL BE ROUGHENED TO 1/4 INCH AMPLITUDE FOR THE ENTIRE INTERSECTING SURFACE ACCORDING TO ACI RECOMMENDATIONS.

10. CONTRACTOR SHALL USE RIGID TEMPLATES TO INSTALL ANCHOR BOLTS.

11. CONCRETE FOR NON-STRUCTURAL FILL SHALL BE REINFORCED WITH 6X6-W1.4XW1.4 W.W.F.

12. TEMPORARY SHORING AND RESHORING SHALL REMAIN IN PLACE AT LEAST 28 DAYS AFTER PLACEMENT OF CONCRETE.

13. ALL WELDED WIRE FABRIC REINFORCEMENT SHALL CONFORM TO ASTM A-185, GRADE 65.

14. PROVIDE CHAIRS FOR WELDED WIRE FABRIC TO INSURE PROPER POSITION DURING CONCRETE PLACEMENT.

15. PROVIDE LAP SPLICES FOR REINFORCING BARS AS SHOWN ON THE DRAWINGS. WHERE NOT SPECIFICALLY INDICATED, USE TENSION LAP SPLICE LENGTHS WITH APPICABLE MODIFICATION FACTORS. LOCATE SPLICES AS PER RECOMMENDATIONS OF ACI 135 AND INDICATE ON SHOP DRAWINGS SUBMITTED FOR REVIEW.

16. PROVIDE CONSTRUCTION JOINTS IN ACCORDANCE WITH ACI 318. INDICATE JOINT LOCATIONS AND POUR SEQUENCE ON THE SHOP DRAWINGS.

17. NO HORIZONTAL JOINT WILL BE PERMITTED IN THE BEAMS, WALLS AND SLABS U.O.N. ON THE WINGS AT THE SPECIFIC LOCATION. VERTICAL CONSTRUCTION JOINTS WILL BE LOCATED AT LEAST FOUR FEET AWAY FROM ANY COLUMN LINE OR WALL OPENING IN FOUNDATION WALLS.

18. INSTALL ALL SLEEVES, INSERTS, FLOOR DRAINS, ETC. PROVIDED BY THE SUBCONTRACTOR BEFORE PLACING CONCRETE.

19. PROVIDE AT LEAST 1" (U.O.N.) SEPARATION USING HIGH DENSITY STYROFOAM WHEN PLACING CONCRETE AGAINST AN ADJACENT EXISTING STRUCTURE.

20. DO NOT INSTALL ANY CONCRETE FLOOR SYSTEM UNTIL AT LEAST TWO HOURS HAVE PASSED AFTER THE SUPPORTING COLUMNS AND WALLS ARE PLACED.

21. MEANS AND METHODS FOR SHORING CONCRETE ELEMENTS ARE TO BE DESIGNED BY THE CONTRACTORS ENGINEER LICENSED IN THE STATE OF NEW YORK.

22. CANTILEVERED CORNERS ARE TO REMAIN SHORED BY MEANS OF "STAY-IN-PLACE" PRE-SHORE CUTOUTS OR A SIMILAR METHOD. CONTRACTOR SHALL SUBMIT SHORING PLANS, SIGNED AND SEALED BY THEIR LICENSED PROFESSIONAL ENGINEER FOR REVIEW.

23. ADDITIONAL SHORING MAY BE REQUIRED AT HOIST PLATFORMS, BRIDGING, ETC. CONTRACTOR TO SUBMIT PLANS, DETAILS AND CALCULATIONS FOR SUCH LOCATIONS, SIGNED & SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK.

24. PIPES OR CONDUITS PLACED WITHIN THE SLAB SHALL NOT HAVE A DIAMETER GREATER THAN ⅓ SLAB THICKNESS OR 2 INCHES. THEIR SPACING SHALL NOT BE CLOSER THAN 3X DIAMETER OF CONDUIT AND NO CONDUIT SHALL BE PLACED WITHIN 12 INCHES OF A COLUMN FACE. ALUMINUM CONDUITS ARE NOT ALLOWED.

25. SIZE OF JUNCTION BOXES PLACED WITHIN THE CONCRETE SHALL BE LIMITED TO 4½"x4½"x3½" DEEP AND SEPARATED BY NOT LESS THAN 8 INCHES.

COLD FORM METAL FRAMING

1. DESIGN, FABRICATION, AND ERECTION SHALL CONFORM TO AISC 'SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS', LATEST EDITION.

2. ALL STUDS AND/OR JOISTS AND ACCESSORIES SHALL BE OF THE TYPE, SIZE, STEEL THICKNESS AND SPACING SHOWN ON THE PLANS. STUDS, RUNNERS (TRACK), BRACING AND BRIDGING SHALL BE MANUFACTURED PER ASTM SPECIFICATION C 955.

3. ALL GALVANIZED STUDS, JOISTS AND ACCESSORIES, 16 GAGE OR HEAVIER, SHALL BE FORMED FROM STEEL THAT CONFORMS TO THE REQUIREMENTS OF ASTM A653 WITH A YIELD OF 50 KSI.

4. ALL GALVANIZED STUDS, JOISTS AND ACCESSORIES, 18 GAGE OR LIGHTER, SHALL BE FORMED FROM STEEL THAT CONFORMS TO THE REQUIREMENTS OF ASTM A653 WITH A YIELD OF 33 KSI MINIMUM.

5. PHYSICAL PROPERTIES AND ALLOWABLE LOAD CAPABILITIES OF MEMBERS SHALL BE DEVELOPED IN ACCORDANCE WITH AISI, "NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS", LATEST EDITION.

6. ALL COMPONENTS TO BE ZINC COATED WITH A MINIMUM G-60 COATING.

7. THE USE OF A CUTTING TORCH IN THE FIELD WILL NOT BE PERMITTED.

8. ALL SCREWS SHALL BE HILTI KWIK BOLT II #10-16 H.W.H. STANDARD SELF-DRILLING SCREWS (OR APPROVED EQUAL), U.O.N.

9. PROVISIONS SHALL BE MADE FOR CONNECTIONS OF OTHER TRADES INCLUDING CUTTING AND PUNCHING OF STRUCTURAL MEMBERS, WHERE REQUIRED BY THE DRAWING OR FOR WHICH INFORMATION IS FURNISHED PRIOR TO FABRICATION.

10. ALL SCREWS SHALL HAVE A MINIMUM SPACING OF 1" O.C. AND A MINIMUM EDGE DISTANCE OF 1/2".

11. ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.3 SPECIFICATIONS.

12. ALL WELDERS TO BE LICENSED BY THE N.Y.C. BUILDING DEPT.

13. ALL WELDS SHALL BE VISUALLY INSPECTED.

14. ALL POWER ACTUATED FASTENERS (P.A.F.) SHALL BE TYPE X-ALH 0.177" ø AS MANUFACTURED BY HILTI OR APPROVED EQUAL. PROVIDE THE FOLLOWING MINIMUM FASTENING DISTANCES:

	STEEL
EDGE DISTANCE:	1/2"
FASTENER SPACING:	1-1/2"
PENETRATION:	1/2" MAX.

STRUCTURAL STEEL NOTES

1. ALL SQUARE AND RECTANGULAR TUBING MEMBERS SHALL CONFORM TO ASTM STANDARD A 500 WITH A MINIMUM YIELD STRENGTH OF 46 KSI UNLESS SPECIFICALLY INDICATED OTHERWISE ON THE DRAWINGS.

2. ALL CHANNELS, ANGLES, BASE PLATES, GUSSET PLATES, AND COLUMN CAP PLATES SHALL CONFORM TO ASTM STANDARD A36 UNLESS OTHERWISE NOTED.

3. SHOP AND FIELD CONNECTIONS NOT SPECIFICALLY DETAILED ON THE DRAWINGS MAY BE BOLTED OR WELDED.

4. ALL STEEL DETAILS AND CONNECTIONS SHALL BE IN ACCORDANCE WITH THE AISC SPECIFICATIONS, LATEST EDITION.

5. ALL WELDING SHALL BE PERFORMED BY QUALIFIED WELDERS IN ACCORDANCE WITH A.W.S. SPECIFICATIONS, LATEST EDITION. ALL WELDING ELECTRODES SHALL CONFORM TO A.W.S. A5.1 GRADE E70. BARE ELECTRODES AND GRANULAR FLUX SHALL CONFORM TO A.W.S. A5.17, F70 A.W.S. FLUX CLASSIFICATION.

6. CUTS, HOLES, COPES, ETC. REQUIRED FOR WORK OF OTHER TRADES SHALL BE SHOWN ON THE SHOP DRAWINGS AND MADE IN THE SHOP. CUTS OR BURNING OF HOLES IN STRUCTURAL STEEL MEMBERS IN THE FIELD WILL NOT BE PERMITTED.

7. ALL ANCHOR BOLTS SHALL CONFORM TO ASTM F1554 UNLESS OTHERWISE NOTED.

8. ALL FIELD SPLICES AND CONNECTIONS SHALL BE WELDED OR BOLTED USING HIGH STRENGTH BOLTS.

9. SPLICES SHALL BE DESIGNED TO DEVELOP THE FULL CAPACITY OF THE MEMBER AT THE POINT OF SPLICE UNLESS OTHERWISE NOTED. MEMBERS SHALL NOT BE SPLICED AT THE POINTS OF MAXIMUM STRESS.

10. PROVIDE TEMPORARY BRACING OR GUYS TO PROVIDE LATERAL SUPPORT FOR UNTIL PERMANENT NEW STRUCTURE CONCRETE SLABS, ARE INSTALLED.

11. ALTERNATE CONNECTION DETAILS MAY BE USED IF SUCH DETAILS ARE SUBMITTED TO THE ENGINEER FOR REVIEW AND ACCEPTANCE IS GRANTED; HOWEVER, THE ENGINEER SHALL BE THE SOLE JUDGE OF ACCEPTABILITY AND THE CONTRACTORS BID SHALL INCLUDE THE COST OF THOSE SPECIFIC DETAILS SHOWN ON THE DRAWINGS. IN ANY EVENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ANY ALTERNATE DETAILS WHICH HE PROPOSES. THE CONTRACTOR SHALL INCORPORATE THE APPROVED ALTERNATE DETAIL AT NO EXTRA COST TO THE OWNER.

12. THE STRUCTURAL STEEL CONTRACTOR SHALL COORDINATE THE BOTTOM OF BASE PLATE ELEVATION WITH THE TOP OF FOOTING PIER, AND TOP OF WALL ELEVATION. IN CASE OF CONFLICT, THE CONTRACTOR SHALL MAKE ALLOWANCE IN HIS BID FOR THE MOST STRINGENT REQUIREMENTS.

13. FILLER BEAMS SHALL BE SPACED EQUALLY BETWEEN ESTABLISHED DIMENSIONS UNLESS OTHERWISE NOTED.

14. ALL WELDS NOT SPECIFICALLY CALLED OUT SHALL BE AT LEAST THE MINIMUM WELD SIZE AS SPECIFIED BY THE AISC MANUAL OF STEEL DESIGN, LATEST EDITION.

15. THE CONTRACTOR SHALL COORDINATE OPENING SIZES AND LOCATIONS IN THE FLOORS AND ROOF WITH THE ARCHITECTURAL AND MECHANICAL DRAWINGS, AND SHALL PROVIDE OPENING REINFORCEMENT AS REQUIRED.

16. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL AND MECHANICAL DRAWINGS AND DRAWINGS RELATING TO OTHER TRADES. THE CONTRACTOR SHALL BE RESPONSIBLE TO CHECK AND COORDINATE DIMENSIONS, CLEARANCES, ETC. WITH THE WORK OF OTHER TRADES.

17. WORK NOT INDICATED ON A PART OF THE DRAWINGS BUT REASONABLY IMPLIED TO BE SIMILAR TO THAT SHOWN AT CORRESPONDING LOCATIONS SHALL BE REPEATED.

18. REQUIREMENTS SHOWN ON THE ARCHITECTURAL AND MECHANICAL DRAWINGS.

19. ALL STEEL MEMBERS INCLUDING COLUMNS, BEAMS AND ATTACHMENTS FOR SHELF ANGLE SUPPORT AT THE PERIPHERY OF THE BUILDING SHALL BE SHOP PAINTED.

20. ALL STEEL MEMBERS WHICH ARE TO BE ENCASED IN CONCRETE OR TO RECEIVE SPRAYED ON FIREPROOFING SHALL NOT BE PAINTED. ALL OTHER STEEL MEMBERS, PLATES, CONNECTIONS, ACCESSORIES, AND MISCELLANEOUS MATERIAL SHALL RECEIVE ONE COAT OF PAINT, ZINC OR BITUMINOUS COATING OR EQUIVALENT METAL PROTECTION BEFORE ERECTION AS SPECIFIED. PARTS OF STRUCTURAL STEEL LEFT UNPAINTED BECAUSE OF WELDING, OR BOLTING SHALL RECEIVE A FIELD APPLICATION OF METAL PROTECTION.

21. PROVIDE CHARPY V-NOTCH TEST FOR ALL GRADE 50 STEEL THICKER THAN 2".

CONTROLLED INSPECTION

OWNER WILL ENGAGE AND PAY FOR AN INDEPENDENT TESTING AGENCY TO PERFORM THE FOLLOWING INSPECTION AND TESTING. IT IS THE CONTRACTOR'S RESPONSIBILTY TO PROVIDE ADEQUATE PRIOR NOTICE FOR COMPLETION OF SUCH.

1. CONCRETE:
   ALL CONCRETE WORK INCLUDING PRECAST PRE-STRESSED SLAB SHALL BE SUBJECT TO CONTROLLED INSPECTION BY OR UNDER THE DIRECT SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER AS REQUIRED BY SECTION BC-1704.4 OF THE 2008 N.Y.C. BUILDING CODE. TECHNICAL REPORT TR-1 SHALL BE FILED WITH THE BUILDING DEPARTMENT FOR APPROVAL.

   A. THE OWNER SHALL ENGAGE A LICENSED PROFESSIONAL ENGINEER, APPROVED BY THE ENGINEER OF RECORD, TO SUPERVISE THE TESTING OF THE MATERIALS AND THE INSPECTION OF CONCRETE CONSTRUCTION.

   B. THE PRELIMINARY TEST FOR CONTROLLED CONCRETE SHALL BE MADE IN ACCORDANCE WITH SECTION BC-1704.4 OF THE 2008 N.Y.C. BUILDING CODE, AND THE RESULTS FILED ON TECHNICAL REPORT TR-3. NO CONCRETE SHALL BE PLACED BEFORE ACCEPTANCE BY ENGINEER.

   C. QUALITY CONTROL AND INSPECTION OF MATERIALS AND OF BATCHING SHALL BE MADE IN ACCORDANCE WITH SECTION BC-1704.4 OF THE 2008 N.Y.C. BUILDING CODE.

   D. ALL FIELD TESTS AND INSPECTIONS SHALL BE PERFORMED AS REQUIRED SECTION BC-1704.4 OF THE 2008 N.Y.C. BUILDING CODE.

2. SOILS & PILE FOUNDATION
   INSPECT SUBGRADE, SITE PREPARATION AND PILE FOUNDATION PER THE 2008 N.Y.C. BUILDING CODE.

3. STEEL:
   INSPECT WELDING OPERATIONS AND TENSIONING OF HIGH STRENGTH BOLTS PER 2008 N.Y.C. BUILDING CODE.

4. CONCRETE MASONRY (CMU) WALL:
   INSPECT MASONRY WALL CONSTRUCTION AS PER THE REQUIREMENTS OF SECTION 1704.5 OF 2008 N.Y.C. BUILDING CODE.

DESIGN IMPOSED LOADING SCHEDULE (POUNDS PER SQ.FT.)

FLOOR	PARTITION	CEILING & MECH.	FINISH	LIVE	TOTAL IMPOSED
RESIDENTIAL	12	5	-	40	57
ROOF[1]	-	5	25	30	60
MECHANICAL	-	25	-	150	175
PARKING	-	5	-	50	55
LOBBY	-	5	25	100	135
COMMERCIAL	-	5	25	100	135

[1]OR HIGHER SNOW DRIFT LOADS AS APPLICABLE

SNOW, WIND, AND SEISMIC LOADING CRITERIA

1. SNOW LOAD CRITERIA:
   SNOW DESIGN CODE: NYC BUILDING CODE 2008
   GROUND SNOW LOAD, Pg = 25PSF
   FLAT ROOF SNOW LOAD, Pf = 19.25PSF
   SNOW EXPOSURE FACTOR, Ce = 1.0
   THERMAL FACTOR, Ct = 1.0
   SNOW LOAD IMPORTANCE FACTOR, Is = 1.0

2. WIND LOAD CRITERIA:
   WIND DESIGN CODE: NYC BUILDING CODE 2008
   BASIC WIND SPEED: 98 MPH (3-SECOND GUST)
   EXPOSURE CATEGORY: B
   WIND DIRECTIONALITY FACTOR, Kd = 0.85
   VELOCITY PRESSURE COEFFICIENT, Kz = 1.0
   TOPOGRAPHIC FACTOR, Kzt = 1.0
   IMPORTANCE FACTOR: 1.0
   INTERNAL PRESSURE COEFFICIENT, Cpi = +/- 0.18
   COMPONENTS & CLADDING PRESSURE = +/- 30PSF

3. SEISMIC LOAD CRITERIA:
   SEISMIC DESIGN CODE: NYC BUILDING CODE 2008
   SEISMIC USE GROUP I Ie = 1.0
   SPECTRAL RESPONSE COEFFICIENTS Ss = 0.365g S1= 0.071g
   SITE CLASS: D
   SEISMIC DESIGN CATEGORY C
   SEPARATION TO COMPLY WITH TPPN 2/96 (1" PER 50-FT HEIGHT)

MASONRY NOTES

1. CONCRETE MASONRY WORK SHALL CONFORM TO NEW YORK CITY CODE PROVISIONS FOR MASONRY.

2. USE ASTM A-615 GRADE 60 FOR ALL REINFORCING STEEL. PROVIDE LAP SPLICES OF NO LESS THAN 40 BAR DIAMETERS OR 24 INCHES WHICHEVER IS LARGER FOR ALL REINFORCEMENT. REINFORCEMENT MUST BE CONTINUOUS AROUND WALL CORNERS AND AT INTERSECTIONS.

3. ALL CONCRETE MASONRY UNITS SHALL BE LIGHT-WEIGHT HOLLOW CONCRETE MASONRY UNITS, WITH A MINIMUM SPECIFIED COMPRESSION STRENGTH OF MASONRY f'm = 2000 PSI PLACED IN RUNNING BOND.

4. ALL INTERIOR CMU WALLS SHALL HAVE AT LEAST #4@48" O/C VERTICAL REINFORCEMENT (FOR 6" AND 8" WALLS) IN GROUTED CELLS FOR FULL HEIGHT OF WALL. ALL EXTERIOR CMU & FACADE WALLS SHALL HAVE AT LEAST #7@16" O/C. VERTICAL REINF. (FOR 8" WALLS) BELOW THE 3RD FLOOR AND #4@16" O/C VERTICAL REINF. (FOR 6" WALLS) ABOVE THE 3RD FLOOR IN GROUTED CELLS FOR FULL HEIGHT OF WALL.

5. GROUT SHALL CONFORM TO SPECIFICATIONS WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED AS FILLING FOR VERTICAL CAVITIES, BOND BEAMS, LINTELS AND HOLLOW MASONRY UNITS DESIGNATED AS SOLID GROUTED IN THE DESIGN DRAWINGS. GROUT SHALL HAVE A MINIMUM SLUMP OF 8 INCHES.

6. U.O.N. HORIZONTAL REINFORCMENT SHALL BE MIN. OF DUR-O-WAL TRUSS OR LADUR TYPE OR APPROVED EQUAL WITH 2 - 9 GAUGE LONGITUDINAL WIRES AND 9 GAUGE CROSS WIRES AT EVERY OTHER COURSE.

7. REFER TO ARCHITECTURAL DRAWINGS FOR SIZE AND LOCATIONS OF MASONRY WALLS AND FOR DETAILS OF EXPANSION JOINTS AND CONTROL JOINTS.

8. PROVIDE ADDITIONAL #5 BARS ON BOTH SIDE OF CONTROL JOINTS, WINDOW JAMBS, DOOR JAMBS, END OF WALLS, AND CORNER.

9. ALL MASONRY WALLS SHALL BE ANCHORED AT TOP AND BOTTOM. TOP OF WALL SHALL BE ANCHORED WITH CAPACITY OF MINIMUM 200 LB/FT ALONG THE WALL.

ABBREVIATIONS

AB	ANCHOR BOLT
AESS	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL
CJ	CONTROL JOINT
EJ	EXPANSION JOINT
EE	EACH END
EF	EACH FACE
EW	EACH WAY
EOS	EDGE OF SLAB
HSS	HOLLOW STRUCTURAL STEEL
IF	INSIDE FACE
LW	LONG WAY
NFP	NO FIREPROOFING
NTS	NOT TO SCALE
OC	ON CENTER
SIM.	SIMILAR
SOG	SLAB ON GRADE
STL	STEEL
T&B	TOP AND BOTTOM
TOC	TOP OF CONCRETE
TOS	TOP OF SLAB
TOSTL	TOP OF STEEL
TOW	TOP OF WALL
UON	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
WP	WORKING POINT
WWF	WELDED WIRE FABRIC

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

M

NYCT OUTSIDE CONTRACT INSURANCE REQUIREMENTS:

1. THE PERMITTEE AT ITS SOLE COST AND EXPENSE SHALL CARRY OR CAUSE TO CARRIED AND SHALL MAINTAIN AT ALL TIMES DURING THE PERIOD OF PERFORMANCE UNDER THIS AGREEMENT POLICIES OF INSURANCE AS HEREIN BELOW SET FORTH BELOW:

   A. WORKERS' COMPENSATION INSURANCE (INCLUDING EMPLOYER'S LIABILITY INSURANCE) WITH LIMITS OF NOT LESS THAN $2,000,000, WHICH LIMIT MAY BE MET BY A COMBINATION OF PRIMARY AND EXCESS INSURANCE MEETING THE STATUTORY LIMITS OF NEW YORK STATE. THE POLICY SHALL BE ENDORSED TO INCLUDE LONGSHOREMAN'S AND HARBOR WORKERS' COMPENSATION ACT/MARITIME COVERAGE ENDORSEMENT AND/OR JONES ACT ENDORSEMENT WHEN APPLICABLE.

   B. COMMERCIAL GENERAL LIABILITY INSURANCE (I.S.O. 2001 FORM OR EQUIVALENT) APPROVED BY PERMITTOR IN THE PERMITTEE'S NAME WITH LIMITS OF LIABILITY IN THE AMOUNT OF AT LEAST $3,000,000 FOR EACH OCCURRENCE ON A COMBINED SINGLE LIMIT BASIS FOR INJURIES TO PERSONS (INCLUDING DEATH) AND DAMAGE TO PROPERTY, $3,000,000 GENERAL AGGREGATE AND $3,000,000 IN THE AGGREGATE WITH RESPECT TO PRODUCTS/COMPLETED OPERATIONS. THE LIMITS MAY BE PROVIDED IN THE FORM OF A PRIMARY POLICY OR COMBINATION OF PRIMARY AND UMBRELLA/EXCESS POLICY. WHEN THE MINIMUM CONTRACT AMOUNTS CAN ONLY BE MET WHEN APPLYING THE UMBRELLA/EXCESS POLICY, THE UMBRELLA/EXCESS POLICY MUST FOLLOW FORM OF THE UNDERLYING POLICY AND BE EXTENDED TO "DROP DOWN" TO BECOME PRIMARY IN THE EVENT PRIMARY LIMITS ARE REDUCED OR AGGREGATE LIMITS ARE EXHAUSTED. SUCH INSURANCE SHALL BE PRIMARY AND NON-CONTRIBUTORY TO ANY OTHER VALID AND COLLECTIBLE INSURANCE AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE.

   SUCH POLICY SHOULD BE WRITTEN ON AN OCCURRENCE FORM, AND SHALL INCLUDE:
   - CONTRACTUAL COVERAGE FOR LIABILITY ASSUMED BY THE PERMITTEE UNDER THIS AGREEMENT;
   - PERSONAL AND ADVERTISING INJURY COVERAGE:
   - PRODUCTS-COMPLETED OPERATIONS;
   - INDEPENDENT CONTRACTORS COVERAGE;
   - "XCU" COVERAGE (EXPLOSION, COLLAPSE, AND UNDERGROUND HAZARDS) WHERE NECESSARY;
   - CONTRACTUAL LIABILITY EXCLUSION, APPLICABLE TO CONSTRUCTION OR DEMOLITION OPERATIONS TO BE PERFORMED WITHIN 50 FEET OF RAILROAD TRACKS, MUST BE REMOVED, WHERE NECESSARY; AND
   - ADDITIONAL INSURED ENDORSEMENT (I.S.O. FORM CG 20 26 07/04 VERSION OR EQUIVALENT) APPROVED BY THE PERMITTOR NAMING:
     - ** NEW YORK CITY TRANSIT AUTHORITY (NYCTA), THE MANHATTAN AND BRONX SURFACE TRANSIT OPERATING AUTHORITY (MABSTOA), THE STATEN ISLAND RAPID TRANSIT OPERATING AUTHORITY (SIRTOA), MTA CAPITAL CONSTRUCTION CO., THE METROPOLITAN TRANSPORTATION AUTHORITY (MTA) INCLUDING ITS SUBSIDIARIES AND AFFILIATES, AND THE CITY OF NEW YORK (AS OWNER).

   C. BUSINESS AUTOMOBILE LIABILITY INSURANCE POLICY – (I.S.O. FORM CA 00 01 10 01 OR EQUIVALENT) APPROVED BY THE PERMITTOR IS REQUIRED IF PERMITEE'S VEHICLE ENTERS PERMITTOR PROPERTY. THE INSURANCE MUST BE IN THE NAME OF THE PERMITTEE OR ITS CONTRACTOR ENTERING THE PERMITTOR PROPERTY WITH LIMITS OF LIABILITY IN THE AMOUNT OF $2,000,000 EACH ACCIDENT FOR CLAIMS FOR BODILY INJURIES (INCLUDING DEATH) TO PERSONS AND FOR DAMAGE TO PROPERTY ARISING OUT OF THE OWNERSHIP, MAINTENANCE OR USE OF ANY OWNED, HIRED OR NON-OWNED MOTOR VEHICLE.

   D. RAILROAD PROTECTIVE LIABILITY INSURANCE (ISO-RIMA OR EQUIVALENT FORM) APPROVED BY PERMITTOR COVERING THE WORK TO BE PERFORMED AT THE DESIGNATED JOB SITE AND AFFORDING PROTECTION FOR DAMAGES ARISING OUT OF BODILY INJURY OR DEATH, PHYSICAL DAMAGE TO OR DESTRUCTION OF PROPERTY, INCLUDING DAMAGE TO THE INSURED'S OWN PROPERTY AND CONFORMING TO THE FOLLOWING:
   - THE FOLLOWING ARE THE "NAMED INSUREDS" FOR THIS COVERAGE:
     - ** NEW YORK CITY TRANSIT AUTHORITY (NYCTA), THE MANHATTAN AND BRONX SURFACE TRANSIT OPERATING AUTHORITY (MABSTOA), THE STATEN ISLAND RAPID TRANSIT OPERATING AUTHORITY (SIRTOA), MTA CAPITAL CONSTRUCTION CO., THE METROPOLITAN TRANSPORTATION AUTHORITY (MTA) INCLUDING ITS SUBSIDIARIES AND AFFILIATES, AND THE CITY OF NEW YORK (AS OWNER).
   - THE LIMIT OF LIABILITY SHALL BE $2,000,000 AT LEAST EACH OCCURRENCE, SUBJECT TO A $6,000,000 ANNUAL AGGREGATE;
   - POLICY ENDORSEMENT CG 28 31 – POLLUTION EXCLUSION AMENDMENT IS REQUIRED TO BE ENDORSED ONTO THE POLICY WHEN ENVIRONMENTAL-RELATED WORK AND/OR EXPOSURES EXIST.
   - INDICATE THE NAME AND ADDRESS OF THE CONTRACTOR TO PERFORM THE WORK, THE CONTRACT # AND THE NAME OF THE RAILROAD PROPERTY WHERE THE WORK IS BEING PERFORMED AND THE AGENCY PERMIT.
   - EVIDENCE OF RAILROAD PROTECTIVE LIABILITY INSURANCE, MUST BE PROVIDED IN THE FORM OF THE ORIGINAL POLICY, A DETAILED INSURANCE BINDER (ACORD OR MANUSCRIPT FORM) WILL BE ACCEPTED PENDING ISSUANCE OF THE ORIGINAL POLICY, WHICH MUST BE PROVIDED WITHIN 30 DAYS OF THE BINDER APPROVAL.

   E. ENVIRONMENTAL/POLLUTION EXPOSURES
   IN THE EVENT ENVIRONMENTAL OR POLLUTION EXPOSURES EXIST; THE PERMITTEE SHALL REQUIRE THE ENVIRONMENTAL CONTRACTOR OR SUB-CONTRACTOR TO PROVIDE THE APPLICABLE INSURANCE COVERING SUCH EXPOSURE. THE LIMITS AND TYPE OF INSURANCE PROVIDED SHALL BE SATISFACTORY TO THE PERMITTOR AND WILL BE CONFIRMED TO THE PARTIES PRIOR TO THE START OF THE WORK.

2. GENERAL REQUIREMENTS APPLICABLE TO INSURANCE POLICIES

   A. ALL OF THE INSURANCE REQUIRED BY THIS ARTICLE SHALL BE WITH COMPANIES LICENSED OR AUTHORIZED TO DO BUSINESS IN THE STATE OF NEW YORK WITH AN A.M. BEST COMPANY RATING OF NOT LESS THAN A--/VII OR BETTER AND REASONABLY APPROVED BY THE PERMITTOR/MTA AND SHALL DELIVER EVIDENCE OF SUCH POLICIES.

   B. EXCEPT FOR WORKERS COMPENSATION, ALL REFERENCES TO FORMS AND COVERAGES REFERRED TO ABOVE SHALL BE THE MOST RECENT USED BY THE INSURANCE SERVICES OFFICE, INC. ("ISO") OR EQUIVALENT FORMS APPROVED BY THE INSURANCE DEPARTMENT OF THE STATE OF NEW YORK, PROVIDED, HOWEVER, THAT EXCESS COVERAGES MAY BE WRITTEN ON FORMS REASONABLY ACCEPTABLE TO PERMITTOR CONTAINING PROVISIONS OTHER THAN THOSE CONTAINED IN ISO FORMS BUT OTHERWISE CONFORMING IN SUBSTANCE TO THE REQUIREMENTS OF THIS ARTICLE.

   C. THE PERMITTEE OR ITS CONTRACTOR PERFORMING THE WORK SHALL FURNISH EVIDENCE OF ALL POLICIES BEFORE ANY WORK IS STARTED TO THE PERMITTOR:

   FOR NYCT CONTRACT INSPECTION
   C/O MR. JOHN MALVASIO
   DIRECTOR, MOW ENGINEERING
   130 LIVINGSTON STREET, ROOM 8044F
   BROOKLYN, NY 11201
   TELEPHONE: (718) 694-1358

   THESE POLICIES MUST: (I) BE WRITTEN IN ACCORDANCE WITH THE REQUIREMENTS OF THE PARAGRAPHS ABOVE, AS APPLICABLE; (II) BE ENDORSED IN FORM ACCEPTABLE TO INCLUDE A PROVISION THAT THE POLICY WILL NOT BE CANCELED, MATERIALLY CHANGED, OR NOT RENEWED, UNLESS OTHERWISE INDICATED HEREIN, AT LEAST THIRTY (30) DAYS PRIOR WRITTEN NOTICE TO THE PERMITTOR C/O MTA RISK AND INSURANCE MANAGEMENT DEPARTMENT – STANDARDS, ENFORCEMENT & CLAIMS UNIT, 2 BROADWAY – 21ST FLOOR, NEW YORK, NY 10004; AND (III) STATE OR BE ENDORSED TO PROVIDE THAT THE COVERAGE AFFORDED UNDER THE CONTRACTOR'S POLICIES SHALL APPLY ON A PRIMARY AND NOT ON AN EXCESS OR CONTRIBUTING BASIS WITH ANY POLICIES WHICH MAY BE AVAILABLE TO THE PERMITTOR/MTA, AND ALSO THAT THE CONTRACTOR'S POLICIES, PRIMARY AND EXCESS, MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. (IV) IN ADDITION, CONTRACTOR'S POLICIES SHALL STATE OR BE ENDORSED TO PROVIDE THAT, IF A SUBCONTRACTOR'S POLICY CONTAINS ANY PROVISION THAT MAY ADVERSELY AFFECT WHETHER CONTRACTOR'S POLICIES ARE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE, CONTRACTOR'S AND SUBCONTRACTOR'S POLICIES SHALL NEVERTHELESS BE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. EXCEPT FOR PROFESSIONAL LIABILITY, POLICIES WRITTEN ON CLAIMS MADE BASIS ARE NOT ACCEPTABLE. AT LEAST TWO (2) WEEKS PRIOR TO THE EXPIRATION OF THE POLICIES, CONTRACTOR SHALL ENDEAVOR TO PROVIDE EVIDENCE OF RENEWAL OR REPLACEMENT POLICIES OF INSURANCE, WITH TERMS AND LIMITS NO LESS FAVORABLE THAN THE EXPIRING POLICIES. EXCEPT AS OTHERWISE INDICATED IN THE DETAILED COVERAGE PARAGRAPHS BELOW, SELF INSURED RETENTIONS AND POLICY DEDUCTIBLES SHALL NOT EXCEED $100,000, UNLESS SUCH INCREASED DEDUCTIBLE OR RETENTION IS APPROVED BY PERMITTOR/MTA. THE PERMITTEE SHALL BE RESPONSIBLE FOR ALL CLAIM EXPENSE AND LOSS PAYMENTS WITHIN THE DEDUCTIBLE OR SELF-INSURED RETENTION. THE INSURANCE MONETARY LIMITS REQUIRED HEREIN MAY BE MET THROUGH THE COMBINED USE OF THE INSURED'S PRIMARY AND UMBRELLA/EXCESS POLICIES.

   D. CERTIFICATES OF INSURANCE MAY BE SUPPLIED AS EVIDENCE OF POLICIES OF THE ABOVE POLICIES, EXCEPT THE RAILROAD PROTECTIVE LIABILITY POLICY, DESIGNATED AS POLICY D. HOWEVER, IF REQUESTED BY THE PERMITTOR, THE PERMITTEE SHALL DELIVER TO THE AUTHORITY, WITHIN FORTY-FIVE (45) DAYS OF THE REQUEST, A COPY OF SUCH POLICIES, CERTIFIED BY THE INSURANCE CARRIER AS BEING TRUE AND COMPLETE. THE RAILROAD PROTECTIVE LIABILITY INSURANCE POLICY MUST BE PROVIDED IN THE FORM OF THE ORIGINAL POLICY. A DETAILED INSURANCE BINDER MAY BE PROVIDED, ACORD OR MANUSCRIPT FORM, PENDING ISSUANCE OF THE ORIGINAL POLICY. THE ORIGINAL POLICY MUST BE SUBMITTED TO MTA RIM WITHIN 30 DAYS OF THE BINDER APPROVAL.

   E. IF A CERTIFICATE OF INSURANCE IS SUBMITTED, IT MUST: (1) BE PROVIDED ON THE PERMITTOR CERTIFICATE OF INSURANCE FORM OR MTA CERTIFICATE OF INSURANCE FORM FOR JOINT AGENCY AGREEMENTS; (2) BE SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE CARRIER OR PRODUCER AND NOTARIZED; (3) DISCLOSE ANY DEDUCTIBLE, SELF-INSURED RETENTION, SUB-LIMIT, AGGREGATE LIMIT OR ANY EXCLUSIONS TO THE POLICY THAT MATERIALLY CHANGE THE COVERAGE; (4) INDICATE THE ADDITIONAL INSUREDS AND NAMED INSUREDS AS REQUIRED HEREIN, ALONG WITH A PHYSICAL COPY OF THE ADDITIONAL INSURED ENDORSEMENT (I.S.O. FORM CG 20 26 07/04 VERSION OR EQUIVALENT), AS APPLICABLE AND THE ENDORSEMENT(S) MUST INCLUDE POLICY NUMBER(S); (5) REFERENCE THE CONTRACT BY NUMBER ON THE FACE OF THE CERTIFICATE; AND (6) EXPRESSLY REFERENCE THE INCLUSION OF ALL REQUIRED ENDORSEMENTS.

   F. THE MINIMUM AMOUNTS OF INSURANCE REQUIRED IN THE DETAIL DESCRIPTION OF POLICIES A, B C, AND D ABOVE SHALL NOT BE CONSTRUED TO LIMIT THE EXTENT OF THE PERMITTEE'S LIABILITY UNDER THIS AGREEMENT.

   G. IF, AT ANY TIME DURING THE PERIOD OF THIS AGREEMENT, INSURANCE AS REQUIRED IS NOT IN EFFECT, OR PROOF THEREOF IS NOT PROVIDED TO THE PERMITTOR, THE PERMITTOR SHALL HAVE THE OPTIONS TO: (I) DIRECT THE PERMITTEE TO SUSPEND WORK OR OPERATION WITH NO ADDITIONAL COST OR EXTENSION OF TIME DUE ON ACCOUNT THEREOF; OR (II) TREAT SUCH FAILURE AS AN EVENT OF DEFAULT.

NYC TRANSIT AUTHORITY GENERAL NOTES:

NOTE: THE APPROPRIATE NOTES ARE TO BE MADE PART OF THE PROJECT'S CONTRACT DRAWINGS.

1. THE NYC TRANSIT (NYCT) RESERVES THE RIGHT TO PLACE INSPECTORS, FLAGMEN OR OTHER PERSONNEL IN THE SUBWAY STRUCTURES DURING CONSTRUCTION OF THE PROJECT LINKED BY A TELEPHONE SYSTEM, IF DEEMED NECESSARY, TO OBSERVE THE EFFECTS OF THE CONSTRUCTION ON THE TRANSIT FACILITIES. NYCT FURTHER RESERVES THE RIGHT TO PLACE SUCH PERSONNEL WHENEVER, IN ITS OPINION, THE PROJECT CONDITIONS WARRANT SUCH PLACEMENT, REGARDLESS OF DISTANCE. THE COST OF SUCH PERSONNEL, TELEPHONE INSTALLATION AND ANY RE-ROUTES, DIVERSIONS OF SERVICE, WORK TRAINS, ETC., MADE NECESSARY BY THE PROJECT, MUST BE BORNE BY THE PROJECT OR THE RESPONSIBLE NEW YORK CITY/STATE AGENCY.

2. ALL ROCK EXCAVATION ADJACENT TO THE TRANSIT STRUCTURE IS TO BE CHANNEL DRILLED TWO FEET BELOW SUBGRADE.

3. IF TOP OF ROCK IS FOUND BELOW SUBWAY STRUCTURE, THE SUBWAY STRUCTURE MUST BE UNDERPINNED IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO NYCT FOR APPROVAL.

4. IF ROCK IS SOFT OR SEAMY, LATERAL SUPPORTS MUST BE PROVIDED BELOW THE SUBWAY STRUCTURE IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO NYCT FOR APPROVAL.

5. BLASTING WILL BE PERMITTED ONLY WITH LIGHT CHARGES SUBJECT TO THE APPROVAL OF NYCT'S ENGINEER AND IN ACCORDANCE WITH THE REGULATIONS OF THE FIRE DEPARTMENT. THE CONTRACTOR SHALL PROVIDE A DETAILED MONITORING PLAN, PROVIDING FOR MEASUREMENTS OF BOTH PARTICLE VELOCITY AND DISPLACEMENTS AT CRITICAL LOCATIONS OF THE NYCT STRUCTURE. THE MONITORING PLAN SHALL INCLUDE THRESHOLD AND UPSET LEVELS OF BOTH PARTICLE VELOCITY AND SETTLEMENT TOGETHER WITH AN ACTION PLAN FOR THEIR IMPLEMENTATION. THE CONTRACTOR SHALL SECURE AN APPROVED SEISMOLOGIST TO INSTALL AND OPERATE SUITABLE VELOCITY GAUGES TO CONTINUOUSLY MONITOR PARTICLE VELOCITY AND AN INDEPENDENT LICENSED SURVEYOR TO MONITOR DISPLACEMENTS. THE PRESENCE OF A QUALIFIED PHYSICIAN FROM MONITORING COMPANY IS NECESSARY TO PROVIDE THE VIBRATION READING UPON REQUEST OF NYCT ENGINEER. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE BLASTING WILL BE 0.5 INCH PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THE UPSET LEVEL OF 2.0 INCHES PER SECOND.

6. BEFORE PLACING CONCRETE, THE SUBGRADE OF THE FOUNDATIONS IN THE VICINITY OF THE SUBWAY STRUCTURE IS TO BE INSPECTED AND APPROVED BY NYCT'S ENGINEER.

7. IF ANY PORTION OF THE SUBWAY STRUCTURE OR FINISH IS DAMAGED, IT SHALL BE REPAIRED OR REPLACED WITH THE SAME MATERIALS IN PLACE, SUBJECT TO THE APPROVAL OF NYCT'S ENGINEER AND AT THE EXPENSE OF THE PROJECT.

8. EXCAVATION EMBANKMENTS ARE TO BE SHORED AND BRACED. DRAWINGS INDICATING A SUGGESTED METHOD OF CONSTRUCTION ARE TO BE SUBMITTED TO NYCT FOR APPROVAL IN CONJUNCTION WITH THE PROJECT'S CONTRACT DRAWINGS. IN CASE OF EXCAVATION UNDERMINING THE SUBWAY STRUCTURE, UNDERPINNING MAY BE REQUIRED. DRAWINGS FOR UNDERPINNING ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

9. TEMPORARY SHORING MAY BE PLACED IN DIRECT CONTACT WITH NYCT STRUCTURES ONLY IF THE NYCT STRUCTURE IS SHOWN TO BE ABLE TO SUPPORT ALL ANTICIPATED LOADS THAT CAN BE TRANSFERRED THROUGH THE TEMPORARY STRUCTURES WITHOUT DAMAGING THE EXISTING STRUCTURE. AT THE COMPLETION OF THE PROJECT, THESE TEMPORARY SHORING AND BRACING SYSTEMS ARE TO BE REMOVED OR CUT-OFF AS APPROVED BY NYCT.

10. WHEN PILES ARE TO BE DRIVEN OR DRILLED ADJACENT TO THE SUBWAY STRUCTURE, BORING DATA, PILE LAYOUTS, SPECIFICATIONS AND INSTALLATION PROCEDURES ARE TO BE SUBMITTED TO NYCT FOR APPROVAL. VELOCITY METERS ARE TO BE INSTALLED IN THE SUBWAY TUNNEL AT CRITICAL LOCATIONS TO MONITOR INDUCED VIBRATIONS. INDUCED DISPLACEMENTS ALONG THE TUNNEL STRUCTURE AND TRACK INVERT ARE TO BE MONITORED DURING DRIVING OR DRILLING. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE DRIVING OR DRILLING WILL BE 0.5 INCH PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THE UPSET LEVEL OF 2.0 INCHES PER SECOND.

11. NO PILES ARE PERMITTED TO BE INSTALLED BY ANY METHOD WITHIN THREE FEET OF SUBWAY STRUCTURE, MEASURED FROM THE EDGE OF THE PILE OR CASING TO THE WALL. CLOSED-END PILES WILL NOT BE PERMITTED TO BE DRIVEN WITHIN TEN FEET OF THE SUBWAY STRUCTURE.

12. ALL PILES ARE TO BE PLACED WITHIN A PREAUGERED CASED HOLE TO THE INFLUENCE LINE. THE CASING SHALL BE CLEANED WITHOUT DISTURBING THE SOIL OUTSIDE THE CASING AND THE PILE TO BE PLACED WITHIN THE CASING FOR INSTALLATION. THE PILES MAY THEN BE DRIVEN BEYOND THE INFLUENCE LINE WITHIN THE CASING.

13. THE INFLUENCE LINE SHALL START AT THE BOTTOM OF THE SUBWAY STRUCTURE AND EXTEND FROM 1H:1V TO 2H:1V SLOPE DEPENDING ON THE SOIL PROPERTIES AND GROUND WATER TABLE. FOR PILES INSTALLED WITHIN TEN FEET OF THE SUBWAY STRUCTURE, THE CASING SHALL BE EXTENDED UP TO THE BOTTOM OF THE SUBWAY STRUCTURE.

14. ALL PILES ARE TO BE DRIVEN OR DRILLED A MINIMUM OF TEN FEET BELOW THE INTERSECTION OF THE PILE CENTERLINE AND THE INFLUENCE LINE OF THE SUBWAY STRUCTURE.

15. THE USE OF 'DOWN-THE-HOLE -HAMMERS' FOR INSTALLATION OF PILES THROUGH OVERBURDEN AND FILL WILL BE PERMITTED ONLY TO REMOVE BOULDERS. IT WILL NOT BE PERMITTED AS A MATTER OF COURSE TO ADVANCE THE HOLE. THEIR USE TO CONSTRUCT ROCK SOCKETS WILL NOT BE ALLOWED WITHIN 5 FEET OF THE NYCT STRUCTURE. THE USE OF MACHINE UTILIZING AIR FOR SOIL REMOVAL WILL NOT BE ALLOWED.

16. VIBRATORY HAMMERS WILL NOT BE PERMITTED WITHIN 75 FEET OF SUBWAY STRUCTURES. HOERAMS WILL NOT BE PERMITTED WITHIN 25 FEET OF SUBWAY STRUCTURES.

17. DYNAMIC COMPACTION METHODS USING DROPPED HEAVY WEIGHTS CANNOT BE CONDUCTED WITHIN 1000 FEET OF ANY NYCT STRUCTURE UNLESS IT IS SHOWN THAT INDUCED SETTLEMENTS AND VIBRATIONS WILL NOT DAMAGE THESE STRUCTURES. A SUITABLE MONITORING PLAN INCLUDING SETTLEMENT AND VIBRATION MEASUREMENTS MUST BE APPROVED BY NYCT'S ENGINEER FOR ALL SUCH OPERATIONS WITHIN THESE DISTANCES.

18. THERE SHALL BE NO MACHINE EXCAVATION WITHIN 3 FEET OF NYCT STRUCTURES, POWER DUCT LINES, OR ANY OTHER FACILITIES UNTIL THEY HAVE BEEN CAREFULLY EXPOSED BY HAND EXCAVATION.

19. ALL DEWATERING OPERATIONS CONDUCTED WITHIN 500 FEET OF THE NYCT STRUCTURE MUST BE PERFORMED IN ACCORDANCE WITH DRAWINGS AND PROCEDURES SUBMITTED TO NYCT FOR APPROVAL. THE DISTANCE FROM THE STRUCTURE TO THE DEWATERING OPERATION CAN BE REDUCED PROVIDED THAT SOIL CONDITIONS AT THE SITE INDICATE THAT THE RADIUS OF INFLUENCE OF THE DEWATERING IS LESS THAN 500 FEET. FOR DEWATERING WITHIN THE RADIUS OF INFLUENCE, THE DEWATERING PROGRAM MUST BE SHOWN TO HAVE NEGLIGIBLE INFLUENCE ON SETTLEMENTS OF THE NYCT STRUCTURE.

20. SUBWAY ENTRANCES (VENTILATORS, ETC.) ARE TO BE UNDERPINNED OR SHORED AND BRACED IF DIRECTED BY NYCT'S ENGINEER.

21. NYCT, AT ITS DISCRETION, RESERVES THE RIGHT TO REQUIRE THE PROJECT TO CLOSE OR MAINTAIN AND PROTECT EXISTING SUBWAY ENTRANCES, VENTILATORS, ETC. ADJACENT TO THE PROJECT DURING CONSTRUCTION. SUCH CONSTRUCTION MAY INCLUDE UNDERPINNING, SHORING, BRACING AND ERECTION OF SUITABLE BARRICADES AND/OR CANOPIES AND SHIELDS. SUCH PROTECTION SHALL BE IN ACCORDANCE WITH DRAWINGS SUBMITTED TO NYCT FOR APPROVAL.

22. IF SHIELDS ARE TO BE INSTALLED TO PROTECT NYCT FACILITIES AND/OR THE PUBLIC, PLANS SHOWING THE LOCATION, TYPE AND METHOD OF ATTACHMENT TO THE TRANSIT STRUCTURE MUST BE SUBMITTED TO NYCT FOR APPROVAL.

23. ALL LUMBER AND PLYWOOD USED FOR PROTECTION OF SUBWAY FACILITIES MUST BE FIRE RETARDANT.

24. SUBWAY EMERGENCY EXITS MUST BE KEPT CLEAR AT ALL TIMES.

25. IN EXCAVATING OVER OR NEAR THE SUBWAY ROOF, SPECIAL CARE SHALL BE EXERCISED SO THAT THE THIN CONCRETE PROTECTION OF THE SUBWAY WATERPROOFING IS NOT DAMAGED.

26. BURNING OF, WELDING TO OR DRILLING THROUGH EXISTING STEEL STRUCTURES WILL NOT BE PERMITTED EXCEPT AS SHOWN ON DRAWINGS APPROVED BY NYCT.

27. HORIZONTAL AND VERTICAL CONTROL SURVEY DATA OF THE EXISTING NYCT STRUCTURE IS TO BE TAKEN BY A LICENSED LAND SURVEYOR TO MONITOR ANY MOVEMENTS THAT OCCUR DURING CONSTRUCTION AND TO SHOW THAT THE INDUCED MOVEMENTS ARE WITHIN ALLOWABLES NOTED BELOW. IF ANY MOVEMENTS EXCEED ALLOWABLES, REMEDIATION AS APPROVED BY NYCT SHALL BE PERFORMED.

STRUCTURE	NOTIFY NYCT ENGINEER	STOP WORK
ELEVATED	1/8 INCH	¼ INCH
SUBWAY	1/4 INCH	½ INCH

28. BUS ROUTES AFFECTED BY THE PROJECT WILL OR MAY REQUIRE BUS DIVERSIONS. THESE ARRANGEMENTS SHALL BE MADE THROUGH:

MS. SARAH WYSS
ACTING DIRECTOR, OPERATIONS PLANNING
NEW YORK CITY TRANSIT
2 BROADWAY, ROOM A17.82
NEW YORK, NEW YORK 10004
TELEPHONE NUMBER 646/252-5517

WHEN IMPACTING ANY BUS STOP, SPECIAL OPERATIONS MUST BE NOTIFIED TWO WEEKS IN ADVANCE.

29. DUCT LINES MUST BE MAINTAINED AND PROTECTED DURING CONSTRUCTION. ANY INTERFERENCE WITH DUCT LINES SHOULD BE REPORTED TO NYCT INSPECTOR WHEN A DUCT LINE CONTAINING CABLES IS TO BE REMOVED, OR WHEN MASONRY ADJACENT THERETO IS TO BE REMOVED, PENETRATED, OR DRILLED, THE WORK SHALL BE DONE WITH HAND LABOR ENTIRELY, USING HAMMER AND CHISEL. JACKHAMMERS, BULL POINTS OR OTHER POWER EQUIPMENT SHALL NOT BE USED.

30. WHERE MANHOLES ARE ENCOUNTERED:

   A. THEY SHALL BE PROTECTED AND RAISED OR LOWERED AS REQUIRED, TO MATCH THE NEW STREET GRADE.

   B. IF MANHOLE COVERS ARE RAISED OR LOWERED, PROTECT CABLES IN MANHOLE BY WOOD SHEETING OF 2" NOMINAL THICKNESS.

   C. PRIOR TO THE START OF CONSTRUCTION OPERATIONS AFFECTING MANHOLES AND DUCT LINES, SEVEN DAYS NOTICE MUST BE GIVEN TO MR. JOHN MALVASIO, P.E., ASSISTANT CHIEF ENGINEERING OFFICER, MAINTENANCE OF WAY, AT 718/694-1358.

31. CONSTRUCTION WORK DONE NEAR VENT GRATINGS AND HATCHES SHALL BE AS FOLLOWS:

   A. UNLESS APPROVED BY THE NYCT'S ENGINEER, ALL VENT GRATINGS AND HATCHES SHOULD REMAIN OUTSIDE THE CONSTRUCTION SITE, SEPARATED BY A CONSTRUCTION FENCE. PROTECTIVE SHIELDS MUST BE PROVIDED OVER VENT GRATINGS AS REQUIRED BY NYCT'S ENGINEER.

   B. NO BUILDING MATERIAL, VEHICLES OR CONSTRUCTION EQUIPMENT IS TO BE STORED OR RUN OVER VENT, GRATINGS, HATCHES OR EMERGENCY EXITS.

   C. DETAILS OF SIDEWALK RECONSTRUCTION AROUND VENT GRATINGS, HATCHES AND EMERGENCY EXITS ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

32. TRACTORS, CRANES, EXCAVATORS, ETC. USED IN THE VICINITY OF THE ELEVATED STRUCTURES SHALL BE ISOLATED FROM THE GROUND. SINCE THE ELEVATED STRUCTURE IS USED AS A NEGATIVE RETURN PATH. WITH A CONSEQUENT POTENTIAL BETWEEN IT AND THE GROUND, ANY CONTACT BETWEEN THE STRUCTURE AND GROUNDED EQUIPMENT COULD RESULT IN BURNING OF THE STEEL.

33. TEMPORARY CONSTRUCTION SHEDS, BARRICADES OR PLYWOOD PARTITIONS MUST BE A MINIMUM OF 5'-0" FROM EDGE OF FINISHED PLATFORM.

34. STATION AREAS OR STAIRWAY/CLOSINGS: THE GENERAL REQUIREMENTS FOR STATION AREAS OR STAIRWAY/CLOSINGS ARE AS FOLLOWS:

   A. ONLY ONE STAIRWAY AT EACH STATION WILL BE PERMITTED TO BE CLOSED AT THE SAME TIME. APPROVALS FOR CLOSING ANY STAIRWAY MUST BE OBTAINED FROM THE DIVISION OF STATION OPERATIONS AT LEAST THREE WEEKS IN ADVANCE.

   B. MR. ASHOK PATEL, DIRECTOR, OFFICE OF STATION PROGRAMS; TELEPHONE 718/694-1695 OF THE DIVISION OF STATIONS MUST BE NOTIFIED ONE WEEK PRIOR TO THE ACTUAL CLOSING AND REOPENING OF THE ENTRANCE.

   C. SIGNAGE MUST BE SUPPLIED AND POSTED AT LEAST ONE WEEK IN ADVANCE, ADVISING THE PUBLIC OF THE PROPOSED SUBWAY STAIR CLOSING. HOWEVER, IF IT IS AN ENTIRE ENTRANCE CLOSING, SIGNAGE MUST BE POSTED TWO WEEKS IN ADVANCE.

   D. THE STREET ENTRANCE STAIRWAY SHOULD NOT BE CLOSED UNLESS MANPOWER AND MATERIALS ARE AVAILABLE TO COMMENCE WORK ON DATES PERMITTED.

   E. ONCE THE CLOSING IS EFFECTED, CONSTRUCTION SIGNS MUST BE PLACED AT APPROPRIATE LOCATIONS ON THE BARRICADES AT THE STREET AND MEZZANINE LEVELS, STATING THE CONTRACTOR'S NAME, 24 HOUR EMERGENCY TELEPHONE NUMBER, CONTRACT NUMBER, THE DURATION OF THE CLOSING, DIRECTION TO AN ALTERNATE ENTRANCE/EXIT, AND AN APOLOGY FOR THE INCONVENIENCE TO OUR CUSTOMERS.

   F. EXISTING STATION SIGNAGE MUST BE ADJUSTED TO REFLECT ANY CHANGES IN ACCESS/EGRESS.

   G. BARRICADES ARE TO BE PAINTED AND KEPT GRAFFITI FREE AT ALL TIMES. THE CONTRACTOR MUST MAINTAIN THE BARRICADED AREA CLEAN OF ALL DEBRIS.

   H. ALL MATERIALS ARE TO BE PROPERLY STORED AND SECURED AWAY FROM PASSENGER TRAFFIC.

   I. THE CONTRACTOR MUST REMOVE ALL WASTE MATERIAL AND BARRICADES FROM ALL STATION AREAS WHEN CONSTRUCTION IS COMPLETED.

   J. INSPECTION OF THE AREA UNDER CONSTRUCTION BY AUTHORIZED STATION DEPARTMENT EMPLOYEES SHALL NOT BE INHIBITED.

   K. IF STREETLIGHTS ON THE SIDEWALKS ARE AFFECTED, TEMPORARY LIGHTS SHALL BE PROVIDED.

35. IF NEW CONCRETE CONSTRUCTION IS JOINED TO EXISTING CONCRETE, DOWELS AND KEYWAYS ARE TO BE USED IN ACCORDANCE WITH NYCT STANDARDS.

36. IF THE PROJECT INVOLVES CONSTRUCTION OR ALTERATION OF A SUBWAY FACILITY ON PRIVATE PROPERTY, THE PROPERTY OWNERS WILL BE REQUIRED TO ENTER INTO AN AGREEMENT WITH NYCT PERTAINING TO ALL WORK AFFECTING THE TRANSIT FACILITIES AND CLEARLY DEFINING LIMITS AND RESPONSIBILITY FOR MAINTENANCE AND LIABILITY.

37. WHEREVER A NEW SIDEWALK IS BEING PLACED ADJACENT TO NYCT STRUCTURES THE FOLLOWING WILL BE REQUIRED:

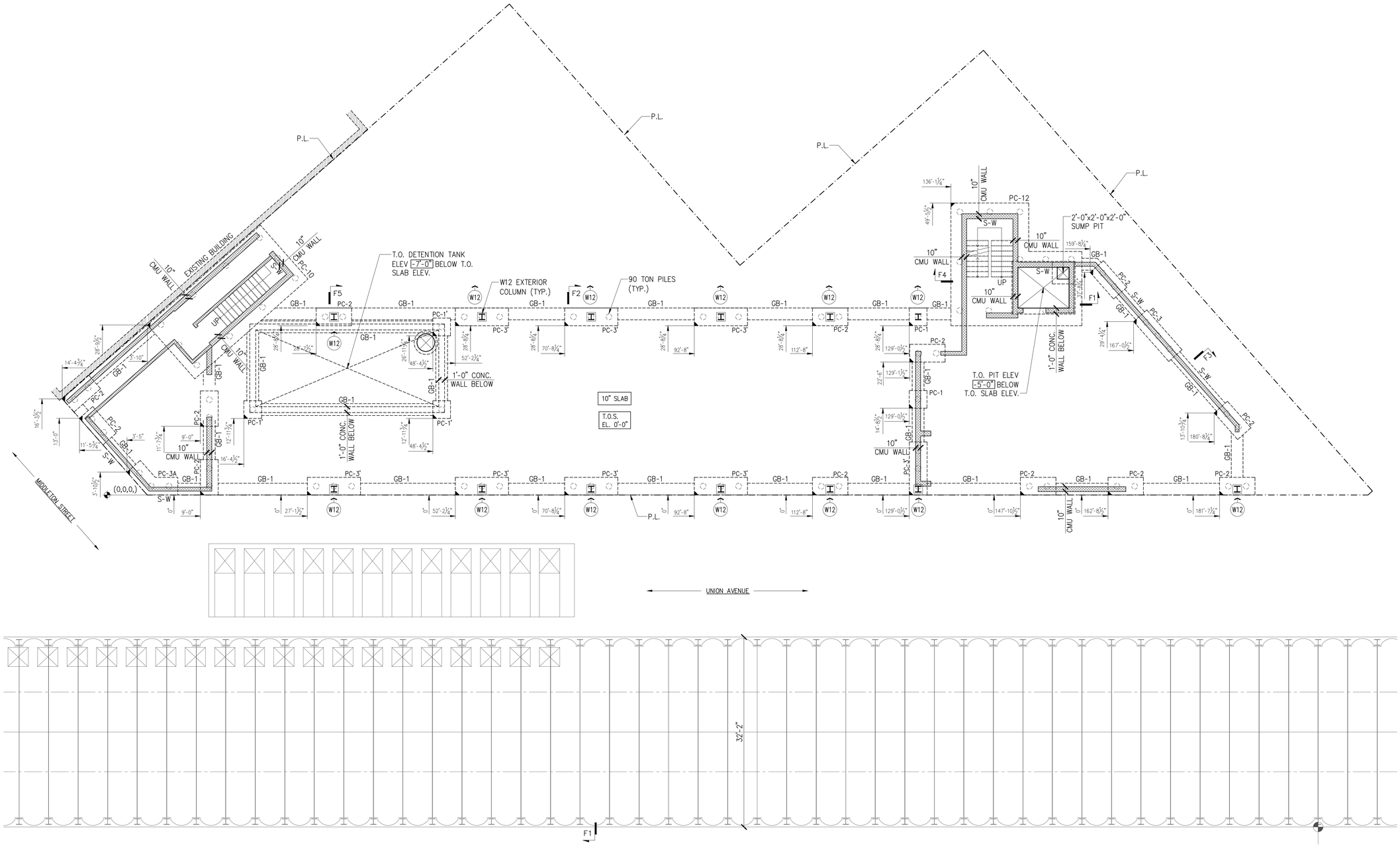
   A. THE TOP OF THE NEW SIDEWALK SHALL BE FLUSH WITH THE SUBWAY VENT GRATINGS, HATCHES AND EMERGENCY EXITS.

   B. THE SLOPE OF THE NEW SIDEWALK SHALL BE SUCH THAT THE DRAINAGE BE AWAY FROM THESE STRUCTURES.

   C. A 1/2" PREMOLDED FILLER SHALL BE INSTALLED BETWEEN THE NEW SIDEWALK AND NYCT STRUCTURE.

   D. WHERE SIDEWALK ELEVATIONS ARE BEING CHANGED DETAILS OF PROPOSED WORK AROUND NYCT STRUCTURES ARE TO BE SUBMITTED FOR APPROVAL.

38. BEFORE ENTERING NYCT PROPERTY, CONTR



FIRST FLOOR FOUNDATION FRAMING PLAN

SCALE: 1/8" = 1'-0"

NOTES:

1. TOP OF SLAB SHALL BE AT PROJECT ELEVATION +0'-0", WHICH REFERS TO EL. XX.XX, U.O.N. THUS ±..... INDICATES ACTUAL TOP OF SLAB ELEVATION.
2. FOUNDATION DESIGN IS BASED ON RECOMMENDATION CONTAINED IN GEOTECHNICAL ENGINEER INVESTIGATION DATED XX/XX/XXXX.
3. PC-.. INDICATES PILE CAP WITH 12" DIA 90 TON DRILLED PILES. SEE PILE CAP SCHEDULE ON DRAWING S-401.00 FOR DETAILS. FOR DETAILS OF PILES, SEE MP-.. SERIES DRAWINGS BY FNA ASSOCIATES INC.
4. PC-..' INDICATES PILE CAP WITH 12" DIA 75 TON DRILLED PILES. SEE PILE CAP SCHEDULE ON SHEET S-401.00 FOR DETAILS. FOR DETAILS OF PILES, SEE MP-.. SERIES DRAWINGS BY FNA ASSOCIATES INC.
5. SLAB SHALL BE 10" THICK SLAB WITH fc'=5,000 PSI REINFORCED WITH #5@12" O.C. TOP AND BOTTOM EACH WAY CONTINUOUS. SEE PLAN FOR ADDITIONAL REINFORCEMENT.
5. TYPICAL CMU LOAD BEARING WALL SHALL BE 8" THICK NORMAL WT. HOLLOW CORE CMU REINFORCED WITH #5@16" O/C VERTICAL REINFORCEMENT. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR WALL LOCATION. PROVIDE FOLLOWING FOR ALL CMU WALLS:
   A. COMPRESSIVE STRENGTH OF MASONRY WALL (f'm) TO BE 2,500 PSI.
   B. FILL ALL CELLS RECEIVING VT. REINF. SOLID WITH 3000 PSI GROUT.
   C. PROVIDE DURO - WALL HORIZ. REINF. AT 16" O.C. (ALT. COURSE).
   D. ADD #5 VT. REBARS AT EACH SIDE OF CONTROL JOINTS, OPENINGS, WALL ENDS, WALL CORNERS.
   E. PROVIDE #5@16" O.C. x 2'-0" LONG DOWELS AT BOTTOM OF WALL.
6. TYPICAL CMU SHEAR WALL SHALL BE 10" THICK NORMAL WT. HOLLOW CORE CMU REINFORCED WITH #6@16" O/C VERTICAL REINFORCEMENT. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR WALL LOCATION. PROVIDE FOLLOWING FOR ALL CMU WALLS:
   A. COMPRESSIVE STRENGTH OF MASONRY WALL (f'm) TO BE 2,500 PSI.
   B. FILL ALL CELLS RECEIVING VT. REINF. SOLID WITH 3000 PSI GROUT.
   C. PROVIDE DURO - WALL HORIZ. REINF. AT 16" O.C. (ALT. COURSE).
   D. ADD #7 VT. REBARS AT EACH SIDE OF CONTROL JOINTS, OPENINGS, WALL ENDS, WALL CORNERS.
   E. PROVIDE #6@16"O.C. x 2'-0" LONG DOWELS AT BOTTOM OF WALL.
7. SEE THE FOLLOWING DRAWINGS FOR THE ITEMS NOTED:

GENERAL NOTES	S-001.00
FRAMING PLANS	S-100.00 SERIES
SHEAR WALL SCHEDULE	S-200.00 SERIES
TYPICAL DETAILS AND SECTIONS	S-301.00 SERIES
FOUNDATION SECTIONS & DETAILS	FO-400.00 SERIES

LEGEND

- INDICATES W12 COLUMN
- INDICATES CONC. WALL BELOW
- INDICATES LOAD BEARING CMU WALL

BEAM SCHEDULE

MARK	SIZE		REINF.					
	WIDTH	DEPTH	BOTTOM		TOP		STIRRUP	REMARK
			CONT.	ADD'L	CONT.	ADD'L	SIZE & SPACING	
GB1	24	42	4 #9	-	4 #9	-	#4 @ 18" O.C. □	2 #7 @ MID HT.

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

SHEET TITLE:

FIRST-FLOOR-FOUNDATION FRAMING-PLAN

SEAL & SIGNATURE

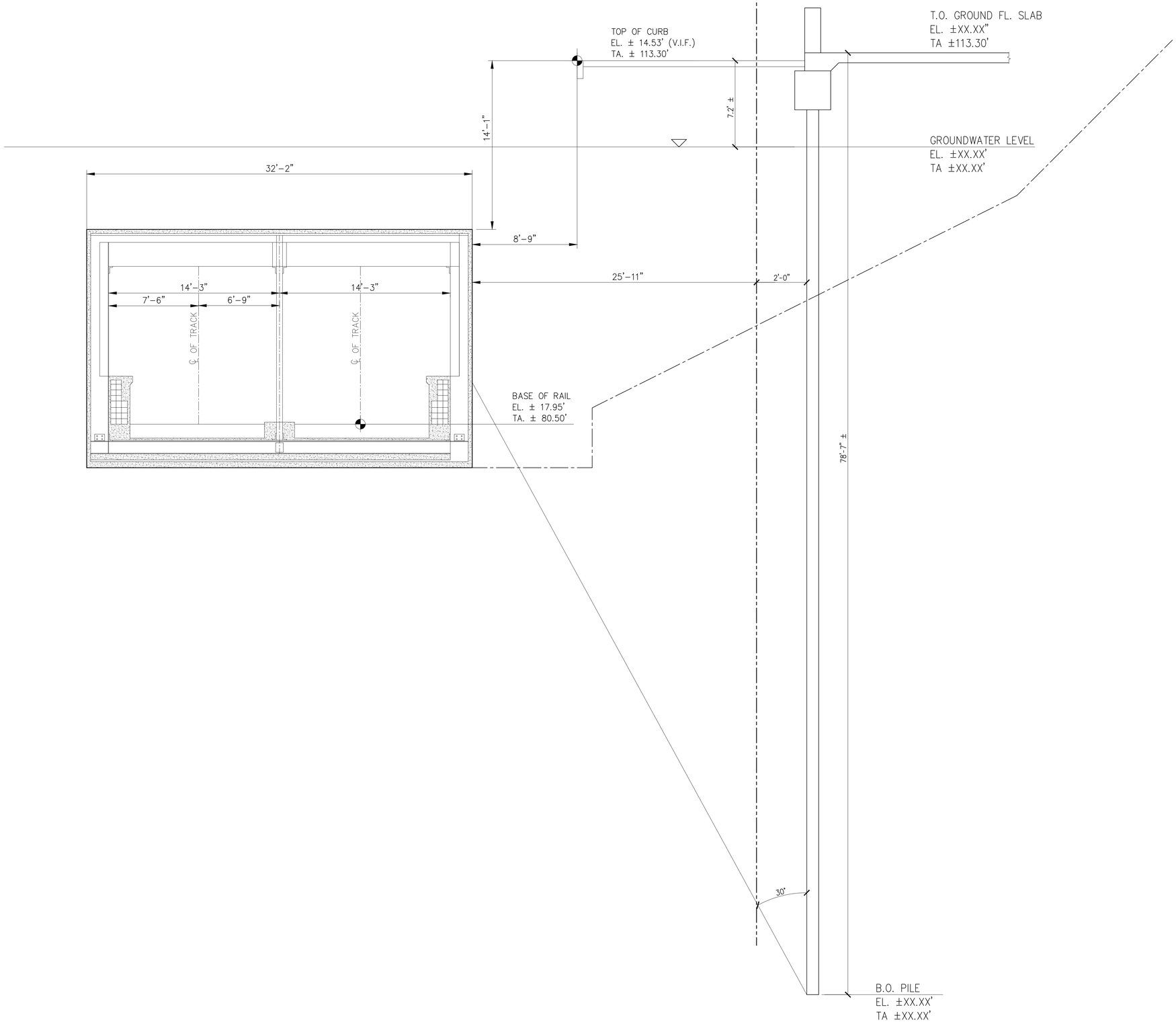
STATE OF NEW YORK · DHIAB AHMAD · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:	PROJECT NO:
08/14/15	#15190
DRAWN BY:	CHECKED BY:
R.G.	O.A.
SCALE:	SHEET NO:
AS-NOTED	3 OF-14

DRAWING NO:

S-100.00

NYC DOB NUMBER: NB # XXX XXX XXX



SECTION

SCALE 1/4" = 1'-0"

F1

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

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810 7TH AVENUE
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RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

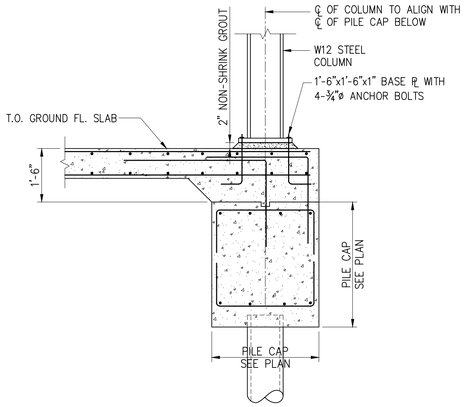
SHEET TITLE:

FOUNDATION SECTIONS-I

SEAL & SIGNATURE

STATE OF NEW YORK
OMAIS AHMAD
093650
LICENSED PROFESSIONAL ENGINEER

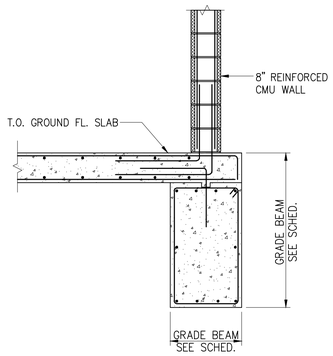
ISSUE DATE: 08/14/15
PROJECT NO: #15190
DRAWN BY: R.G.
CHECKED BY: O.A.
SCALE: AS-NOTED
SHEET NO: 4 OF-14
DRAWING NO: FO-400.00
NYC DOB NUMBER: NB # XXX XXX XXX



SECTION

SCALE 1/2" = 1'-0"

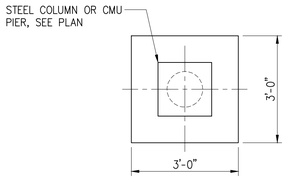
F2



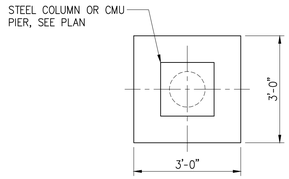
SECTION

SCALE 1/2" = 1'-0"

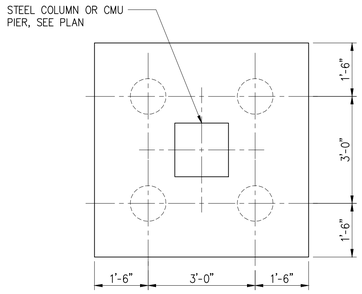
F3



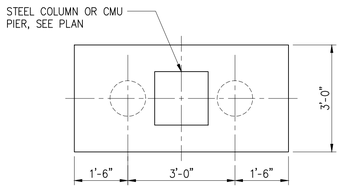
PC–1



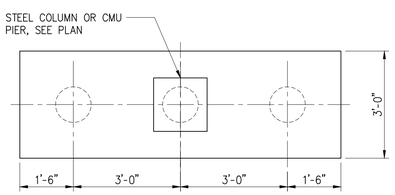
PC–1'



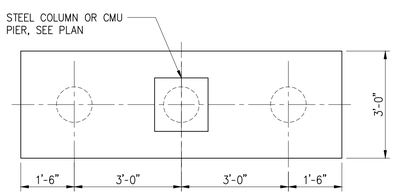
PC–4



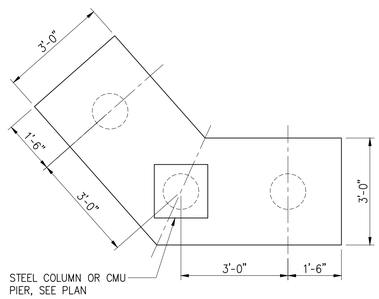
PC–2



PC–3



PC–3'



PC–3A

PILE CAP SCHEDULE
(90 TON DRILLED PILES)

MARK	NUMBER OF PILES	DEPTH (INCHES)	BOTT. REINF. LONG BARS	BOTT. REINF. SHORT BARS	TOP REINF. LONG BARS	TOP REINF. SHORT BARS	REMARKS
PC-1	1	39	3-#8(H)	3-#8(H)			
PC-2	2	42	4-#8(H)	8-#6 (H)			
PC-3	3	42	6-#8 (H)	12-#6 (H)			
PC-3A	3	42	4-#8 (H)	THREE WAYS			
PC-4	4	42	10-#8 (H)	10-#8 (H)			
PC-12	12	42	#8@12" (H)	#8@12" (H)			
PC-10	10	42	#8@12" (H)	#8@12" (H)			

NOTES :
1) 90-TON DRILLED PILE CONSISTS OF A 12"O.D. X 0.50" WALL N-80 (80 KSI) STEEL CASING DRILLED TO A DEPTH OF 60' +/-. REFER TO GEOTECH RECOMMENDATION FOR DETAIL OF THE DRILLED PILE.
2) CENTER OF PILE CAP IS CENTER OF COLUMN AND/OR GRADE BEAM UNLESS OTHERWISE NOTED.
3) PILE CAP DIMENSION BASED ON PILE SPACING 3'-0" ON CENTER AND 1'-6" EDGE DISTANCE.
4) (H) INDICATES HOOKED REINFORCEMENT.
5) LONG BARS ARE PLACED IN LOWEST LAYER.

PILE CAP SCHEDULE
(75 TON DRILLED PILES)

MARK	NUMBER OF PILES	DEPTH (INCHES)	BOTT. REINF. LONG BARS	BOTT. REINF. SHORT BARS	TOP REINF. LONG BARS	TOP REINF. SHORT BARS	REMARKS
PC-1'	1	42	6-#8 (H)	12 #6 (H)			
PC-3'	3	42	6-#8 (H)	12 #6 (H)			

NOTES :
1) 75-TON DRILLED PILE CONSISTS OF A 12"O.D. X 0.50" WALL N-80 (80 KSI) STEEL CASING DRILLED TO A DEPTH OF 60' +/-. REFER TO GEOTECH RECOMMENDATION FOR DETAIL OF THE DRILLED PILE.
2) CENTER OF PILE CAP IS CENTER OF COLUMN AND/OR GRADE BEAM UNLESS OTHERWISE NOTED.
3) PILE CAP DIMENSION BASED ON PILE SPACING 3'-0" ON CENTER AND 1'-6" EDGE DISTANCE.
4) (H) INDICATES HOOKED REINFORCEMENT.
5) LONG BARS ARE PLACED IN LOWEST LAYER.

PILE CAP DETAILS

SCALE 1/2" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

SHEET TITLE:

FOUNDATION SECTIONS-II

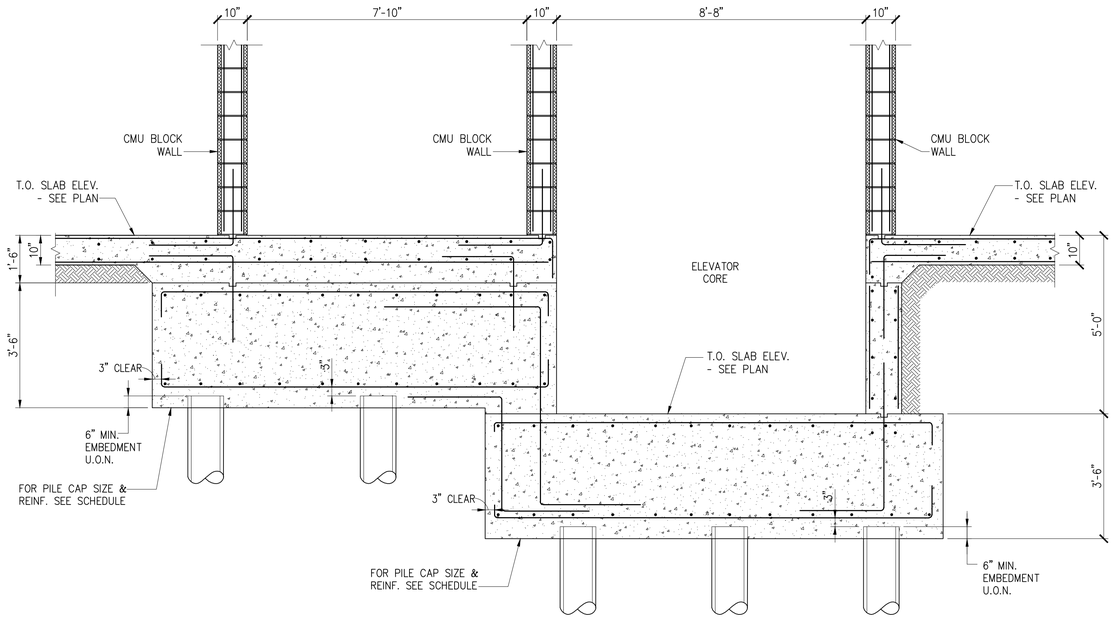
SEAL & SIGNATURE

STATE OF NEW YORK
OWAIS AHMAD
083650
LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: 08/14/15
PROJECT NO: #15190
DRAWN BY: R.G.
CHECKED BY: O.A.
SCALE: AS-NOTED
SHEET NO: 5 OF-14

DRAWING NO:
FO-401.00

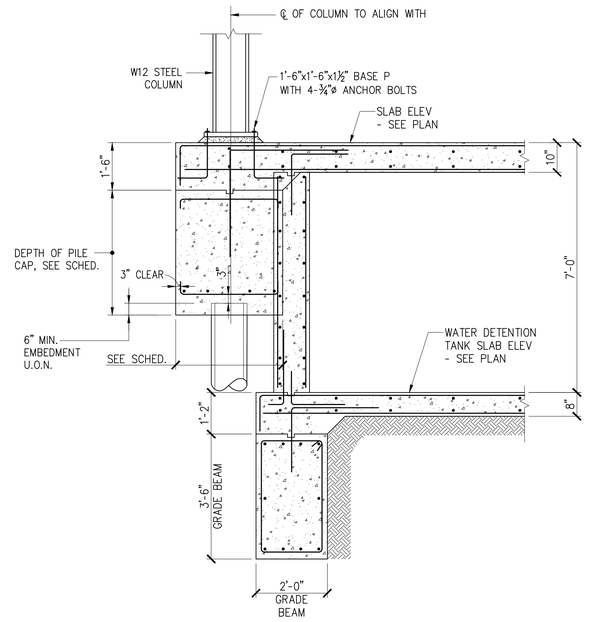
NYC DOB NUMBER: NB # XXX XXX XXX



SECTION

N.T.S

F4



SECTION

N.T.S

F2

PILE CAP DETAILS

SCALE 1/2" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

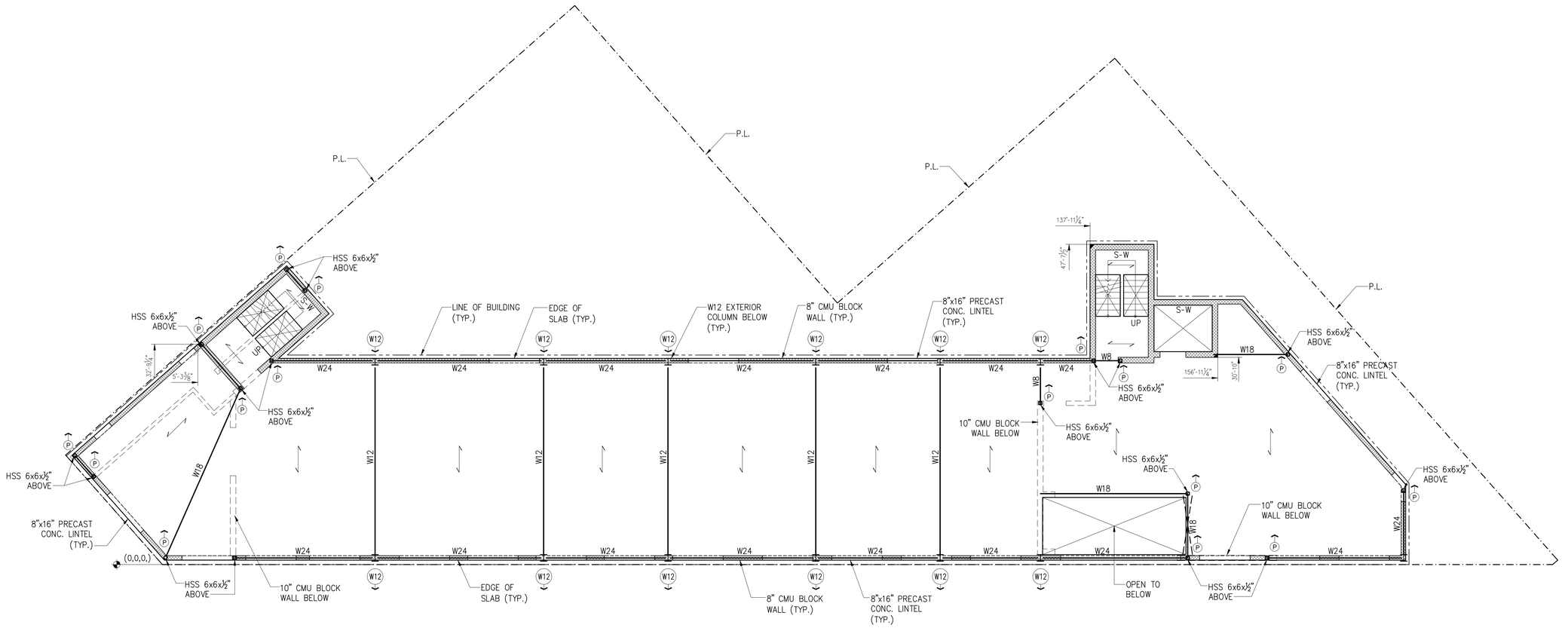
SHEET TITLE:

FOUNDATION SECTIONS-III

SEAL & SIGNATURE

STATE OF NEW YORK · OWAIS AHMAD · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: 08/14/15
PROJECT NO: #15190
DRAWN BY: R.G.
CHECKED BY: O.A.
SCALE: AS-NOTED
SHEET NO: 6 OF-14
DRAWING NO: FO-402.00
NYC DOB NUMBER: NB # XXX XXX XXX



SECOND FLOOR FRAMING PLAN

SCALE: ⅛" = 1'-0"

NOTES:

1. TOP OF SLAB SHALL BE AT ELEVATION +12'-0", WITH REFERENCE TO TOP FIRST FLOOR SLAB EL. 0'-0", U.O.N. THUS ±.... INDICATES DISTANCE WITH RESPECT TO EL. INDICATED.

2. ⟵ INDICATES SPAN DIRECTION OF 8" THICK HOLLOW-CORE NORMAL WEIGHT PRE-CAST AND PRE-STRESSED CONCRETE SLAB. AVERAGE WEIGHT OF SLAB SHALL NOT EXCEED 56 PSF.

3. ALL SLAB OPENING AND PENETRATION THROUGH THE SLAB MUST BE COORDINATED WITH ARCH/MEPF DRAWINGS AND SHALL BE DESIGNED BY THE PRECAST CONCRETE MANUFACTURER.

4. TYPICAL CMU LOAD BEARING WALL SHALL BE 8" THICK NORMAL WT. HOLLOW CORE CMU REINFORCED WITH #5@16" O/C VERTICAL REINFORCEMENT. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR WALL LOCATION. PROVIDE FOLLOWING FOR ALL CMU WALLS:

   A. COMPRESSIVE STRENGTH OF MASONRY WALL ($f'm$) TO BE 2,500 PSI.
   B. FILL ALL CELLS RECEIVING VT. REINF. SOLID WITH 3000 PSI GROUT.
   C. PROVIDE DURO - WALL HORIZ. REINF. AT 16" O.C. (ALT. COURSE).
   D. ADD #5 VT. REBARS AT EACH SIDE OF CONTROL JOINTS, OPENINGS, WALL ENDS, WALL CORNERS.
   E. PROVIDE #5@16 x 2'-0" LONG DOWELS AT BOTTOM OF WALL.

5. SEE FOLLOWING DRAWINGS FOR ITEMS NOTED:

GENERAL NOTES	S-001.00
FRAMING PLANS	S-100.00 SERIES
SHEAR WALL SCHEDULE	S-200.00 SERIES
TYPICAL DETAILS & SECTIONS	S-301.00 SERIES
FOUNDATION SECTIONS & DETAILS	FO-400.00 SERIES

LEGEND

- INDICATES HSS POST ABOVE
- INDICATES W12 COLUMN BELOW
- INDICATES CMU WALL BELOW
- INDICATES LOAD BEARING CMU WALL
- INDICATES STEEL BEAM
- INDICATES 6x6 DIAGONAL BRACE

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

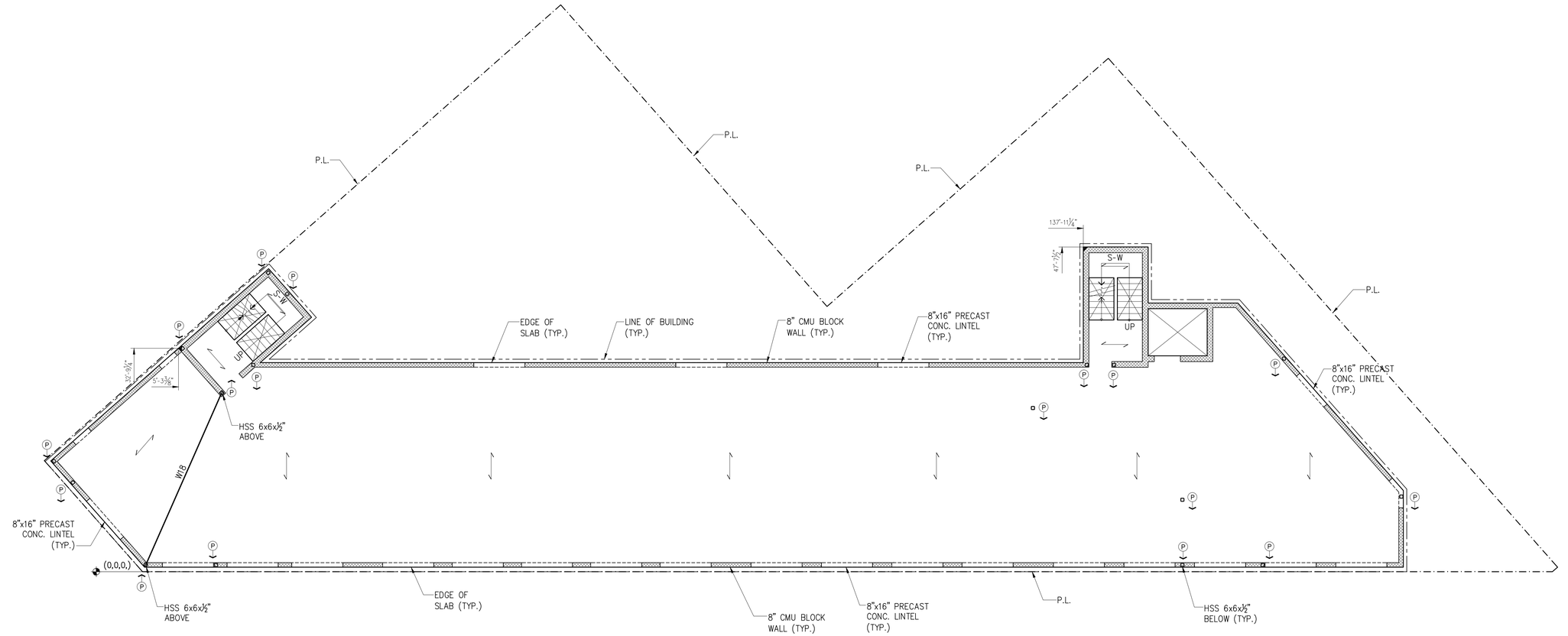
SHEET TITLE:

SECOND-FLOOR FRAMING-PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · OMAR AHMED · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: 08/14/15
PROJECT NO: #15190
DRAWN BY: R.G.
CHECKED BY: O.A.
SCALE: AS-NOTED
SHEET NO: 7 OF-14
DRAWING NO: S-101.00
NYC DOB NUMBER: NB # XXX XXX XXX



THIRD TO SIXTH FLOOR FRAMING PLAN

SCALE: ⅛" = 1'-0"

NOTES:

1. TOP OF FLOOR SLAB SHALL BE AT ELEVATION (3RD FLOOR +21'-7", 4TH FLOOR +31'-2", 5TH FLOOR +40'-9", 6TH FLOOR +50'-4") WITH REFERENCE TO TOP FIRST FLOOR SLAB EL. 0'-0", U.O.N. THUS ±.... INDICATES DISTANCE WITH RESPECT TO EL. INDICATED.
2. ⟷ INDICATES SPAN DIRECTION OF 8" THICK HOLLOW-CORE NORMAL WEIGHT PRE-CAST AND PRE-STRESSED CONCRETE SLAB. AVERAGE WEIGHT OF SLAB SHALL NOT EXCEED 56 PSF.
3. ALL SLAB OPENING AND PENETRATION THROUGH THE SLAB MUST BE COORDINATED WITH ARCH/MEPF DRAWINGS AND SHALL BE DESIGNED BY THE PRECAST CONCRETE MANUFACTURER.
4. TYPICAL CMU LOAD BEARING WALL SHALL BE 8" THICK NORMAL WT. HOLLOW CORE CMU REINFORCED WITH #5@16" O/C VERTICAL REINFORCEMENT. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR WALL LOCATION. PROVIDE FOLLOWING FOR ALL CMU WALLS:
   A. COMPRESSIVE STRENGTH OF MASONRY WALL (f'm) TO BE 2,500 PSI.
   B. FILL ALL CELLS RECEIVING VT. REINF. SOLID WITH 3000 PSI GROUT.
   C. PROVIDE DURO - WALL HORIZ. REINF. AT 16" O.C. (ALT. COURSE).
   D. ADD #5 VT. REBARS AT EACH SIDE OF CONTROL JOINTS, OPENINGS, WALL ENDS, WALL CORNERS.
   E. PROVIDE #5@16 x 2'-0" LONG DOWELS AT BOTTOM OF WALL.
5. SEE FOLLOWING DRAWINGS FOR ITEMS NOTED:

GENERAL NOTES	S-001.00
FRAMING PLANS	S-100.00 SERIES
SHEAR WALL SCHEDULE	S-200.00 SERIES
TYPICAL DETAILS & SECTIONS	S-301.00 SERIES
FOUNDATION SECTIONS & DETAILS	FO-400.00 SERIES

LEGEND

- Ⓟ ↑ — INDICATES HSS POST ABOVE
- Ⓟ ↓ — INDICATES HSS POST BELOW
- INDICATES CMU WALL BELOW
- INDICATES LOAD BEARING CMU WALL
- INDICATES STEEL BEAM

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION
08/17/15	TA SUBMISSION

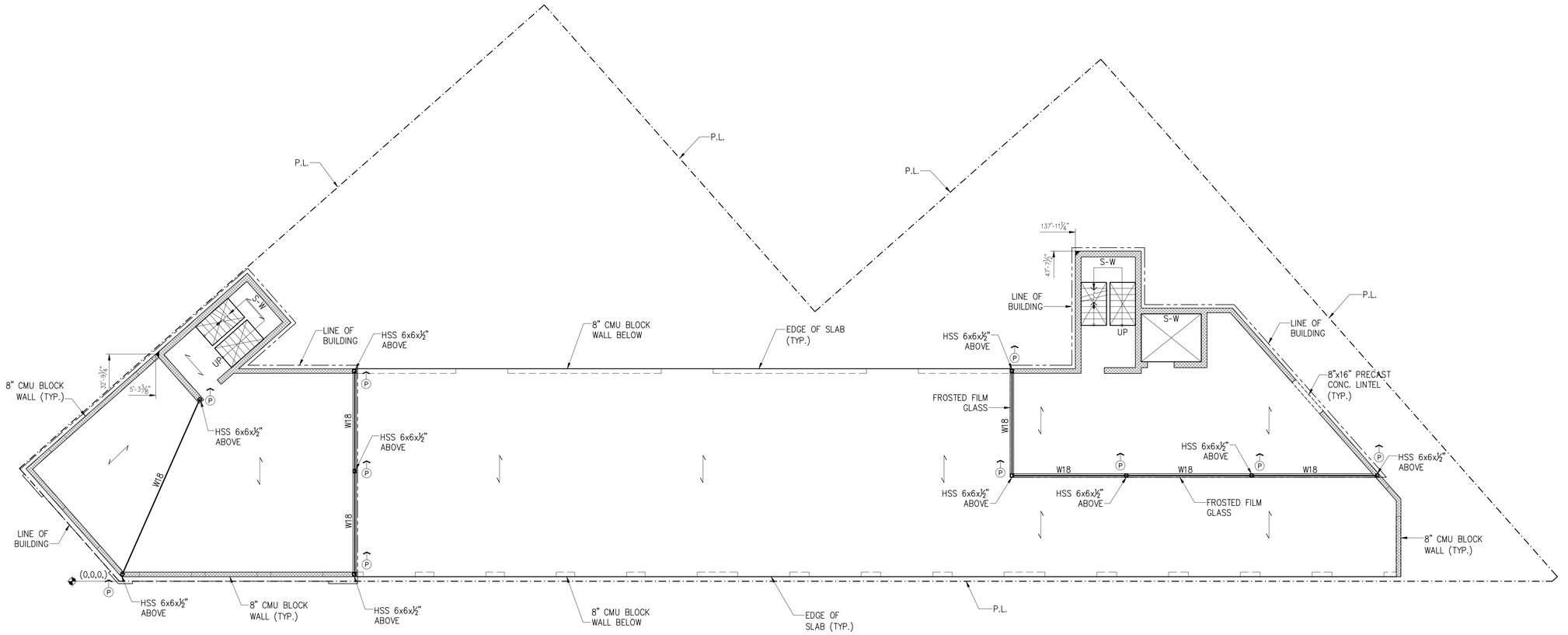
SHEET TITLE:

THIRD-SIXTH-FLOOR FRAMING-PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · OWAIS AHMAD · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: 08/14/15
PROJECT NO: #15190
DRAWN BY: R.G.
CHECKED BY: O.A.
SCALE: AS-NOTED
SHEET NO: 8 OF-14
DRAWING NO: S-102.00
NYC DOB NUMBER: NB # XXX XXX XXX



SEVENTH FLOOR/ROOF FRAMING PLAN

SCALE: ⅛" = 1'-0"

NOTES:

1. TOP OF SLAB SHALL BE AT ELEVATION +59'-11", WITH REFERENCE TO TOP FIRST FLOOR SLAB EL. 0'-0", U.O.N. THUS ±..... INDICATES DISTANCE WITH RESPECT TO EL. INDICATED.
2. ←—→ INDICATES SPAN DIRECTION OF 8" THICK HOLLOW-CORE NORMAL WEIGHT PRE-CAST AND PRE-STRESSED CONCRETE SLAB. AVERAGE WEIGHT OF SLAB SHALL NOT EXCEED 56 PSF.
3. TOP OF STEEL ELEVATION SHALL BE 2" BELOW TOP OF CONCRETE PLANK ELEVATION FOR ALL UPSET STEEL BEAMS.
4. ALL SLAB OPENING AND PENETRATION THROUGH THE SLAB MUST BE COORDINATED WITH ARCH/MEPF DRAWINGS AND SHALL BE DESIGNED BY THE PRECAST CONCRETE MANUFACTURER.
5. TYPICAL CMU LOAD BEARING WALL SHALL BE 8" THICK NORMAL WT. HOLLOW CORE CMU REINFORCED WITH #5@16" O/C VERTICAL REINFORCEMENT. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR WALL LOCATION. PROVIDE FOLLOWING FOR ALL CMU WALLS:
   A. COMPRESSIVE STRENGTH OF MASONRY WALL (f'm) TO BE 2,500 PSI.
   B. FILL ALL CELLS RECEIVING VT. REINF. SOLID WITH 3000 PSI GROUT.
   C. PROVIDE DURO - WALL HORIZ. REINF. AT 16" O.C. (ALT. COURSE).
   D. ADD #5 VT. REBARS AT EACH SIDE OF CONTROL JOINTS, OPENINGS, WALL ENDS, WALL CORNERS.
   E. PROVIDE #5@16 x 2'-0" LONG DOWELS AT BOTTOM OF WALL.
6. SEE FOLLOWING DRAWINGS FOR ITEMS NOTED:

GENERAL NOTES	S-001.00
FRAMING PLANS	S-100.00 SERIES
SHEAR WALL SCHEDULE	S-200.00 SERIES
TYPICAL DETAILS & SECTIONS	S-301.00 SERIES
FOUNDATION SECTIONS & DETAILS	FO-400.00 SERIES

LEGEND

- Ⓟ — INDICATES HSS POST ABOVE
- INDICATES CMU WALL BELOW
- INDICATES LOAD BEARING CMU WALL
- INDICATES STEEL BEAM

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

SHEET TITLE:

SEVENTH-FLOOR-ROOF FRAMING-PLAN

SEAL & SIGNATURE

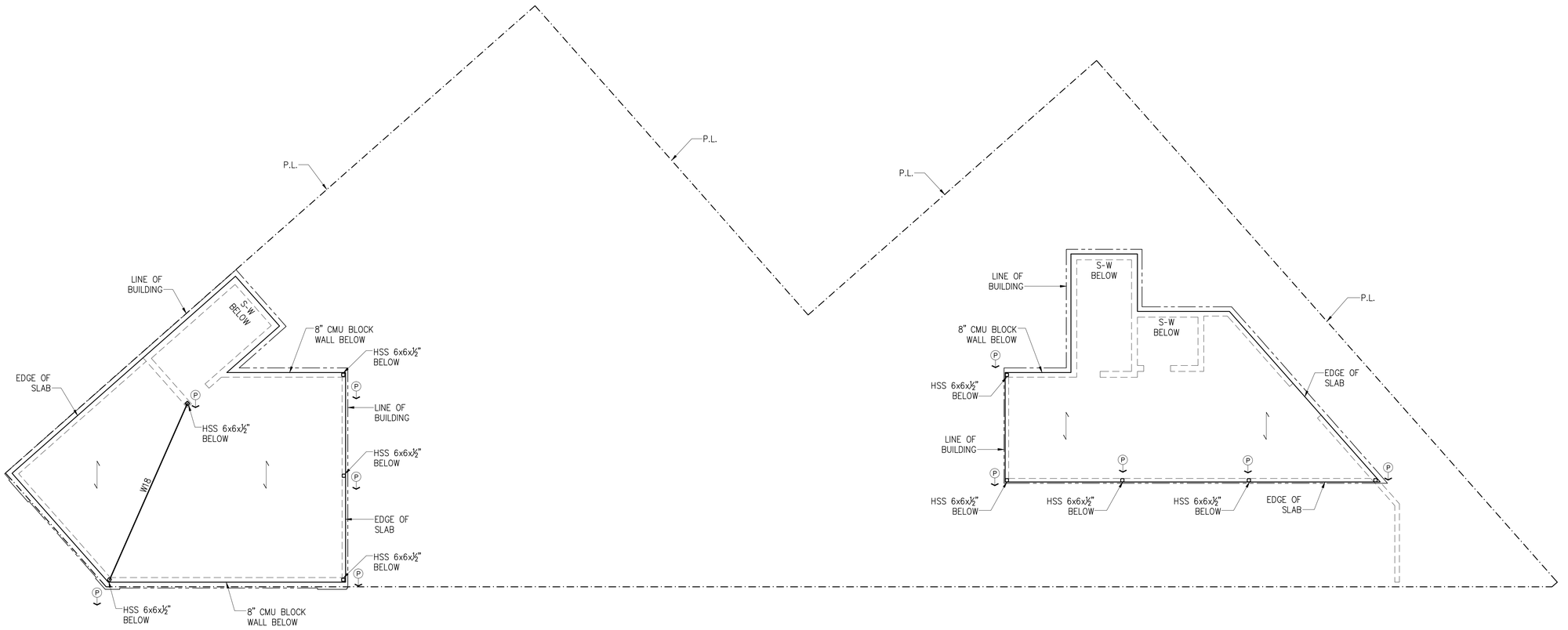
STATE OF NEW YORK · OMAS AHMAD · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:	PROJECT NO:
08/14/15	#15190
DRAWN BY: R.G.	CHECKED BY: O.A.
SCALE: AS-NOTED	SHEET NO: 9 OF-14

DRAWING NO:

S-103.00

NYC DOB NUMBER: NB # XXX XXX XXX



ROOF BULKHEAD FRAMING PLAN

SCALE: ⅛" = 1'-0"

NOTES:

1. TOP OF SLAB SHALL BE AT ELEVATION +69'-11", WITH REFERENCE TO TOP FIRST FLOOR SLAB EL. 0'-0", U.O.N. THUS ±.... INDICATES DISTANCE WITH RESPECT TO EL. INDICATED.
2. ⟷ INDICATES SPAN DIRECTION OF 8" THICK HOLLOW-CORE NORMAL WEIGHT PRE-CAST AND PRE-STRESSED CONCRETE SLAB. AVERAGE WEIGHT OF SLAB SHALL NOT EXCEED 56 PSF.
3. TOP OF STEEL ELEVATION SHALL BE 2" BELOW TOP OF CONCRETE PLANK ELEVATION FOR ALL UPSET STEEL BEAMS.
4. ALL SLAB OPENING AND PENETRATION THROUGH THE SLAB MUST BE COORDINATED WITH ARCH/MEPF DRAWINGS AND SHALL BE DESIGNED BY THE PRECAST CONCRETE MANUFACTURER.
5. TYPICAL CMU LOAD BEARING WALL SHALL BE 8" THICK NORMAL WT. HOLLOW CORE CMU REINFORCED WITH #5@16" O/C VERTICAL REINFORCEMENT. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR WALL LOCATION. PROVIDE FOLLOWING FOR ALL CMU WALLS:
   A. COMPRESSIVE STRENGTH OF MASONRY WALL (f'm) TO BE 2,500 PSI.
   B. FILL ALL CELLS RECEIVING VT. REINF. SOLID WITH 3000 PSI GROUT.
   C. PROVIDE DURO - WALL HORIZ. REINF. AT 16" O.C. (ALT. COURSE).
   D. ADD #5 VT. REBARS AT EACH SIDE OF CONTROL JOINTS, OPENINGS, WALL ENDS, WALL CORNERS.
   E. PROVIDE #5@16 x 2'-0" LONG DOWELS AT BOTTOM OF WALL.
6. SEE FOLLOWING DRAWINGS FOR ITEMS NOTED:

GENERAL NOTES	S-001.00
FRAMING PLANS	S-100.00 SERIES
SHEAR WALL SCHEDULE	S-200.00 SERIES
TYPICAL DETAILS & SECTIONS	S-301.00 SERIES
FOUNDATION SECTIONS & DETAILS	FO-400.00 SERIES

LEGEND

- ⌃ P — INDICATES HSS POST ABOVE
- P ⌄ — INDICATES HSS POST BELOW
- INDICATES CMU WALL BELOW
- INDICATES LOAD BEARING CMU WALL
- INDICATES STEEL BEAM

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

SHEET TITLE:

ROOF-BULKHEAD FRAMING-PLAN

SEAL & SIGNATURE

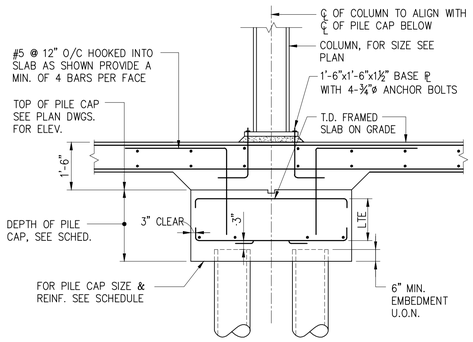
STATE OF NEW YORK · OWAIS AHMAD · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:	PROJECT NO:
08/14/15	#15190
DRAWN BY: R.G.	CHECKED BY: O.A.
SCALE: AS-NOTED	SHEET NO: 10 OF-14

DRAWING NO:

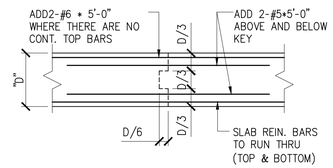
S-104.00

NYC DOB NUMBER: NB # XXX XXX XXX

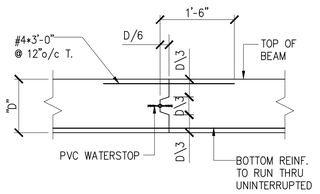


TYPICAL PILE CAP DETAIL

N.T.S



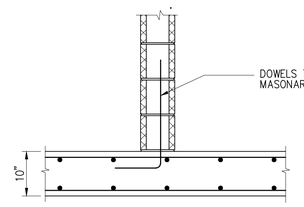
BEAM



FRAMED SLAB

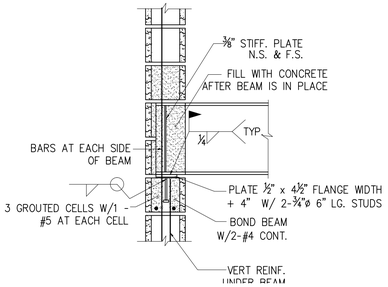
NOTES:

1. FOUNDATION WALLS AND GRADE BEAMS - LOCATE MIDWAY BETWEEN COLUMN CENTER LINE AND AT 60 FEET MAXIMUM. ALLOW 7 DAYS MINIMUM BETWEEN ADJACENT POURS.
2. OTHER CONCRETE - LOCATE MIDWAY AT SUPPORTS. ALLOW 7 DAYS MINIMUM BETWEEN PLACING ADJACENT CONCRETE. MAXIMUM LENGTH OF CASTING, 75 FEET.



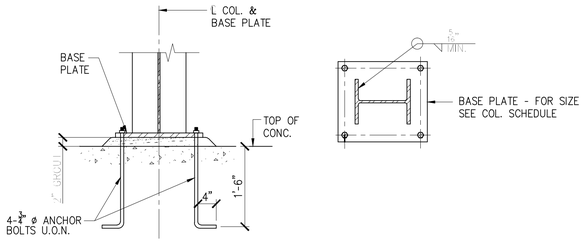
TYPICAL DETAIL AT CMU PARTITIONS

N.T.S



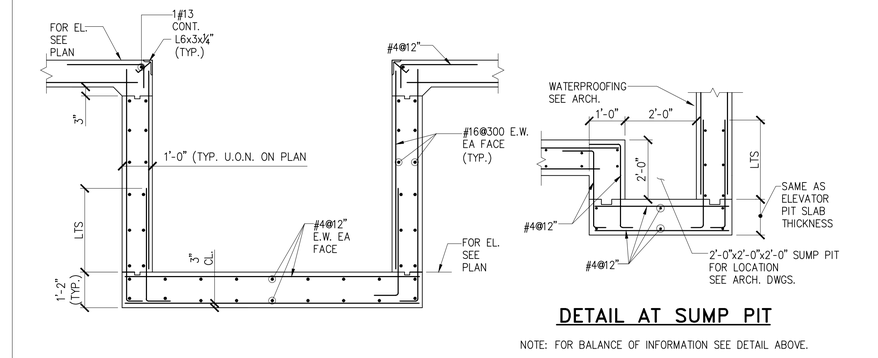
TYPICAL STEEL BEAM TO CMU CONNECTION

N.T.S



TYPICAL COLUMN BASE DETAILS

N.T.S

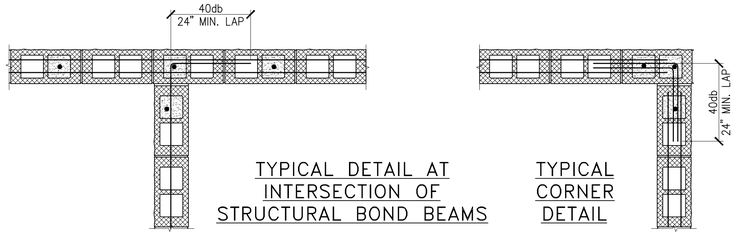


DETAIL AT SUMP PIT

NOTE: FOR BALANCE OF INFORMATION SEE DETAIL ABOVE.

TYPICAL ELEVATOR PIT DETAIL

N.T.S

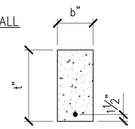


TYPICAL DETAIL AT INTERSECTION OF STRUCTURAL BOND BEAMS

TYPICAL CORNER DETAIL

PRECAST CONCRETE LINTEL SCHEDULE FOR 8" CMU WALL

CLEAR SPAN	SIZE (bxt)	MIN. REINF.
UP TO 4'-0"	8" x 16"	1 #4
4'-1" TO 8'-0"	8" x 16"	1 #6



NOTES:
1. PROVIDE 8" BEARING AT EA. END
2. CONC. COMP. STRENGTH f'c TO BE 4,000 PSI
3. REINF. BAR TO BE GR. 60, fy = 60,000 PSI

TYPICAL DETAIL AT INTERSECTION OF STRUCTURAL BOND BEAMS

N.T.S

fy = 60000 psi f'c = 5000 psi cylinder strength

BAR SIZE db	COMPRESSION		TENSION EMBEDMENT LENGTH				TENSION LAP SPLICE LENGTH - CLASS B			
	EMBEDMENT LENGTH	LAP SPLICE LENGTH	TOP BARS		OTHER BARS		TOP BARS		OTHER BARS	
			CATEGORY		CATEGORY		CATEGORY		CATEGORY	
			I	II	I	II	I	II	I	II
#3	8	12	17	25	13	19	22	32	17	25
#4	9	15	22	33	17	25	29	43	22	33
#5	11	19	28	41	21	32	36	54	28	41
#6	14	23	33	50	25	38	43	65	33	50
#7	16	26	48	72	37	56	63	94	48	72
#8	18	30	55	83	42	64	72	108	55	83
#9	20	34	62	93	48	72	81	121	82	93
#10	23	38	70	105	54	81	91	137	70	105
#11	25	42	78	117	60	90	101	152	78	117
NOTATION USED ON DRAWING	• LCE	• LCS	• LTE				• LTS			

fy = 60000 psi f'c = 6000 psi cylinder strength

BAR SIZE db	COMPRESSION		TENSION EMBEDMENT LENGTH				TENSION LAP SPLICE LENGTH - CLASS B			
	EMBEDMENT LENGTH	LAP SPLICE LENGTH	TOP BARS		OTHER BARS		TOP BARS		OTHER BARS	
			CATEGORY		CATEGORY		CATEGORY		CATEGORY	
			I	II	I	II	I	II	I	II
#3	8	12	15	23	12	17	20	29	15	23
#4	9	15	20	30	15	23	26	39	20	30
#5	11	19	25	38	19	29	33	49	25	38
#6	14	23	30	45	23	35	39	59	30	45
#7	16	26	44	66	34	51	57	86	44	66
#8	18	30	50	76	39	58	62	98	50	76
#9	20	34	57	85	44	66	74	111	57	85
#10	23	38	64	96	49	54	83	125	64	96
#11	25	42	71	106	55	82	92	138	71	106

NOTES FOR EMBEDMENT & SPLICE SCHEDULE

1) THIS SCHEDULES APPLY FOR NORMAL WEIGHT CONCRETE. (W=150 PCF)

2) THE CATEGORY OF THE REINFORCEMENT FOR DETERMINING THE EMBEDMENT & SPLICE LENGTHS SHALL BE OBTAINED FROM THE FOLLOWING TABLE: (db = BAR DIAMETER)

CATEGORY	CLEAR COVER	CLEAR SPACING	REMARKS
I	> db	> db	BEAM STIRRUPS OR COLUMN TIES THROUGHOUT DEVELOPMENT LENGTH >= CODE MINIMUM.
I	> db	> 2 db	
II	OTHER CASES		

3) TENSION LAP SPLICE LENGTH CATEGORIES I, II ARE BASED ON ACI CLASS B CONDITIONS. LESSER LENGTHS MAY BE ACCEPTABLE, BUT ONLY IF HALF OR LESS OF THE BARS ARE SPLICED AT A POINT AND REINFORCEMENT AREA IS AT LEAST TWICE THAT REQUIRED BY ANALYSIS. CONTRACTOR CAN REQUEST SUCH REDUCTION BY INDICATING THE FOLLOWING. BY INDICATING THE FOLLOWING:
   - A) WHERE THE SIZE AND NUMBER OF TIES OR SPIRALS PERMITS THE REDUCTION OF LAP LENGTH, THOSE BARS SHALL BE INDICATED ON THE DETAILS.
   - B) WHERE COMPUTED STRESS VALUES PERMIT THE REDUCTION OD LAP LENGTH. COMPUTATIONS SHALL BE SUBMITTED FOR REVIEW.
   - C) THE APPLICABLE SECTION OF THE ACI-99 CODE, PERMITTING THE LESSER SPLICE LENGTH, SHALL BE INDICATED ON THE SUBMITTED MATERIAL.

4) WHERE BARS OF DIFFERENT SIZE ARE TO BE SPLICED, THE SPLICE LENGTH FOR ALL ALL BARS SHALL BE THAT REQUIRED FOR THE LARGEST BAR.

5) USE TENSION LAP SPLICE LENGTH (LTS) AT ALL SPLICE LOCATIONS NOT SPECIFICALLY DETAILED UNLESS INDICATED OTHERWISE ON PLANS OR DETAILS.

6) TOP BARS ARE HORIZONTAL BARS PLACED SUCH THAT MORE THAN 12" OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE BAR.

7) SPLICE LENGTHS SHALL BE DIMENSIONED AT ALL LOCATIONS ON ALL SHOP DRAWINGS.

EMBEDMENT AND SPLICE LENGTH SCHEDULE

N.T.S

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

SHEET TITLE:

TYPICAL DETAILS-I

SEAL & SIGNATURE

STATE OF NEW YORK
OWAIS AHMAD
093650
LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: 08/14/15 PROJECT NO: #15190

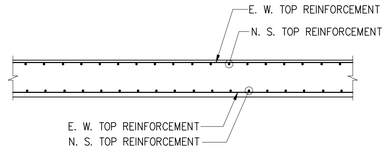
DRAWN BY: R.G. CHECKED BY: O.A.

SCALE: AS-NOTED SHEET NO: 11 OF-14

DRAWING NO:

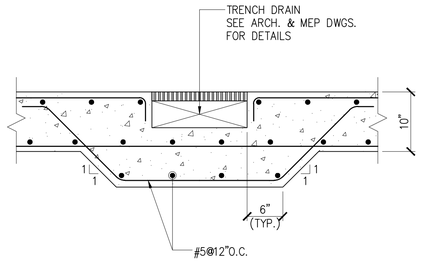
S-300.00

NYC DOB NUMBER: NB # XXX XXX XXX



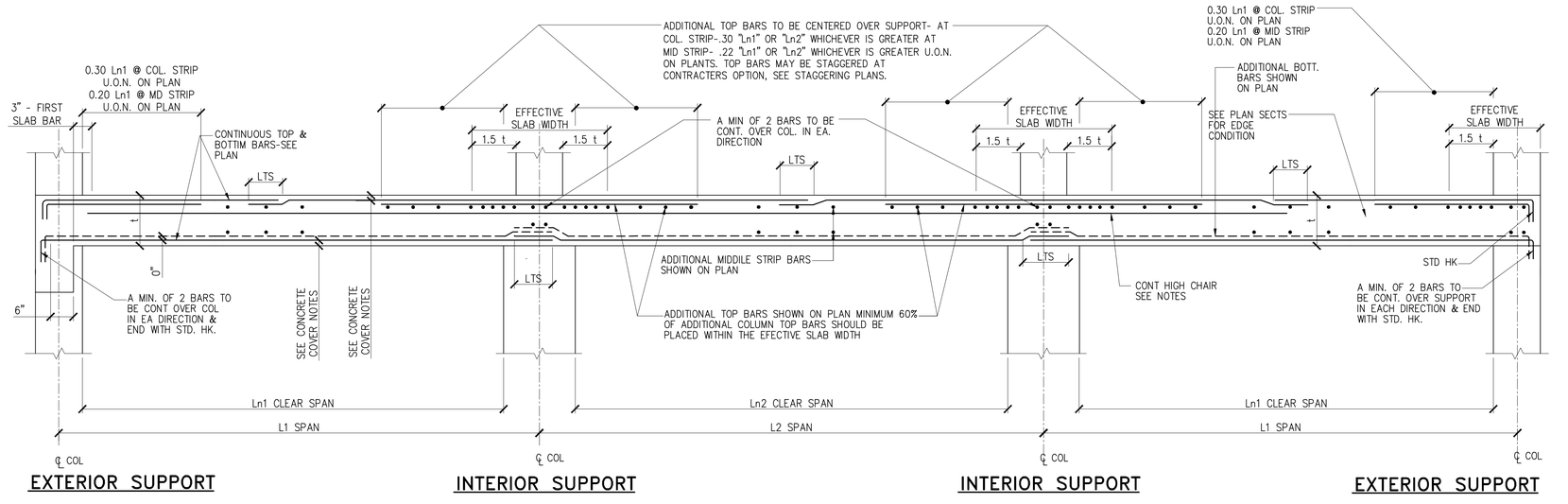
TYPICAL SLAB REINFORCEMENT DETAILS

N.T.S



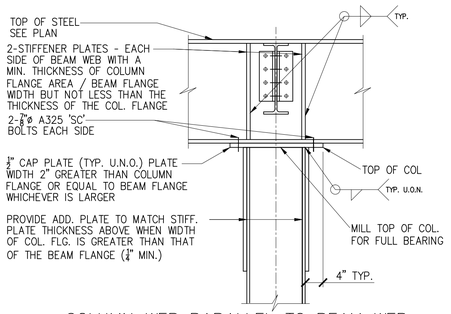
DETAIL @ TRENCH DRAIN

SCALE 1" = 1'-0"

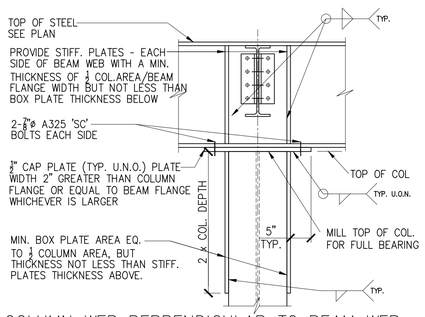


TYPICAL CONCRETE SLAB DETAILS

1/2" = 1'-0"



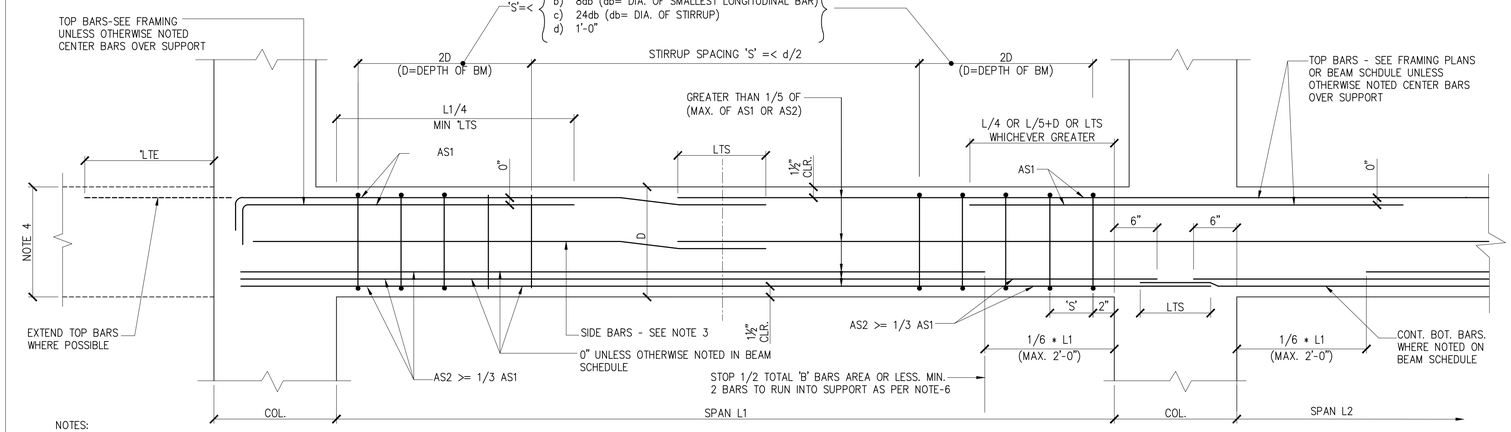
COLUMN WEB PARALLEL TO BEAM WEB



COLUMN WEB PERPENDICULAR TO BEAM WEB

TYPICAL STEEL CONNECTION DETAILS

3/4" = 1'-0"



NOTES:

1) UPTURNED BEAMS MUST BE PLACED MONOLITHICALLY FOR FULL TOTAL DEPTH OF BEAMS. COLUMNS SUPPORTING UPTURNED BEAMS MUST BE POURED MONOLITHICALLY WITH BEAMS FOR FULL TOTAL DEPTH OF BEAMS.
2) L IS THE LARGER OF TWO ADJACENT SPANS L1 OR L2.
3) PROVIDE #4 LONGITUDINAL BARS AT A MAX. VERTICAL SPACING OF 12" AT EACH VERTICAL FACE FOR BEAMS 24" OR MORE IN DEPTH, UNLESS OTHERWISE NOTED IN SECTIONS OR SCHEDULE.
4) CONTINUE TOP & BOTT. REINF. FOR LTE OR TO EDGE OF CANTILEVERS WHERE APPLICABLE SEE PLAN & SECTIONS.
5) THIS DETAIL ALSO APPLIES TO GRADE BEAMS UNLESS OTHERWISE NOTED ON PLANS AND DETAILS.
6) PROVIDE #4@12" TOP BARS (MIN.) OVER ALL BEAMS IF NO OTHER REINF. IS CALLED ON PLACE.
7) WHERE TWO OR MORE LAYERS OF REINF. ARE INDICATED (#L) ON BEAM SCHEDULE, PLACE LAYERS 1" CLEAR DISTANCE APPART.
8) SEE "SCHEDULE OF EMBEDMENT & SPLICE LENGTHS" THIS DRAWING.

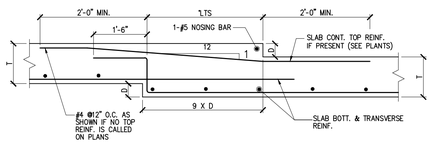
ELEVATION

TYPICAL CONCRETE BEAM DETAILS

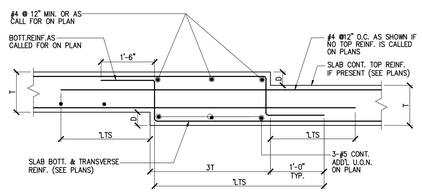
3/4" = 1'-0"

STEP IN FRAMED SLAB DETAILS

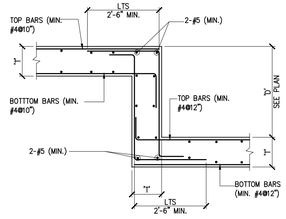
N.T.S



FOR "D" EQUAL TO OR LESS THAN 2"



FOR "D" GREATER THAN 2" (BUT LESS THAN "T")



FOR "D" GREATER THAN "T")

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

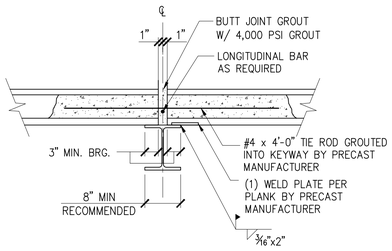
SHEET TITLE:

TYPICAL DETAILS-II

SEAL & SIGNATURE

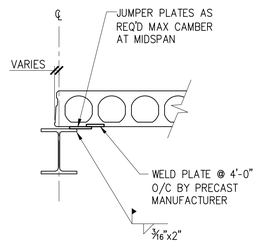
STATE OF NEW YORK · DINAS ARKADI · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: 08/14/15
PROJECT NO: #15190
DRAWN BY: R.G.
CHECKED BY: O.A.
SCALE: AS-NOTED
SHEET NO: 12 OF-14
DRAWING NO: S-301.00
NYC DOB NUMBER: NB # XXX XXX XXX



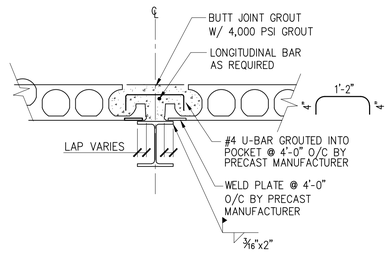
NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR (BEARING ON STEEL) N.T.S.



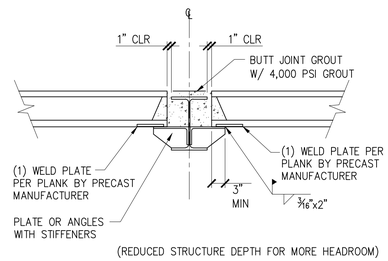
NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

PRECAST CONCRETE HOLLOW CORE PLANK
SIDE LAP ON STEEL N.T.S.



NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

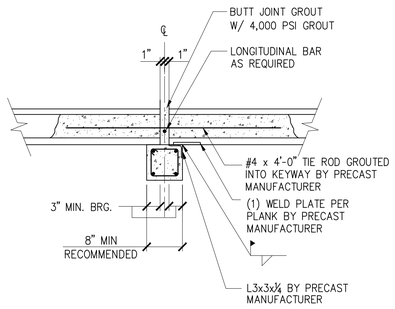
PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR SIDE LAP ON STEEL N.T.S.



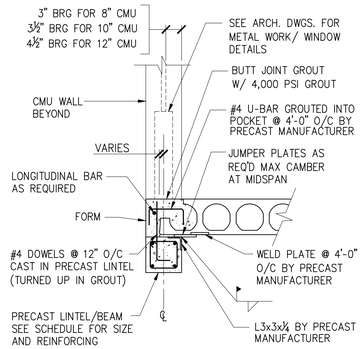
(REDUCED STRUCTURE DEPTH FOR MORE HEADROOM)

NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

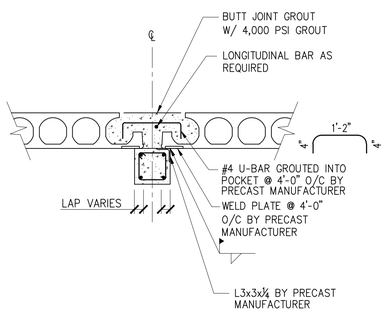
PRECAST CONCRETE HOLLOW CORE PLANK INTERIOR BEARING
ON STEEL (REDUCED STRUCTURE DEPTH FOR MORE HEADROOM)



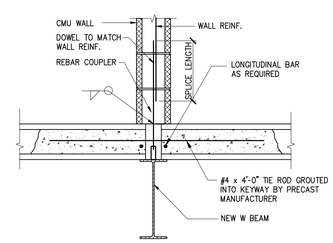
PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR (BEARING ON PRECAST CONC. BEAM) N.T.S.



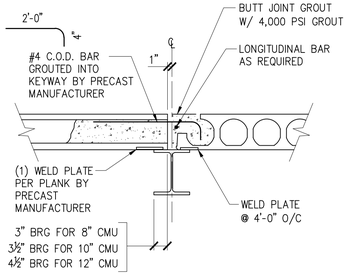
PRECAST CONCRETE HOLLOW CORE PLANK
SIDE LAP ON PRECAST CONC. BEAM N.T.S.



PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR SIDE LAP ON PRECAST CONC. BEAM N.T.S.

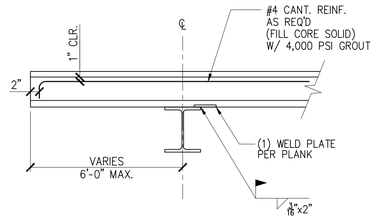


TYPICAL STEEL BEAM SUPPORTING CMU DETAILS
N.T.S.



NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

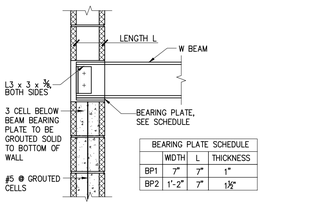
PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR (BEARING ON PRECAST CONC. BEAM) N.T.S.



NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

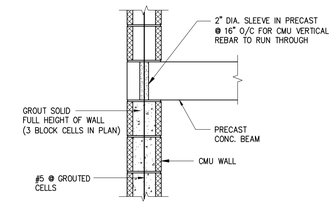
HOLLOWCORE PLANKS THAT ARE USED FOR EXTERIOR BALCONIES NEED TO HAVE A SLOPED WATERPROOF TOPPING APPLIED IN THE FIELD BY OTHERS.

PRECAST CONCRETE HOLLOW CORE PLANK
SIDE LAP ON PRECAST CONC. BEAM N.T.S.



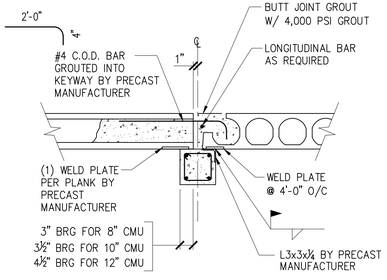
BEARING PLATE SCHEDULE			
	WIDTH	L	THICKNESS
BP1	7"	7"	1"
BP2	1'-2"	7"	½"

TYPICAL W- BEAM SBEARING ON CMU DETAIL
N.T.S.



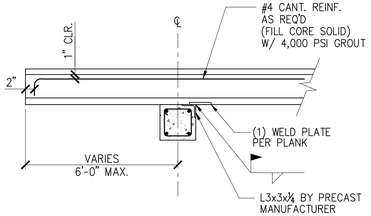
TYPICAL PRECAST CONC. BEAM BEARING ON CMU DETAIL
N.T.S.

PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR CHANGE OF DIRECTION (BEARING ON STEEL) N.T.S.



NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

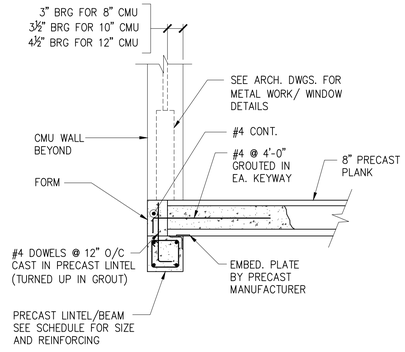
PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR CHANGE OF DIRECTION (BEARING ON PRECAST CONC. BEAM)



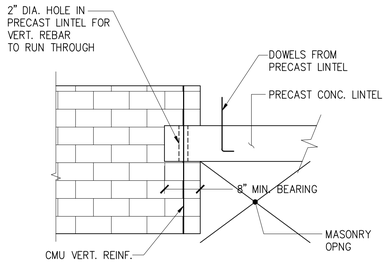
NOTE: DO NOT WELDING BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

HOLLOWCORE PLANKS THAT ARE USED FOR EXTERIOR BALCONIES NEED TO HAVE A SLOPED WATERPROOF TOPPING APPLIED IN THE FIELD BY OTHERS.

PRECAST CONCRETE HOLLOW CORE PLANK
CANTILEVER (BEARING ON PRECAST CONC. BEAM) N.T.S.



PRECAST PLANK BEARING ON PRECAST LINTEL/BEAM
N.T.S.



TYPICAL PRECAST CONC. BEAM BEARING ON CMU DETAIL
N.T.S.

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
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STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

SHEET TITLE:

TYPICAL DETAILS-III

SEAL & SIGNATURE

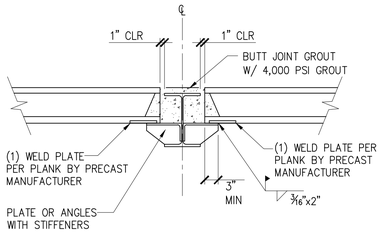
STATE OF NEW YORK · OWAIS AHMAD · 093650 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:	PROJECT NO:
08/14/15	#15190
DRAWN BY:	CHECKED BY:
R.G.	O.A.
SCALE:	SHEET NO:
AS-NOTED	13 OF-14

DRAWING NO:

S-302.00

NYC DOB NUMBER: NB # XXX XXX XXX

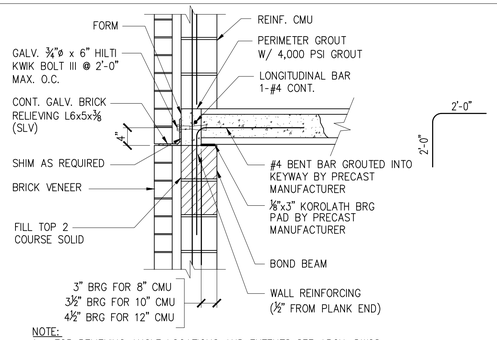


(REDUCED STRUCTURE DEPTH FOR MORE HEADROOM)

NOTE: DO NOT WELD BOTH ENDS OF THE SAME PLANK. ALTERNATING ENDS MUST BE WELDED TO BRACE BEAMS AT BOTH BEARINGS.

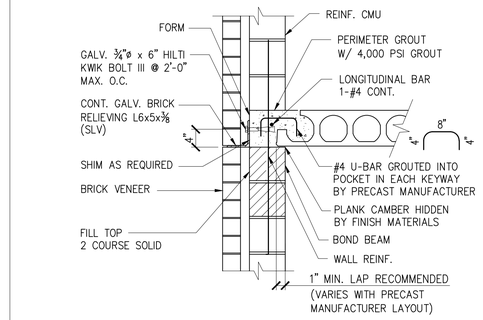
SECTION @ 3RD FLOOR-ROOF UPTURNED BEAM

5

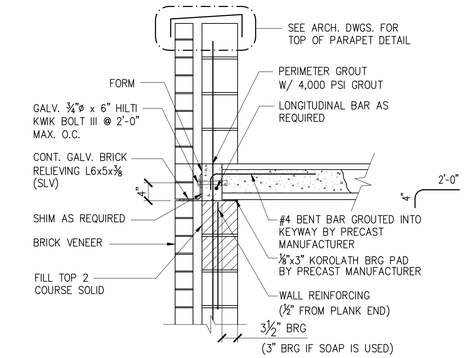


NOTE:
1. FOR RELIEVING ANGLE LOCATIONS AND EXTENTS SEE ARCH. DWGS.

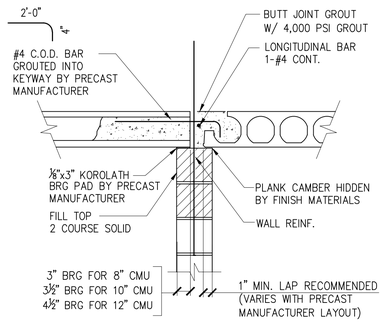
PRECAST CONCRETE HOLLOW CORE PLANK
EXTERIOR BEARING (TYP. FLR.) N.T.S.



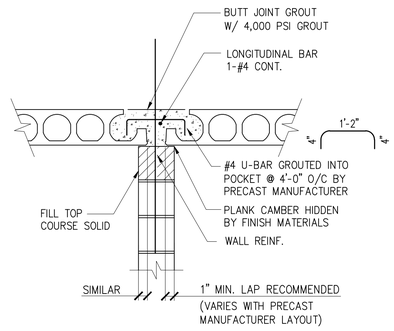
PRECAST CONCRETE HOLLOW CORE PLANK
EXTERIOR SIDE LAP N.T.S.



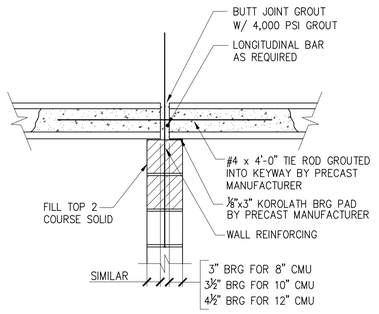
PRECAST CONCRETE HOLLOW CORE PLANK
EXTERIOR BEARING (ROOF) N.T.S.



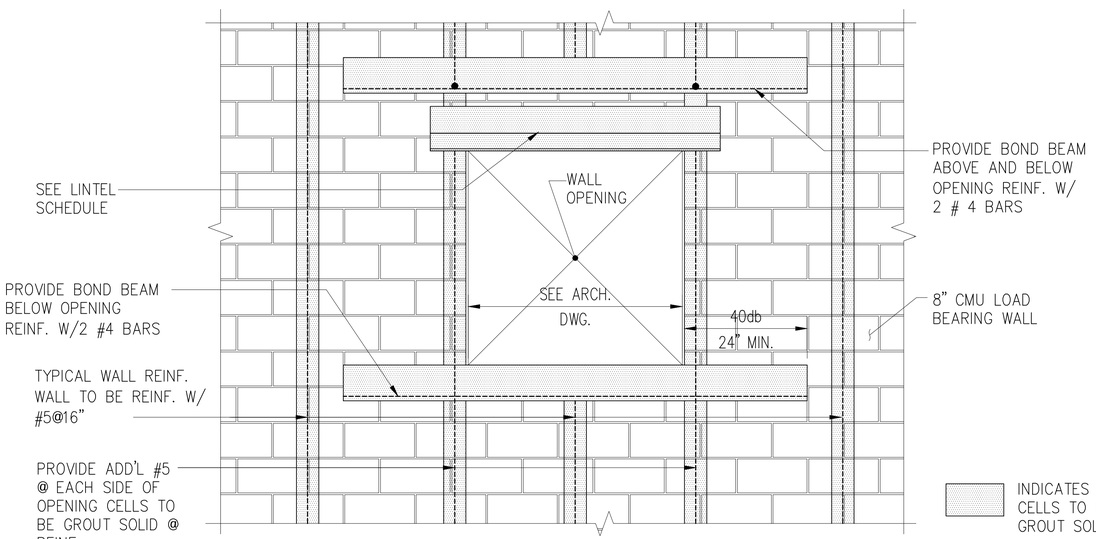
PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR CHANGE OF DIRECTION N.T.S.



PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR SIDE LAP N.T.S.



PRECAST CONCRETE HOLLOW CORE PLANK
INTERIOR BEARING N.T.S.



NOTES:

1. WALL DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE NEW YORK CITY BUILDING CODE, LATEST EDITION.
2. CMU WALL TO HAVE MINIMUM COMPRESSIVE STRENGTH OF F'M=2500 PSI.
3. GROUT FOR FILLED CELLS TO HAVE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.
4. PROVIDE #5 VERT. REBAR AT WALL ENDS AND WALL CORNERS.
5. ADD #5 VERT. REBAR AT EACH SIDE OF CONTROL JOINTS & OPENINGS.
6. PROVIDE DURO-WALL HORIZONTAL REINFORCEMENT AT EVERY OTHER COURSE.
7. GROUT ALL CELLS SOLIDS FOR ALL CMU AT STONE BACK-UP WALL

TYPICAL CMU WALL OPENING DETAILS

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER:
100 UNION OWNER, LLC
810 7TH AVENUE
NEW YORK, NY 10019

DEVELOPER:
MGM PROPERTY GROUP, LLC
810 7TH AVENUE
NEW YORK, NY 10019

STRUCTURAL ENGINEER:
ADG ENGINEERING, PC
744 BROAD STREET-19TH FL.
NEWARK N.J. 07102

MEP ENGINEER:
RODKIN CARDINALE CONSULTING ENGINEERS,PC
224 WEST 29TH STREET-4TH FLR
NEW YORK, N.Y.10001
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
09/02/15	DOB SUBMISSION

SHEET TITLE:

TYPICAL DETAILS-IV

SEAL & SIGNATURE

STATE OF NEW YORK
OWAIS AHMAD
093650
LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: 08/14/15
PROJECT NO: #15190
DRAWN BY: R.G.
CHECKED BY: O.A.
SCALE: AS-NOTED
SHEET NO: 14 OF-14
DRAWING NO: S-303.00
NYC DOB NUMBER: NB # XXX XXX XXX

COMcheck Software Version 4.0.1

Mechanical Compliance Certificate

Project Information

Energy Code: 2014 New York Energy Conservation Construction Code
Project Title:
Location: Bronx County, New York
Climate Zone: 4a
Project Type: New Construction

Construction Site: Owner/Agent: Designer/Contractor:

Additional Efficiency Package

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity System Type & Description

54 PTAC-A (Single Zone):
Cooling: 1 each - Packaged Terminal Unit, Capacity = 10 kBtu/h, Air-Cooled Condenser, No Economizer, Economizer exception: Low Operating Hours
Proposed Efficiency = 12.00 EER, Required Efficiency = 10.89 EER
Fan System: None

34 PTAC-B (Single Zone):
Cooling: 1 each - Packaged Terminal Unit, Capacity = 13 kBtu/h, Air-Cooled Condenser, No Economizer, Economizer exception: Low Operating Hours
Proposed Efficiency = 11.40 EER, Required Efficiency = 9.90 EER
Fan System: None

1 ACCU-1 (Single Zone):
VRF, Air Cooled Heat Pump
Heating Mode: Capacity = 54 kBtu/h,
No minimum efficiency requirement applies
Cooling Mode: Capacity = 48 kBtu/h,
No minimum efficiency requirement applies
Fan System: None

2 B-1 & B-2:
Heating: Hot Water Boiler, Capacity 1600 kBtu/h, Gas
Proposed Efficiency: 86.00 % Et, Required Efficiency: 80.00 % Et

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2014 New York Energy Conservation Construction Code requirements in COMcheck Version 4.0.1 and to comply with the mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

COMcheck Software Version 4.0.1

Inspection Checklist

Energy Code: 2014 New York Energy Conservation Construction Code

Requirements: 77.0% were addressed directly in the COMcheck software
Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

2014 New York Energy	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR2]¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C406 [PR9]¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

2014 New York Energy	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C403.2.4.5 [FO9]¹	Freeze protection and snow/ice melting system sensors for future connection to controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
C403.2.3 [ME55]¹	HVAC equipment efficiency verified.	Efficiency:____	Efficiency:____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C403.2.5.1 [ME59]¹	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.7 [ME60]¹	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	R-____	R-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.8 [ME61]¹	HVAC piping insulation thickness. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	____ in.	____ in.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.8 [ME61]¹	HVAC piping insulation thickness. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	____ in.	____ in.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.8 [ME41]¹	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.7 [ME10]¹	Ducts and plenums sealed based on static pressure and location.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.7.1.3 [ME11]¹	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.7.1.3 [ME11]¹	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.7.1.3 [ME11]¹	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.3.2 [ME64]¹	Two-pipe hydronic systems using a common distribution system have controls to allow a deadband >=15 ºF, allow operation in one mode for at least 4 hrs before changeover, and have rest controls to limit heating and cooling supply temperature to <=30 ºF.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
C408.2.2.1 [ME71]¹	Air outlets and zone terminal devices have means for air balancing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2 [ME66]¹	VAV fan motors >=5.0 hp to be driven by variable speed drive, have a vane-axial fan with variable pitch blades, or have controls to limit fan motor demand.	☐ VSD ☐ Vane axial fan ☐ Other	☐ VSD ☐ Vane axial fan ☐ Other	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.2 [ME66]¹	VAV fan motors >=5.0 hp to be driven by variable speed drive, have a vane-axial fan with variable pitch blades, or have controls to limit fan motor demand.	☐ VSD ☐ Vane axial fan ☐ Other	☐ VSD ☐ Vane axial fan ☐ Other	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.2 [ME66]¹	VAV fan motors >=5.0 hp to be driven by variable speed drive, have a vane-axial fan with variable pitch blades, or have controls to limit fan motor demand.	☐ VSD ☐ Vane axial fan ☐ Other	☐ VSD ☐ Vane axial fan ☐ Other	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.2 [ME66]¹	VAV fan motors >=5.0 hp to be driven by variable speed drive, have a vane-axial fan with variable pitch blades, or have controls to limit fan motor demand.	☐ VSD ☐ Vane axial fan ☐ Other	☐ VSD ☐ Vane axial fan ☐ Other	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.3.4 [ME68]¹	Hydronic systems greater than 300,000 Btu/h designed for variable fluid flow.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.3.4 [ME69]¹	Temperature reset by representative building loads in pumping systems for chiller and boiler systems >300,000 Btu/h.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.6 [ME57]¹	Exhaust air energy recovery on systems meeting Table C403.2.6			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.11 [ME71]¹	Unenclosed spaces that are heated use only radiant heat.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.7 [ME35]¹	Hot gas bypass limited to: <=240 kBtu/h - 50% >240 kBtu/h - 25%			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.7 [ME35]¹	Hot gas bypass limited to: <=240 kBtu/h - 50% >240 kBtu/h - 25%			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
C403.3.4 [ME76]¹	Sleeping rooms in Group R-1 occupancies are provided with dedicated system to automatically control HVAC systems and energy consumption during unoccupied periods. Controls are designed to raise cooling and lower heating temperature set points by at least 4°F when room is unoccupied.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** null.
C403.3.4 [ME76]¹	Sleeping rooms in Group R-1 occupancies are provided with dedicated system to automatically control HVAC systems and energy consumption during unoccupied periods. Controls are designed to raise cooling and lower heating temperature set points by at least 4°F when room is unoccupied.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** null.
C403.3.4 [ME76]¹	Sleeping rooms in Group R-1 occupancies are provided with dedicated system to automatically control HVAC systems and energy consumption during unoccupied periods. Controls are designed to raise cooling and lower heating temperature set points by at least 4°F when room is unoccupied.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** null.
C403.3.4 [ME76]¹	Sleeping rooms in Group R-1 occupancies are provided with dedicated system to automatically control HVAC systems and energy consumption during unoccupied periods. Controls are designed to raise cooling and lower heating temperature set points by at least 4°F when room is unoccupied.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** null.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

2014 New York Energy	Final Inspection	Complies?	Comments/Assumptions
C403.2.4.2 [FI47]¹	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.2 [FI47]¹	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.2 [FI47]¹	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.2 [FI38]¹	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Manual changeover thermostats.
C403.2.4.2 [FI20]¹	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.3 [FI39]¹	Each zone equipped with setback controls using automatic time clock or programmable control system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.3 [FI40]¹	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C408.2.5.1 [FI7]¹	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C303.3,C408.2.5.2 [FI8]¹	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.5.3 [FI43]¹	An air and/or hydronic system balancing report is provided for HVAC systems.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.3.2 [FI10]¹	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.2 [FI27]¹	HVAC systems and equipment capacity does not exceed calculated loads.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

2014 New York Energy	Final Inspection	Complies?	Comments/Assumptions
C408.2.1 [FI28]¹	Commissioning plan developed by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Applicable	
C408.2.4 [FI29]¹	Preliminary commissioning report completed and certified by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.5.4 [FI30]¹	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.3.1 [FI31]¹	HVAC equipment has been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C406 [FI34]¹	Efficient HVAC performance, efficient lighting system, or on-site supply of renewable energy consistent with what is shown the approved plans.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

COMCHECK SHEET 1

SEAL & SIGNATURE

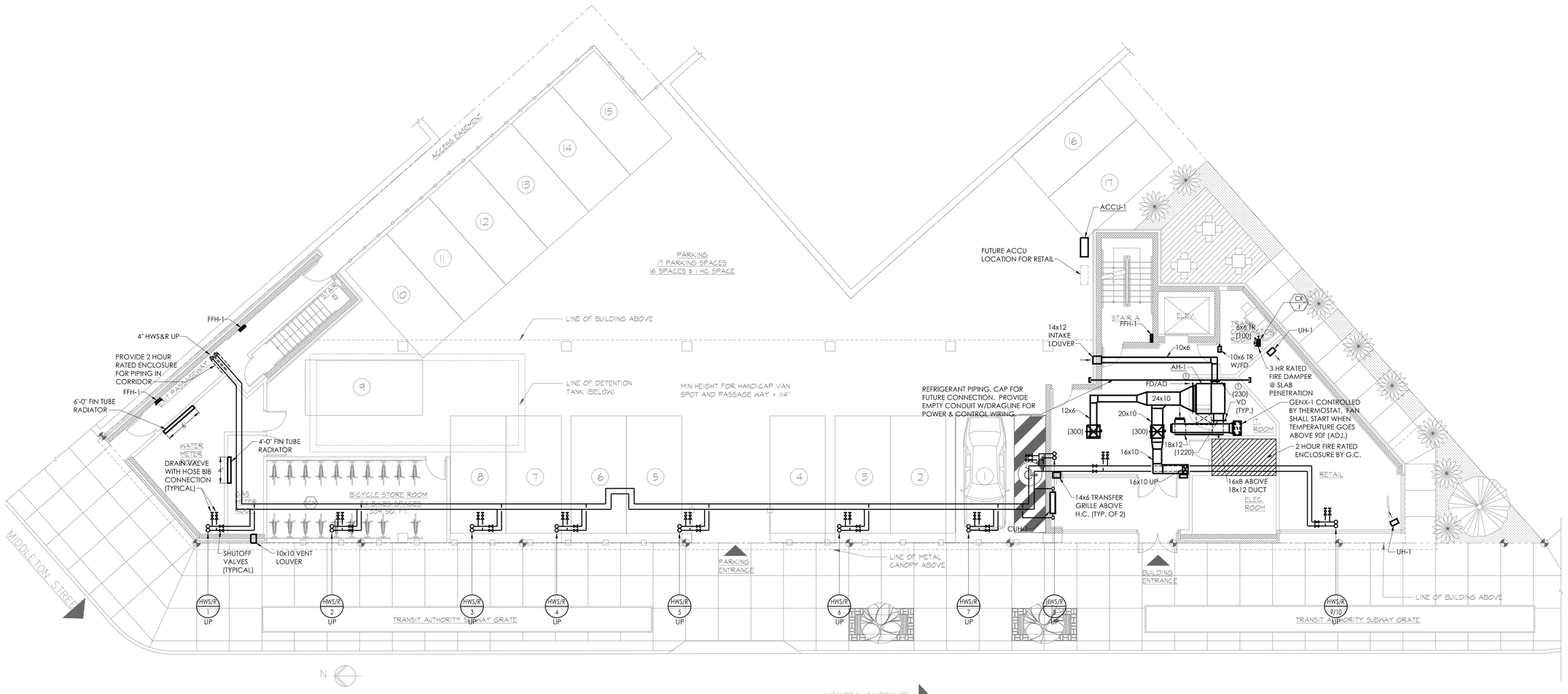
ISSUE DATE: PROJECT NO:
RC #1540

DRAWN BY: CHECKED BY:
YP DC

SCALE: SHEET NO:
AS NOTED

DRAWING NO:
EN-001.00

NYC DOB NUMBER: NB # XXX XXX XXX



1ST FLOOR PLAN

SCALE: 1/8" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

MECHANICAL 1ST FLOOR PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · ANTHONY JOSEPH AUFGANG · LICENSED PROFESSIONAL ENGINEER · 083593

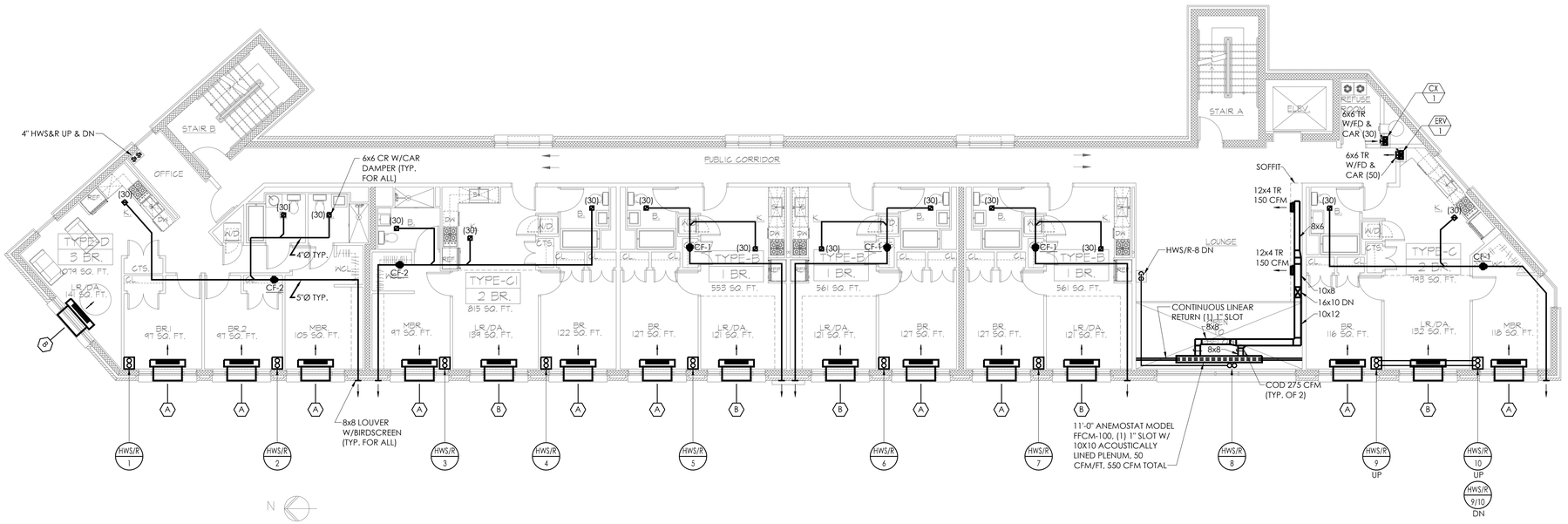
ISSUE DATE: PROJECT NO:
RC #1540

DRAWN BY: CHECKED BY:
YP DC

SCALE: SHEET NO:
AS NOTED

DRAWING NO:
M-101.00

NYC DOB NUMBER: NB # XXX XXX XXX



2ND FLOOR PLAN

SCALE: 1/8" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

MECHANICAL 2ND FLOOR PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · DOMINIC JOSEPH SCIULLO · 083592 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:

PROJECT NO: RC #1540

DRAWN BY: YP

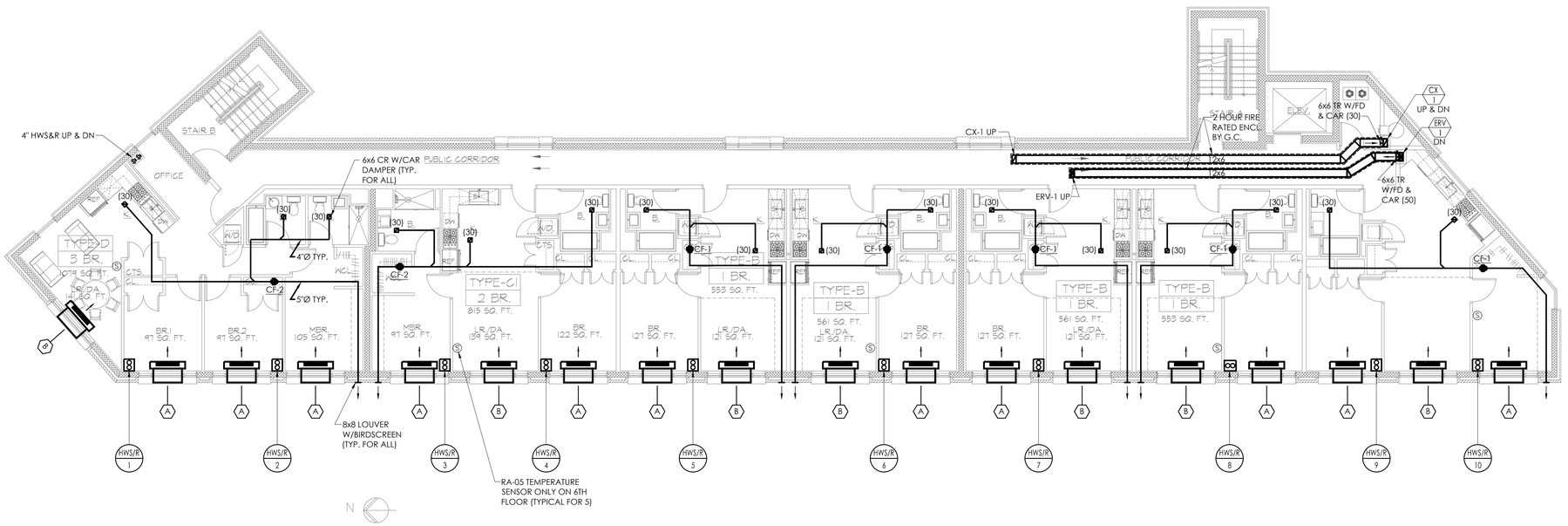
CHECKED BY: DC

SCALE: AS NOTED

SHEET NO:

DRAWING NO: M-102.00

NYC DOB NUMBER: NB # XXX XXX XXX



3RD-6TH FLOOR PLAN

SCALE: 1/8" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

MECHANICAL 3RD-6TH FLOOR PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · DOMINIC JOSEPH ANDRIULLI · 083592 · LICENSED PROFESSIONAL ENGINEER

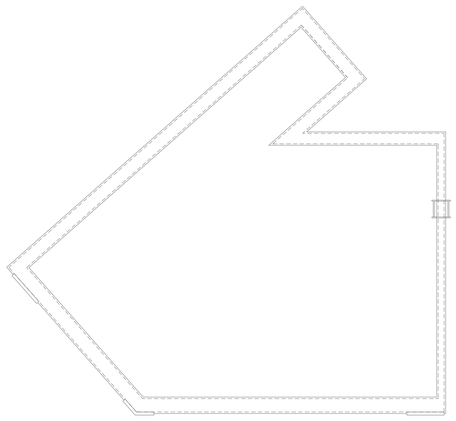
ISSUE DATE: PROJECT NO:
RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

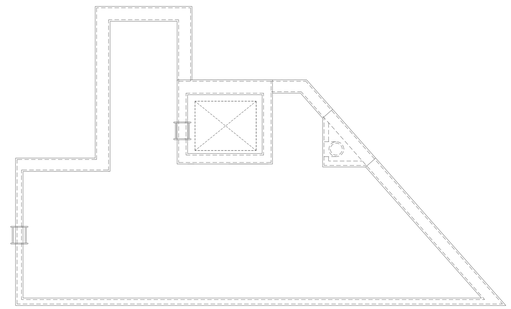
DRAWING NO:
M-103.00

NYC DOB NUMBER: NB # XXX XXX XXX



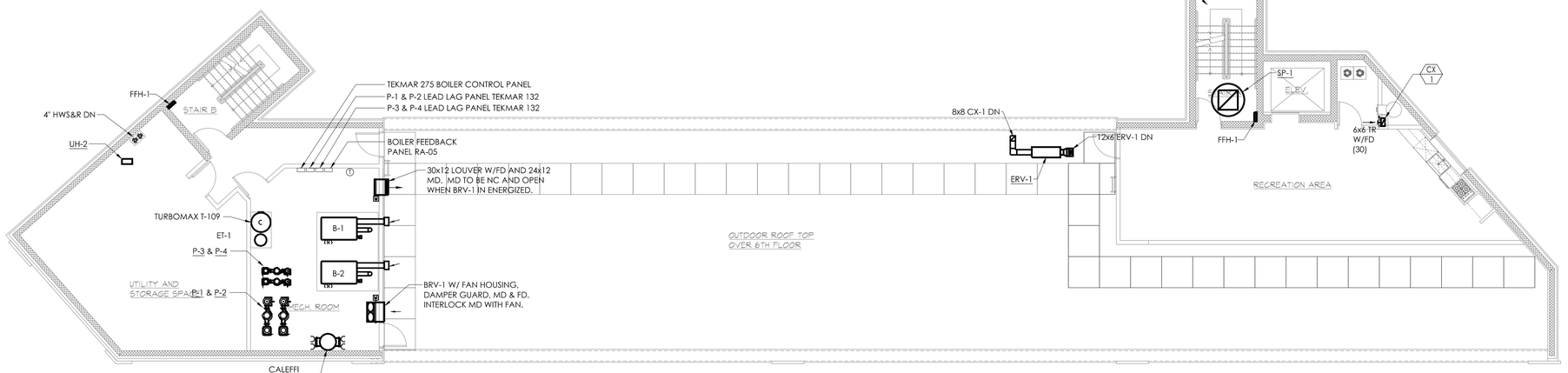
MECHANICAL BOILER ROOM AND
STAIR BULKHEAD ROOF PLAN

N



RECREATION AREA ROOF, STAIR BULKHEAD
& ELEVATOR PENTHOUSE ROOF PLAN

N



NOTES:

1) INSTALL BOILERS ON SPRING VIBRATION ISOLATORS WITH A MINIMUM OF 1" DEFLECTION.
2) PROVIDE 4" CONCRETE PAD FOR ALL FLOOR MOUNTED BOILER ROOM EQUIPMENT.
3) MOUNT P-1&2 AND P-3&4 FROM THE CEILING. REFER TO DETAIL SHEET M-400 FOR MORE INFORMATION.
4) IN ADDITION TO CO DETECTOR TIED TO THE FIRE ALARM SYSTEM, PROVIDE AN ADDITIONAL CO DETECTOR TO SHUT DOWN THE BOILERS IF CO LEVELS GO ABOVE SET POINT. REFER TO ELECTRICAL DRAWINGS FOR WIRING DIAGRAM.
5) PROVIDE THE FOLLOWING SAFETIES FOR BOILERS: FLOW SWITCH AND LOW WATER CUT OUT.
6) SEE ARCHITECTUAL DRAWING FOR THE SIZE AND LOCATION OF STAIR SMOKE VENTS. PROVIDE MOTORIZED DAMPER IN SMOKE VENT. MOTORIZED DAMPER TO BE NORMALLY CLOSED AND OPEN WHEN SMOKE IS DETECTED IN THE STAIR.
7) ALL DUCTWORK EXPOSED TO OUTDOORS SHALL BE COVERED IN FLEX CLAD WEATHERPROOF ENCLOSURE.

N

7TH FLOOR PLAN

SCALE: 1/8" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

MECHANICAL 7TH FLOOR PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · JOSEPH · MICHAEL · 083592 · LICENSED PROFESSIONAL ENGINEER

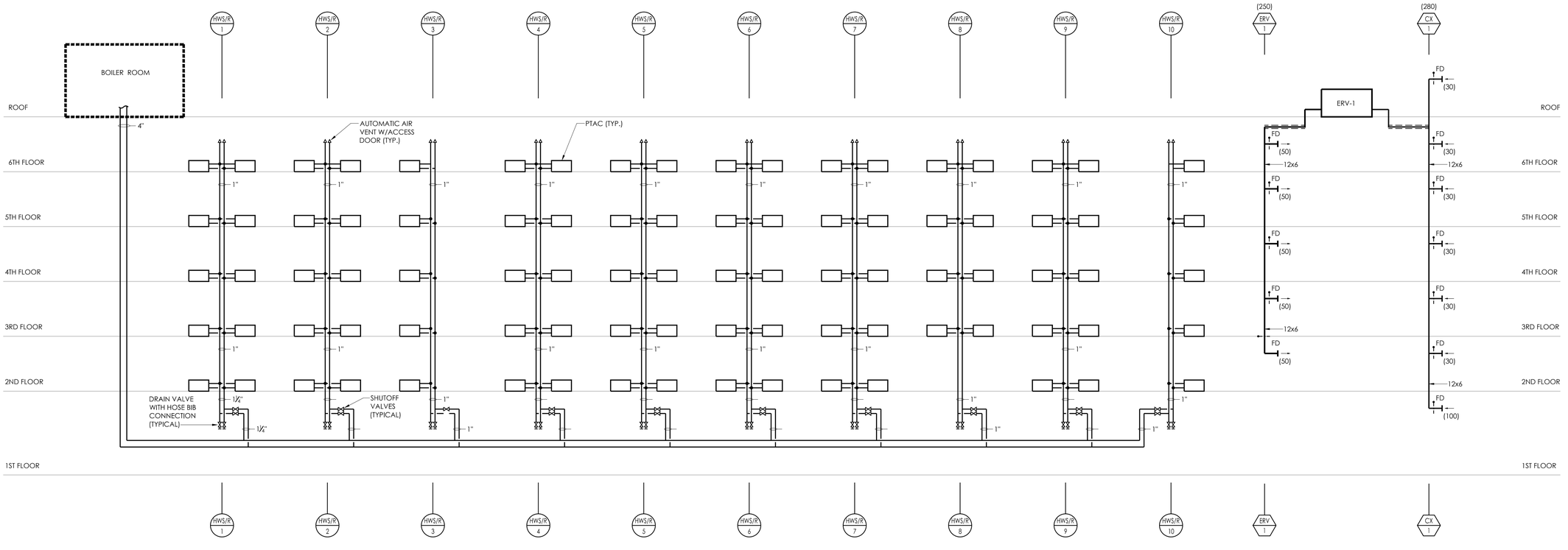
ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: M-104.00

NYC DOB NUMBER: NB # XXX XXX XXX



HOT WATER AND AIR RISER DIAGRAM

NOTES:

1. PROVIDE 1" INSULATION FOR ALL HWS&R BRANCHES FROM RISER TO PTAC. ALL OTHER HOT WATER PIPING TO BE INSULATED AS PER INSULATION TABLE ON M-300.

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

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DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

MECHANICAL WATER AND AIR RISER DIAGRAM

SEAL & SIGNATURE

STATE OF NEW YORK · DOMINIC JOSEPH GIGLIO · 083592 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:

PROJECT NO:
RC #1540

DRAWN BY: YP

CHECKED BY: DC

SCALE: AS NOTED

SHEET NO:

DRAWING NO:
M-200.00

NYC DOB NUMBER: NB # XXX XXX XXX

BOILER SCHEUDLE

NO.	TYPE	GAS HEATING CAPACITY		GPM	EWT (°F)	LWT (°F)	ELECTRICAL DATA						PRESSURE RELIEF (LBS)	MANUFACTURER MODEL NUMBER	MEA #	OPERATING WEIGHT (LBS)	EFFICIENCY
							BOILER			PUMP							
		INPUT (MBH)	OUTPUT (MBH)				VOLTS	PH	AMPS	VOLTS	PH	AMPS					
B-1&2	WATER TUBE NON- COND.	1600	1376	138	160	180	120	1	20	230	1	20	75 LBS. PRESSURE REL VALVE	LAARS RHEOS RHCH 1600	68-03-E	-	86%

1) PROVIDE TEKMAR 275 CONTROL PANEL

INCREMENTAL AC UNIT (PTAC)

UNIT NO.	GPM	COOLING CAPACITY, BTU/HR	HEATING CAPACITY, BTU/HR	ELECTRICAL DATA			MANUFACTURER & MODEL	EER	REMARKS
				VOLTS	PH	AMPS			
TYPE (A)	1	9,700	16,500	208	1	3.9	ICE AIR 8RSNU09	12	HEATING CAPACITY BASED ON 150°F ENT. WATER TEMP. 1 GPM, DELTA T=20°F. PROVIDE 2 WAY MOTORIZED VALVE AND AUTOFLOW LIMITING VALVE BUILT-IN DIGITAL CONTROLS. R-410 REFRIGERANT
TYPE (B)	1	12,800	16,500	208	1	5.5	ICE AIR 8RSNU13	11.4	

PTAC LOUVER SHALL BE 42"X16" AS PER NYS ENERGY CODE.
PROVIDE AUTO FLOW LIMITING VALVE, 2-WAY MOTORIZED VALVE AND BALL VALVES FOR ALL PTACS.
PROVIDE MANUAL OUTSIDE AIR DAMPER.

CABINET UNIT HEATER (hydronic)

UNIT No.	CAPACITY, BTUH	GPM	CFM	VOLTS	PHASE	HP	CONTROL	MANUFACTURER	MODEL	REMARKS
CUH-1	22,400	2.3	330	115	1	0.03	BUILT-IN	MODINE	CW-07-003	BUILT-IN THERMOSTAT
UH-2										

FAN SCHEDULE

DESIGNATION	SERVICE	LOCATION	CFM	S.P.	FAN RPM	MOTOR					WEIGHT (LBS)	MANUFACTURER MODEL NO.	REMARKS
						BHP	HP	VOLTS	PHASE	HZ			
CF-1	TOILET EXHAUST	APARTMENTS	60	0.2	2822	-	19.1 W	115	1	60	6	FANTECH FR-100	1,3,5
CF-2	TOILET EXHAUST	APARTMENTS	90	0.2	2899	-	80 W	115	1	60	7	FANTECH FR-110	1,3,5
GENX-1	SERVER RM	1ST FLOOR	600	0.125	1100	-	350 W	115	1	60	126	GREENHECK SP-A700	1,4,5
SP-1	SOUTH STAIR	ROOF	6500	0.75	667	-	2.0	208	3	60	147	GREENHECK GB-260	1,2,4,6,7
BRV-1	BOILER ROOM	ROOF	900	0.2	1750	-	0.25	115	1	60		GREENHECK SS1-12-432-A	1,4

NOTES:
1. SWITCH - NEMA-1, TOGGLE, MOUNTED & WIRED.
2. PREFABRICATED CURB BY MANUFACTURER. (ACOUSTICALLY INSULATED CURBS)
3. BACK DRAFT DAMPER
4. MOTOR MOUNTED SPEED CONTROL
5. HANGING VIBRATION ISOLATORS
6. LONG WALL HOUSING, FIRE DAMPER, MOTORIZED DAMPER, AND OSHA GAURD.
7. PROVIDE UL-HT-5 OPTION, CAPABLE OF HANDLING 500 °F FOR 4 HOURS.

PUMP SCHEDULE

PUMP NO.	LOCATION	DUTY	TYPE	WATER TEMP. (°F)	GPM	P.D. (FT H20)	RPM	MOTOR HP	ELECTRICAL DATA			MODEL NUMBER	SIZE	MANUFACTURER	REMARKS
									VOLTS	PHASE	HZ.				
P-1 & P-2	ROOF	PRIMARY HEATING	VERTICAL IN-LINE	180	100	60	1586	5	208	3	60	SERIES 4300 IVS SENSORLESS	2x2x10	ARMSTRONG	VFD
P-3 & P-4	ROOF	DOMESTIC HW	IN-LINE CIRCULATOR	180	100	25	1750	1	208	1	60	SERIES S-69	-	ARMSTRONG	NO VFD

1) PROVIDE TRIPLE DUTY VALVE, SUCTION GUIDE AND NEMP PREMIUM EFFICIENCY MOTOR FOR P-1 & P-2
2) P-1 & P-2 PROVIDE EACH PUMP WITH PUMP MOUNTED VFD (SENSOR-LESS) AND ALTERNATING DUPLEX PUMP CONTROLLER, SIMILAR TO ARMSTRONG IVS SERIES PUMPS.

ELECTRIC HEATERS SCHEDULE

NO.	CAPACITY, BTUH	CAPACITY, WATTS	VOLTS	PH	MANUFACTURER	MODEL	REMARKS
FFH-1	13,600	4000	208	1	BERKO	FRA-4020	BUILT-IN THERMOSTAT, WALL MOUNTED (SURFACE MOUNTED)
UH-1	17,000	5000	208	1	BERKO	HUHAA520	BUILT-IN THERMOSTAT, CEILING HUNG (SURFACE MOUNTED)

EXPANSION TANK SCHEDULE

NO.	LOCATION	SERVICE	GALLONS	ACCEPTANCE GALLONS	DIMENSIONS	MANUFACTURER MODEL	TYPE
ET-1	ROOF	HOT WATER	53	53	37"H 24"~	EXTROL 200-L	BLADDER

ENERGY RECOVERY VENTILATOR

NO.	SERVICE	LOCATION	EXHAUST CFM	SUPPLY CFM	HEATING MBH (SENSIBLE)	COOLING MBH (TOTAL)	SUPPLY FAN		EXHAUST FAN		EL. DATA				WEIGHT LB.	MANUFACTURER MODEL	REMARKS
							ESP	H.P.	ESP	H.P.	MCA	MFS	VOLTS	PH			
ERV-1	CORRIDOR	ROOF	280	250	12.3	6.9	0.5	0.75	0.5	0.75	6.4	15	208	1	141	RENEWAIRE EV450IN	

PROVIDE: PREFABRICATED ROOF CURB, ECM MOTORS, DISCONNECT CONTACT TECHNICAL AIR SYSTEMS FOR MORE INFORMATION, 212-946-4935

FIN-TUBE RADIATION SCHEDULE

TYPE	MODEL	ELEMENT TYPE	BTU PER FT. @160° F	MANUFACTURER	REMARKS
H-1	HD-850	3/4"	640	SLANT FIN	1 ROW

REMARKS: CAP OR AS OTHERWISE NOTED ON DWG.

AIR COOLED CONDENSING UNIT SCHEDULE

UNIT NO.	LOCATION	SERVICE	COOLING DATA	HEATING DATA	ELECTRICAL DATA					REFRIGERANT		MANUFACTURER MODEL NUMBER	EFFICIENCY (SEER)	COP	REMARKS
			CAP/BTU	CAP/BTU	MFS	MCA	VOLTS	PHASE	HZ.	TYPE	LBS.				
ACCU-1	1ST FLOOR	AH-1	47,500	54,000	30	27	208	1	60	R-410A	8.8	DAIKIN RXYMQ48PVJU	15.1	2.6	
ACCU-2	1ST FLOOR	AH-2	24,000	18,700	20	16.5	208	1	60	R-410A	5.1	DAIKIN RZQ24PVJU9	16.5	-	

NOTES:
1) PROVIDE BRANCH SELECTOR BOXES AS PER MANUFACTURERS RECOMMENDATIONS.
2) PROVIDE POWER TO BRANCH SELECTOR BOXES COORDINATE WITH ELECTRICAL CONTRACTOR.
3) START UP BY FACTORY PERSONNEL.
4) REFRIGERANT PIPING SIZES TO BE AS PER MFR'S RECOMMENDATIONS
5) NO PIPING SHALL BE INSTALLED IN THE FIELD WITHOUT APPROVAL OF SHOP DRAWINGS INDICATING THE LENGTH OF EACH REFRIGERANT CIRCUIT AND NUMBER OF ELBOWS.
6) PROVIDE 1" ARMAFLEX INSULATION FOR ALL REFRIGERANT PIPING.
7) PROVIDE .5" INSULATION FOR ALL CONDENSATE PIPING

AIR HANDLING UNIT SCHEDULE

UNIT NO.	LOCATION	SERVICE	SERVED BY	CFM	ESP IN W.C.	FAN SPEED	NOMINAL COOLING CAP. (MBH)	NOMINAL HEATING CAP. (MBH)	ELECTRICAL DATA				WEIGHT (LBS)	MANUFACTURER MODEL NUMBER	REMARKS
									MCA	MOCP	VOLTS	PH			
AH-1	1ST FLOOR	LOBBY	ACCU-1	1150	0.4	MED	48.0	54	3.40	15	208	1	102	DAIKIN FXMQ48PAVJU	
AH-2	1ST FLOOR	RETAIL	ACCU-2	618	0.8	MED	24.0	27	1.8	15	208	1	80	DAIKIN FBQ24PVJU	

1) PROVIDE CONDENSATE PUMPS IF PROPER PITCH CANNOT BE ESTABLISHED DUE TO FIELD CONDITIONS.
2) CONTRACTOR TO FURNISH AND INSTALL ELECTRICAL DISCONNECT FOR ALL AIR HANDLERS AND CONDENSING UNITS.
3) PROVIDE NEOPRENE VIBRATION ISOLATORS FOR CONDENSING UNITS.
4) PROVIDE EXTERNAL FILTER RACK AND FILTER FOR ALL DUCTED AIR HANDLERS
5) PROVIDE 7-DAY DIGITAL PROGRAMMABLE BACK-LIT CONTROLLER FOR ALL DUCTED AIR HANDLERS
6) ALL CONTROL WIRING TO BE DONE BY MECHANICAL CONTRACTOR, UNLESS OTHERWISE NOTED BY CONSTRUCTION MANAGEMENT.
7) ALL REFRIGERANT PIPING TO BE INSULATED WITH MINIMUM 1.5" ARMAFLEX TYPE INSULATION.

TRAINING AND MANUALS:

UPON COMPLETION OF THE JOB, ALL APPLICABLE OPERATING AND SPECIFICATION MANUALS TO BE DELIVERED TO THE BUILDING STAFF. CONTRACTOR SHALL PROVIDE TRAINING FOR THE BUILDING MAINTENANCE STAFF TO ASSURE THAT THE SYSTEM IS MAINTAINED AND OPERATED PROPERLY.
✳ ALL EQUIPMENT MUST BE UL/REFERENCE STANDARD APPROVED

NYS ENERGY NOTES:

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT. THE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2014 NYCECC.

ENERGY CODE COMPLIANCE NOTES
1. OUTDOOR SUPPLY AND RETURN AIR DUCTWORK SHALL BE INSULATED WITH MINIMUM OF R-8 RIGID INSULATION. IN ACCORDANCE WITH 2014 NYSECCC SEC. 503.2.7.

2. SUPPLY AND RETURN DUCTWORK LOCATED IN UNCONDITIONED SPACE SHALL BE INSULATED WITH R-5 BATT INSULATION, IN ACCORDANCE WITH 2014 NYSECCC SEC. 503.2.7.

3. ALL JOINTS, LONGITUDINAL AND TRANSVERSE SEAMS, AND CONNECTIONS IN DUCTWORK, SHALL BE SECURELY FASTENED AND SEALED WITH WELDS, GASKETS, MASTICS, (ADHESIVES), MASTIC-PLUS-EMBEDDED FABRIC SYSTEMS OR TAPES. TAPES AND MASTICS USED TO SEAL DUCTWORK SHALL BE LISTED AND LABELED IN ACCORDANCE WITH UL 181A OR UL181B. DUCT CONNECTIONS TO FLANGES OF AIR DISTRIBUTION SYSTEM EQUIPMENT SHALL BE SEALED AND MECHANICALLY FASTENED. UNLISTED DUCT TAPE IS NOT PERMITTED AS A SEALANT ON ANY METAL DUCTS.

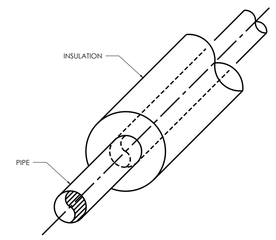
4. THE DUCTWORK IS CLASSIFIED AS LOW PRESSURE AND TO BE CONSTRUCTED IN ACCORDANCE WITH MECHANICAL CODE, SMACNA STANDARDS, AND IN ACCORDANCE WITH NYSEC SECTION 803.2.8.1.2. ALL LONGITUDINAL AND TRANSVERSE JOINTS, SEAMS AND CONNECTIONS OF SUPPLY AND RETURN DUCTS SHALL BE SECURELY FASTENED AND SEALED WITH WELDS, GASKETS, MASTICS (ADHESIVES), MASTIC-PLUS-EMBEDDED-FABRIC SYSTEMS OR TAPES INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

5. HEATING EQUIPMENT TO BE CONTROLLED BY A PROGRAMMABLE THERMOSTAT OR CONTROL PANEL. THERMOSTATIC SETBACK CONTROLS SHALL HAVE THE CAPABILITY TO SET BACK OR TEMPORARILY OPERATE THE SYSTEM TO MAINTAIN ZONE TEMPERATURE DOWN TO 55° F. THE WATER TEMPERATURE SHALL BE SET AS SPECIFIED BY EQUIPMENT MANUFACTURER AND IN COMPLIANCE WITH SECTION 503.2.4 OF THE 2014 ECCCNYS.

PIPING INSULATION SCHEDULE

INSULATION THICKNESS	HOT WATER PIPE NOMINAL DIAMETER RANGE
1.5"	LESS THAN OR EQUAL TO 1 ½"
2"	GREATER OR EQUAL TO 2"

NOTE:
IN COMPLIANCE TO THE 2014 NYCECC TABLE C403.2.8



PIPING INSULATION DETAIL:

GENERAL N.Y.C. BUILDING CODE
(MECHANICAL CODE OF NEW YORK EFFECTIVE 2008 TO BE COMPLIED WITH)

1. MATERIAL AND EQUIPMENT SUBJECT TO CONTROLLED INSPECTION

A. MECHANICAL VENTILLATION (M.V.) AIR CONDITION (A.C.)
(1) INSPECTION AND TEST OF REQUIRED VENTILATION SYSTEMS PER MC-403

B. HEATING EQUIPMENT
(1) APPLICATION FOR EQUIPMENT USE PERMIT FOR HEATING SYSTEM TO BE ACCOMPANIED BY A SIGNED STATEMENT BY AN ARCHITECT OR ENGINEER INDICATING COMPLIANCE WITH CODE TEMPERATURES, ETC., PER MC-309

2. THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIIES ETC., TO COMPLY WITH THE FOLLOWING:

ARTICLE REFERNCE:	
WORK ITEM OR MATERIAL (S)	SECTION
C. DUCT CONSTRUCTION	MC-603
D. AIR INTAKES AND OUTLETS	MC-608
E. FILTER	MC-605
F. FANS	MC-503
G. ELEC. WIRING AND EQUIP.	MC-301
H. AIR CLG HTG EQUIP	MC-302
I. FIRE CONTROLS	MC-509, MC-513
J. CONTROLS	MC-405
I. HEATING CAPACITY	MC-312
K. NOISE CRITERIAL LEVEL	MC-926
L. TEST PROCEEDURES FOR SPL	MC-926
M. PIPING INSULATION	MC-1204
N. INTAKES, EXHAUSTS, RELIEFS	MC-502

3. REFER TO ARCHITECTUAL DRAWINGS FOR FIRE RELATED WALL COMPOSITIONS.
4. MINIMUM TEMPERATURE TO BE MAINTAINED DURING HEATING SEASON: 68° F. WHEN 0° F OUTSIDE WITH 15 MPH WINDS HEATING REQUIREMENTS PER MC-309.
5. A STATEMENT WILL BE FILLED (BY OWNER OR TENANT IN POSSESSION) THAT THE VENTING SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION DURING NORMAL OCCUPANCY OF THE PREMISES.
6. THE VENTILATION INDEX OF ALL AREAS COMPLIES WITH THE MINIMUM CODE REQUIREMENTS MC-403. ALL CALCULATIONS OF VENTILATION INDEX MADE WITHOUT TAKING ANY CREDIT FOR EXTERIOR WINDOWS AND / OR OPENINGS.

DIRECTIONAL SQUARE NECK DIFFUSER SCHEDULE (NOT FOR LAY IN CEILING)

MARK NO.	NECK SIZE	CFM RANGE	ANEMOSTAT MODEL No
A	6X6	0-100	D
B	9X9	101-250	D
C	12X12	251-500	D
D	15X15	501-750	D
E	18X18	751-900	D

1) MECHANICAL CONTRACTOR TO COORDINATE BORDER TYPES WITH CLG. CONSTRUCTION. SEE ARCHITECTURAL REFLECTED CLG. DRAWINGS.
2) ANEMOSTAT MODEL DF FOR SURFACE MOUNTED AND GYB BOARD CEILINGS.
3) ANEMOSTAT MODEL DP/DPD FOR 24X24 LAY-IN CEILINGS.
4) DIFFUSERS LOCATED IN GYP. BOARD SHALL BE FURNISHED WITH CABLE DAMPERS YOUNG REGULATOR MODEL #850AW.

ROUND NECK LOUVERED FACE DIFFUSER SCHEDULE (FOR GYP. CEILING)

MARK NO.	NECK SIZE	CFM	FACE SIZE	ANEMOSTAT MODEL NO.
A	8"ø	0-250	24x24	EPL-D
B	10"ø	251-400	24x24	EPL-D
C	12"ø	401-550	24x24	EPL-D
D	15"ø	551-750	24x24	EPL-D

1) MECHANICAL CONTRACTOR TO COORDINATE BORDER TYPES WITH CLG. CONSTRUCTION.
2) FURNISH PLASTIC FRAMES FOR SHEETROCK AREAS, ANEMOSTAT MODEL "TBF".
3) DIFFUSERS LOCATED IN GYP. BOARD SHALL BE FURNISHED WITH CABLE DAMPERS YOUNG REGULATOR MODEL #850AW.
4) ALL BALANCING TO BE PERFORMED THRU BRANCH DAMPERS.
5) ALL EPL-D DIFFUSER FURNISHED WITH DIRECTIONAL ADJUSTABLE DEFLECTORS.

SYMBOLS & LEGEND KEY

	NEW DUCTWORK (SINGLE LINE)
	NEW DUCTWORK
	DUCT IN FIRE RATED ENCLOSURE
V.D.	VOLUME DAMPER
D	INCLINED DROP IN THE DIRECTION OF AIR FLOW
C.O.	CLEANOUT
FC	FLEXIBLE CONNECTION
FD/AD	FIRE DAMPER AND ACCESS DOOR
SD	SMOKE DETECTOR
M	MOTORIZED DAMPER
CG	CEILING GRILLE
CR	CEILING REGISTER
AL	1" ACOUSTICAL LINING. SIZES SHOWN ARE CLEAR INSIDE DIMENSIONS
D	DRAIN
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
	COMBINATION BALANCING VALVE/FLOW MEASURING STATION
	SHUT OFF VALVE
	BALL VALVE
	GLOBE VALVE
	CONTROL VALVE
	STRAINER WITH BLOW DOWN VALVE
	UNION
	THREE WAY VALVE
	CHECK VALVE
	PRESSURE RELIEF VALVE
	AUTOMATIC AIR VENT
	THERMOMETER
	PRESSURE GAUGE WITH GATE VALVE
1.0"	LOUVERED DOOR W/ SQ.FT OF NFA
NFA	NET FREE AREA
T	THERMOSTAT
WAC	WALL AIR CONDITIONING UNIT
OED	OPEN ENDED DUCT
WMS	WIRE MESH SCREEN
AFF	ABOVE FINISHED FLOOR
DN	DOWN
TYP	TYPICAL
OAI	OUTSIDE AIR INTAKE
CAI	COMBUSTION AIR INTAKE

BRANCH DUCT SCHEDULE

DUCT SIZE	CFM RANGE
14x4	90 - 190
14x6	195 - 350
14x8	355 - 500

DUCT SIZES AS PER SCHEDULE UNLESS OTHERWISE NOTED.

PROPOSED NEW DEVELOPMENT FOR:

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100-118 AVE., BROOKLYN , NY 10454

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AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
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08/28/15	PROGRESS SET

SHEET TITLE:

MECHANICAL SCHEDULES

SEAL & SIGNATURE

ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

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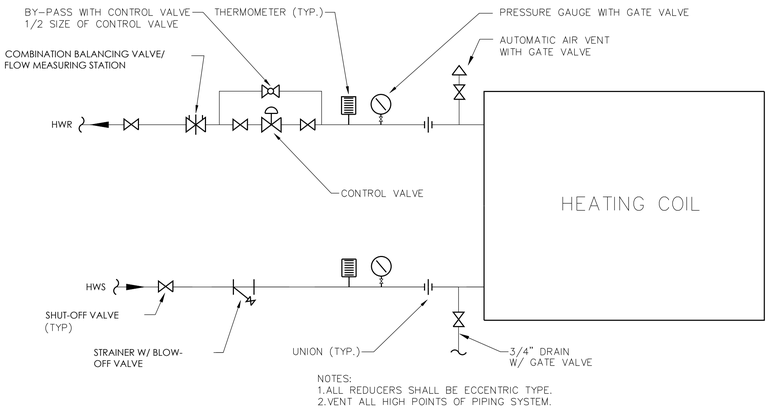
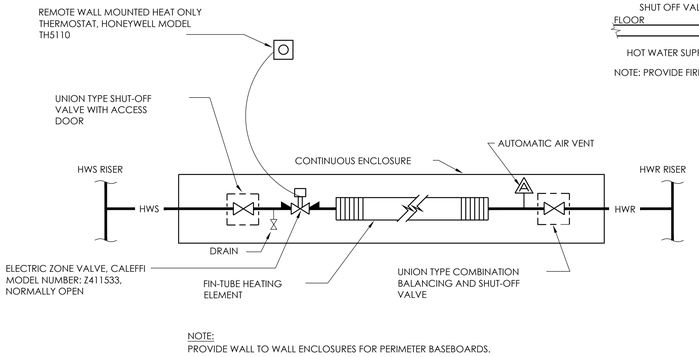
NYC DOB NUMBER: NB # XXX XXX XXX

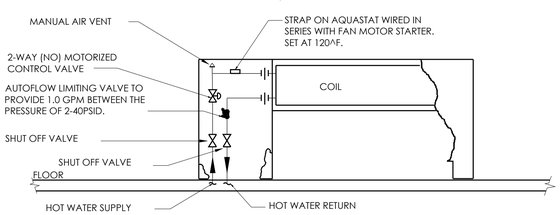


HEATING COIL CONNECTION-HOT WATER



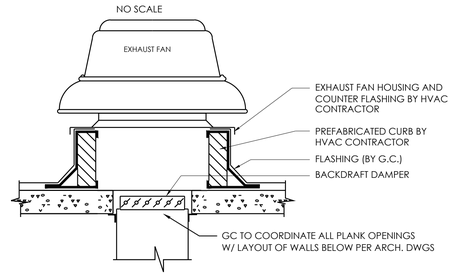
NOTE:
PROVIDE WALL TO WALL ENCLOSURES FOR PERIMETER BASEBOARDS.

ONE-ROW HOT WATER FIN-TUBE RADIATOR PIPING

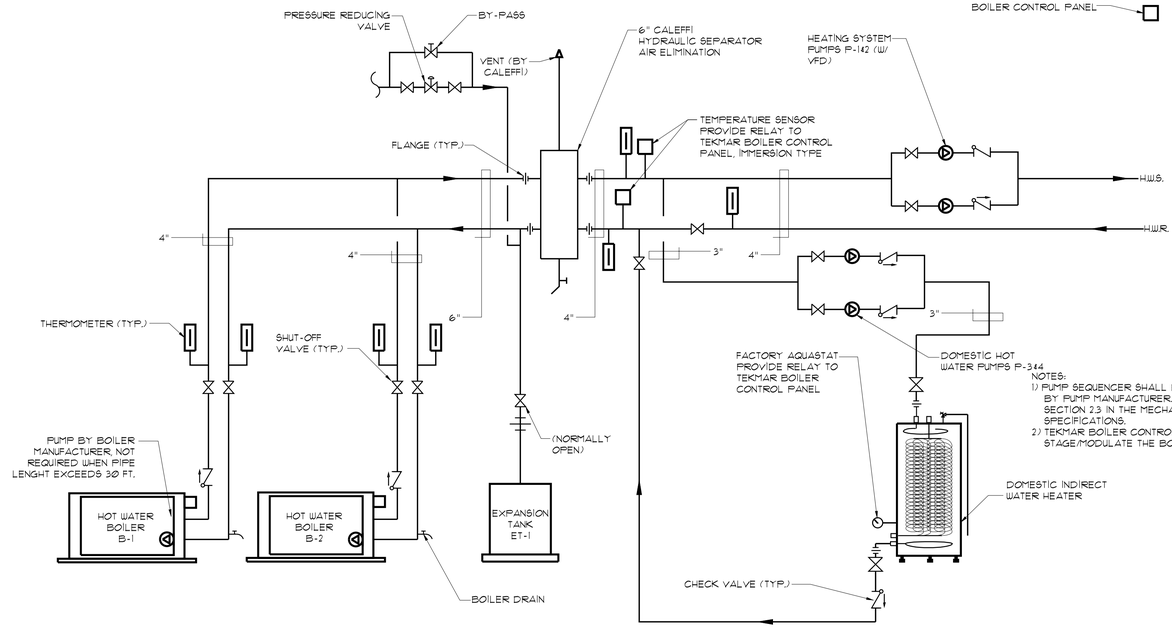


NOTE: PROVIDE FIRE STOPPING AROUND ALL PIPE PENETRATIONS.

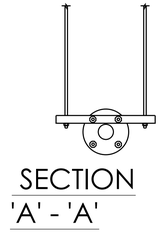
PTAC PIPING CONNECTION DETAIL

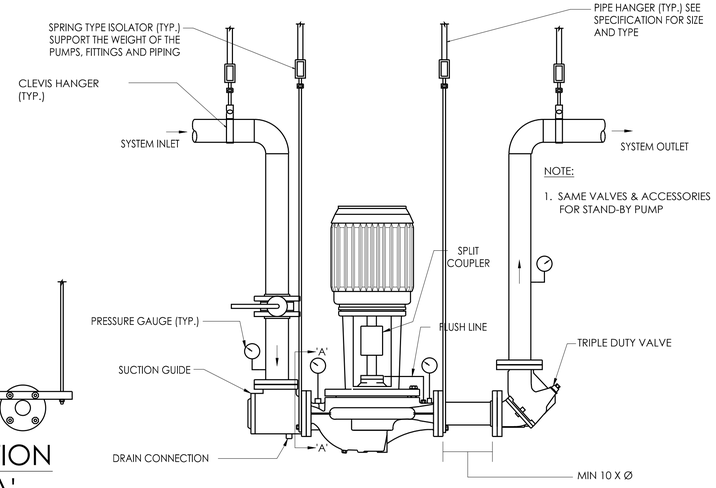


ROOF EXHAUST FAN CURB



COMBINATION HOT WATER BOILER/DOMESTIC WATER HEATER FLOW DIAGRAM





VERTICAL IN-LINE PUMP DETAIL CEILING MOUNTED

NOT TO SCALE

PROPOSED NEW DEVELOPMENT FOR:

100-118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

MECHANICAL DETAILS SHEET #1

SEAL & SIGNATURE

STATE OF NEW YORK · DOMINIC JOSEPH ANTINOLFI · LICENSED PROFESSIONAL ENGINEER · 085592

ISSUE DATE: PROJECT NO:

RC #1540

DRAWN BY: CHECKED BY:

YP DC

SCALE: SHEET NO:

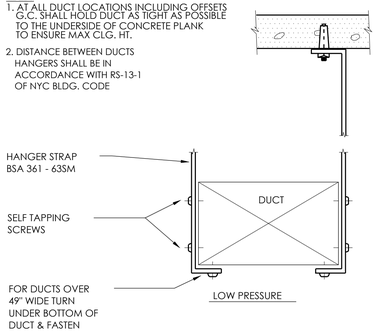
AS NOTED

DRAWING NO:

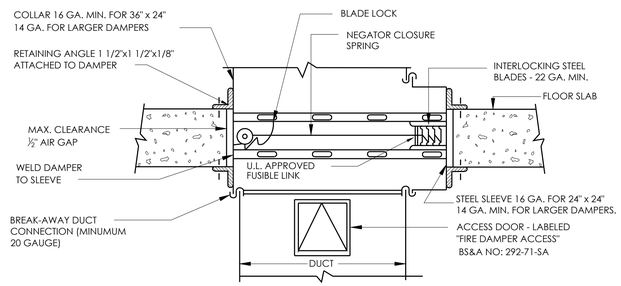
M-400.00

NYC DOB NUMBER: NB # XXX XXX XXX

NOTE:
1. AT ALL DUCT LOCATIONS INCLUDING OFFSETS G.C. SHALL HOLD DUCT AS TIGHT AS POSSIBLE TO THE UNDERSIDE OF CONCRETE PLANK TO ENSURE MAX CLG. HT.
2. DISTANCE BETWEEN DUCTS HANGERS SHALL BE IN ACCORDANCE WITH RS-13-1 OF NYC BLDG. CODE

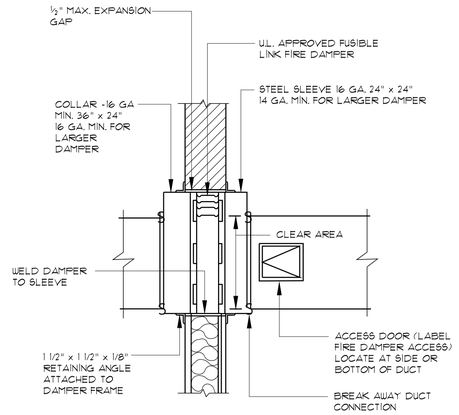


METHOD OF HANGING DUCTWORK



NOTES:
1. TYPE "B" OR "C" MOUNTING SHALL BE USED FOR ALL DAMPERS. TYPE "A" MOUNTING IS NOT PERMITTED.
2. DYNAMIC TYPE DAMPER SHALL BE PROVIDED FOR ALL SYSTEMS RUNNING DURING SMOKE CONDITION.
3. INSTALLATION MUST BE AS PER DAMPER MANUFACTURERS RECOMMENDATION.
4. DAMPER MANUFACTURER: ARLAN OR APPROVED EQUAL.

HORIZONTAL FIRE DAMPER DETAIL



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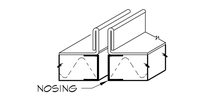
2. DYNAMIC TYPE DAMPER SHALL BE PROVIDED FOR ALL SYSTEMS RUNNING DURING SMOKE CONDITION.
3. INSTALLATION MUST BE AS PER DAMPER MANUFACTURERS RECOMMENDATION.
4. DAMPER MANUFACTURER: ARLAN OR APPROVED EQUAL.

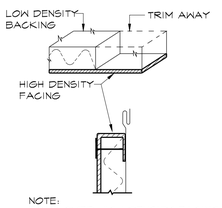
B.S.A. NO. 100-65 SM

FIRE DAMPER DETAIL



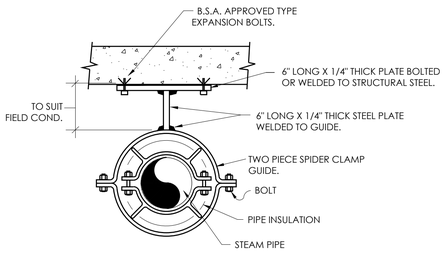
NOTE:
ENTERING, BUTTING & TRAILING EDGES OF LINER AT TRANSVERSE JOINTS TO BE COVERED BY NOSING

TRANSVERSE JOINT DETAIL

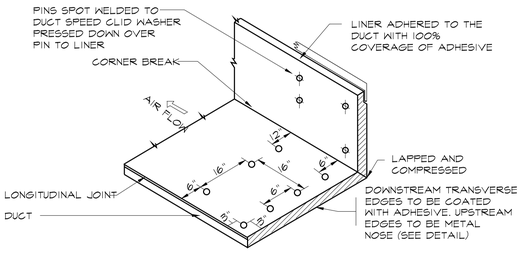


NOTE:
FOLD OVER HIGH DENSITY FACING ON ALL LONGITUDINAL JOINTS & SECURE WITH MECH. FASTENERS

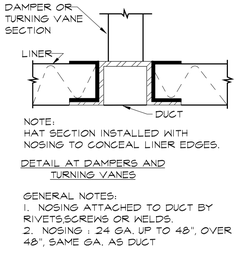
LONGITUDINAL JOINT DETAIL



PIPE GUIDE



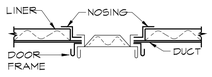
ACOUSTICAL DUCT LINER DETAIL



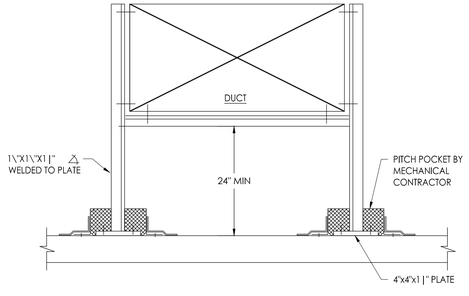
NOTE:
HAT SECTION INSTALLED WITH NOSING TO CONCEAL LINER EDGES.

DETAIL AT DAMPERS AND TURNING VANES

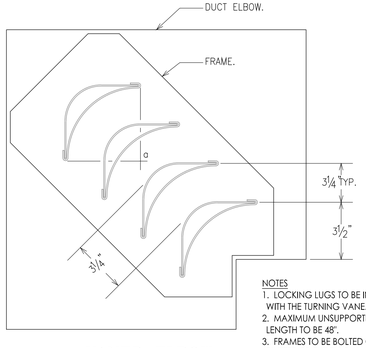
GENERAL NOTES:
1. NOSING ATTACHED TO DUCT BY RIVETS,SCREWS OR WELDS.
2. NOSING : 24 GA. UP TO 48", OVER 48", SAME GA. AS DUCT



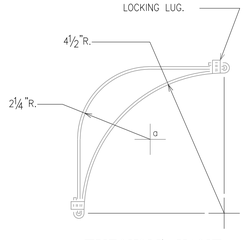
ACCESS DOOR NOSING DETAIL



ROOF MOUNTED DUCT SUPPORT DETAIL
N.T.S.



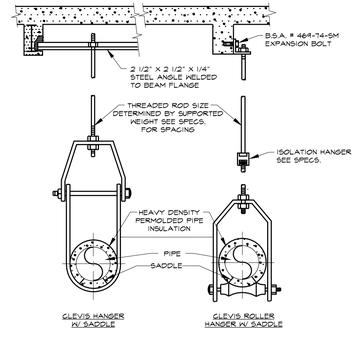
VANED ELBOW



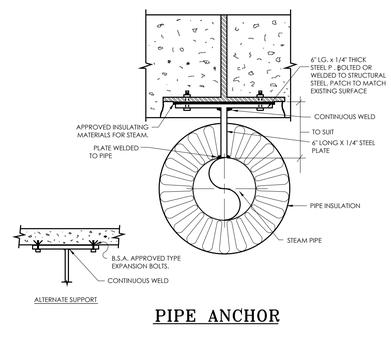
TURNING VANE

NOTES
1. LOCKING LUGS TO BE INTEGRAL WITH THE TURNING VANE.
2. MAXIMUM UNSUPPORTED FRAME LENGTH TO BE 48".
3. FRAMES TO BE BOLTED OR RIVETED TO THE ELBOW.
4. VANES AND FRAMES TO BE SAME GAUGE AS THE ELBOW. (MINIMUM 20 GAUGE)
5. SQUARE ELBOWS ARE TO BE USED ONLY WHEN SPECIFICALLY INDICATED ON THE DESIGN DRAWINGS.

DOUBLE THICKNESS TURNING VANES FOR MITERED ELBOWS



PIPE HANGING DETAIL



PIPE ANCHOR

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
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55 BRUCKNER BLVD
BRONX NY 10454
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STRUCTURAL ENGINEER:
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PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

MECHANICAL DETAILS SHEET #2

SEAL & SIGNATURE

STATE OF NEW YORK — JOSEPH MICHAEL AUFGANG — 085592 — LICENSED PROFESSIONAL ENGINEER

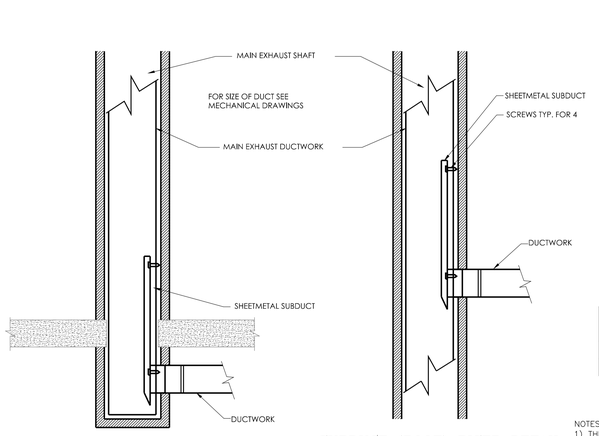
ISSUE DATE: PROJECT NO:
RC #1540

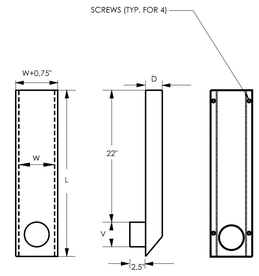
DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO:
M-401.00

NYC DOB NUMBER: NB # XXX XXX XXX

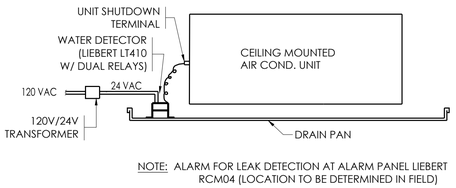




VENT CONNECTION (V)	MAXIMUM CFM	OVERALL LENGHT (L)	WIDTH (W)	DEPTH (D)	MFR. MODEL
4"	40	27"	6"	2"	EXHAUSTO LSR_04
6"	90	29"	9"	3.5"	EXHAUSTO LSR_06

SUBDUCT (BOOT) RISER DETAIL
NOT TO SCALE

NOTES:
1) THE SUBDUCT SHOULD BE MOUNTED FLUSH AGAINST THE EXHAUST SHAFT USING FOUR RIVETS OR SELF TAPPING SCREWS.
2) PROVIDE 24 GAUGE.



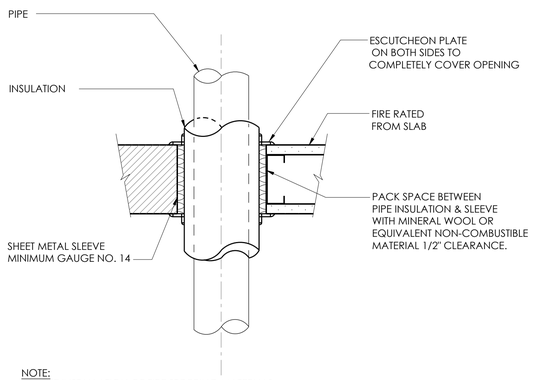
NOTE: ALARM FOR LEAK DETECTION AT ALARM PANEL LIEBERT RCM04 (LOCATION TO BE DETERMINED IN FIELD)

PAN CONSTRUCTION

1. PAN 12" LARGER THAN AC UNIT ON ALL FOUR (4) SIDES.
2. 2" HEM SHALL BE TURNED DOWN OUTSIDE OF PAN.
3. FABRICATE PAN OF 16 GAUGE GALVANIZED STEEL WITH SOLDERED CORNERS WATERTIGHT.

AUXILIARY DRAIN PAN

NOT TO SCALE

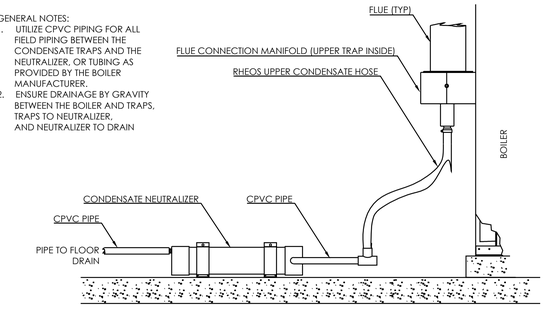


NOTE:
1.) THE INSTALLATION OF FIRE STOPPING MATERIALS SHALL BE SUBJECT TO CONTROLLED INSPECTION IN ACCORDANCE WITH C26-106.3.

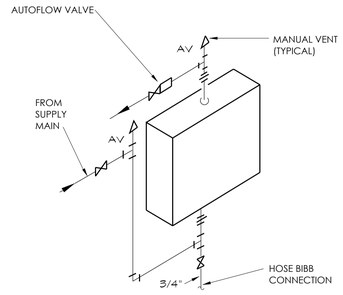
PIPE SLEEVE THRU SLAB

NOT TO SCALE

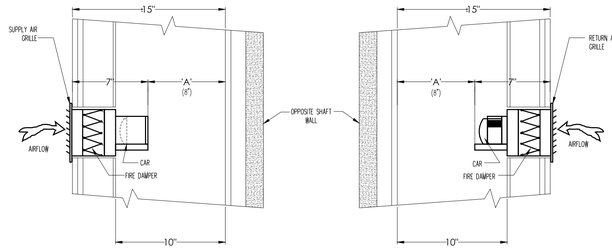
GENERAL NOTES:
1. UTILIZE CPVC PIPING FOR ALL FIELD PIPING BETWEEN THE CONDENSATE TRAPS AND THE NEUTRALIZER, OR TUBING AS PROVIDED BY THE BOILER MANUFACTURER.
2. ENSURE DRAINAGE BY GRAVITY BETWEEN THE BOILER AND TRAPS, TRAPS TO NEUTRALIZER, AND NEUTRALIZER TO DRAIN



CONDENSATE CONNECTIONS



UNIT HEATER HOT WATER PIPING



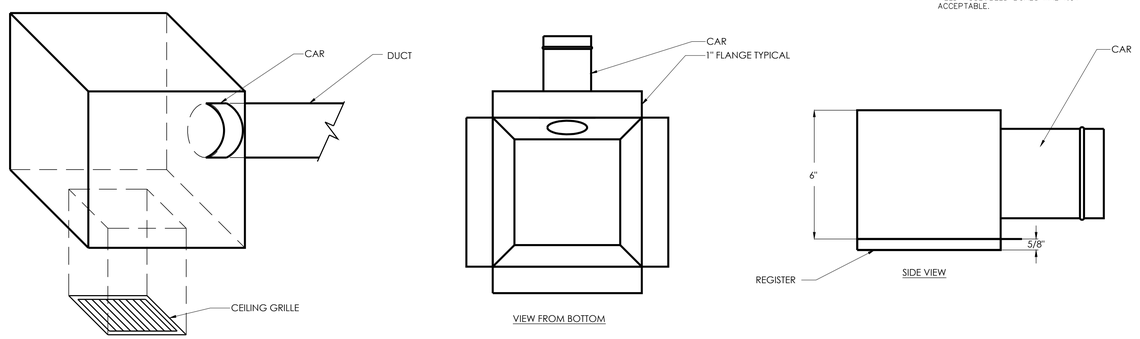
CAR DIA.	MAX. AIR FLOW CFM*	MINIMUM "A" DIMENSION CER-FE	CER-FS
4"	50	1.0"	1.0"
5"	95	1.0"	1.0"
6"	150	1.5"	1.5"
8"	235	2.0"	2.0"
10"	380	2.5"	2.5"

*MINIMUM CLEARANCE ASSUMES MAXIMUM AVAILABLE AIRFLOW FOR EACH CAR DIAMETER. CLEARANCEES MAY BE REDUCED AT LOWER AIRFLOW RATES

NOTE:
MINIMUM CLEARANCE "A" DIMENSION. PROVIDE FOR ALL TOILET AND KITCHEN EXHAUST OUTLETS.

CAR DAMPER BOXES SHALL BE BY MFR. FIELD ASSEMBLED BOXES ARE NOT ACCEPTABLE.

CONSTANT AIRFLOW REGULATOR



CEILING GRILLE WITH CAR ASSEMBLY DETAIL

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
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NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

MECHANICAL DETAILS SHEET #3

SEAL & SIGNATURE

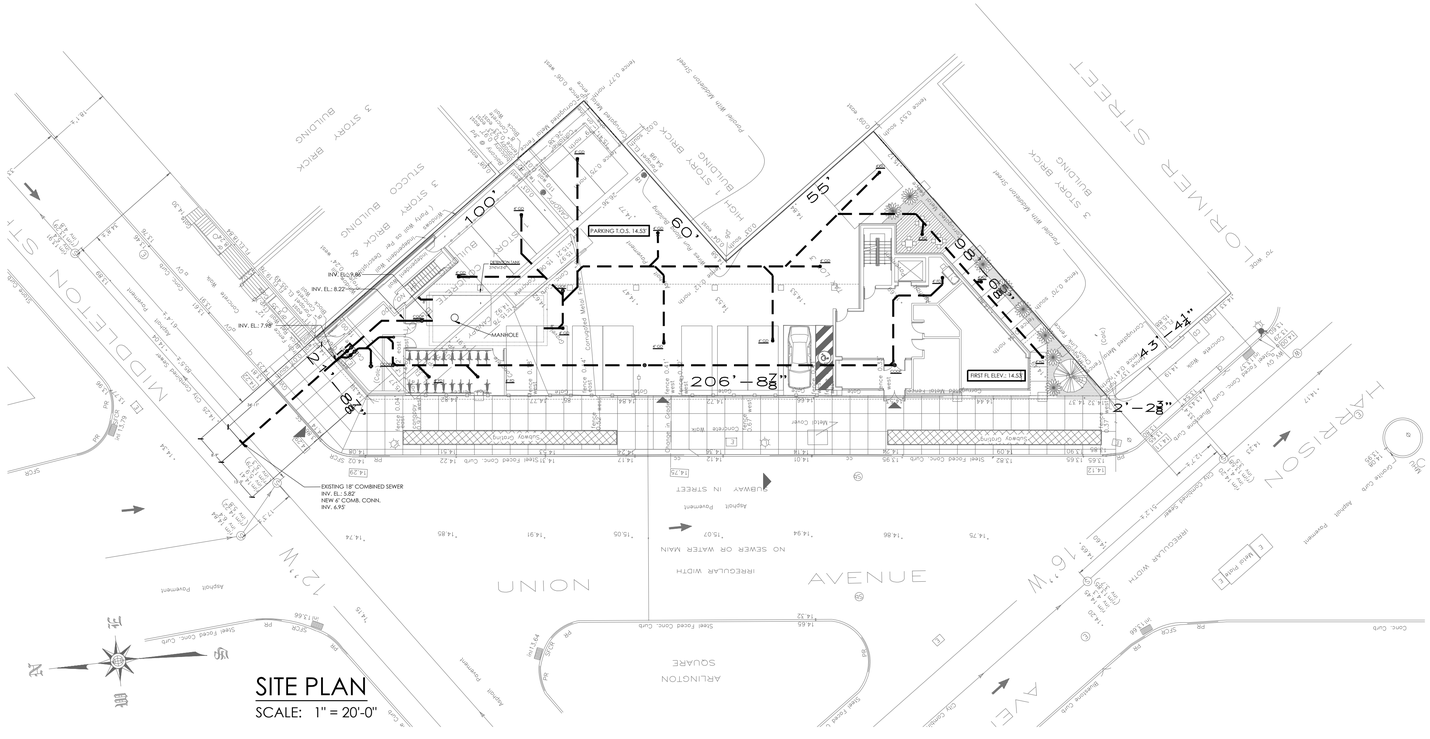
ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: M-402.00

NYC DOB NUMBER: NB # XXX XXX XXX



SITE PLAN
SCALE: 1" = 20'-0"

Project:	110 Union Ave		Revised 8/28/2015
Location:	110 Union Ave	BROOKLYN	Project # 1540

Tax Block	2242
Tax Lot	3
Zoning Map No.	13b
Zoning District	R6

Storm and Sewage Flow Calculations

1 Actual Storm Drainage (using Q =AiC)

Area of site = 10,617.00 sq. ft. 0.244 acres

a. Cont. Flow Roof Area
Total CF roof area = ____ sq. ft.
0 / 43560 x 5.95 x 0.95 0.000 cfs

b. Green Roof Area
Total Green Rf. area = ____ sq. ft.
0 / 43560 x 5.95 x 0.70 0.000 cfs

c. Paved Area
Total paved area = 4,306.00 sq. ft.
4,306 / 43560 x 5.95 x 0.85 = 0.500 cfs

d. Std Roof Drains
Total Std Roof area = 6,311.00 sq. ft.
6,311 / 43560 x 5.95 x 0.95= 0.819 cfs

e. Grass
Total Grassed area = ____ sq. ft.
0 / 43560 x 5.95 x 0.20 = 0.000 cfs

f. Porous Asphalt
Total Asphalt area = ____ sq. ft.
0 / 43560 x 5.95 x 0.70 = 0.000 cfs

e. Total Developed storm water flow = 1.319 cfs

2 Sanitary drainage Calculation using population density Waste Flow

a. Existing 18" Combined Sewer in Middleton Street

170 persons/acre x 0.244 acres x 150 gal/person/day x 4 / 7.48 x 86,400 = 0.038 cfs

Summary

Storm flow developed	1.319 cfs	
Storm Flow (Qall) =		0.250 cfs
Sanitary		0.038 cfs
		0.298 cfs cfs total.

BUILDING AND SITE CONDITIONS — **Qall ALLOWABLE STORM FLOW :**

Tributary area to the 18" Combined Sewer in Middleton Street

BROOKLYN

Tributary Area =	10,617.00	sq. ft.		0.244 ACRES	
AREA =	10,617.00	sq. ft.		0.244 ACRES	
CONT FLOW ROOF	0.00	sq. ft.	0.95 =	0	
PAVED =	4,306.00	sq. ft.	0.85 =	3,660	
POROUS ASPHALT=	0.00	sq. ft.	0.70 =	0	
GREEN ROOF =	0.00	sq. ft.	0.70 =	0	
GRASS=	0.00	sq. ft.	0.20 =	0	Qall based on Tributary Area = 0.610 cfs
STD ROOF DRAINS	6,311.00	sq. ft.	0.95 =	5,995.45	Greater of 0.25 cfs or 10% of the Qall = 0.250 cfs Q=
TOTAL =	10,617.00	sq. ft.			

Qall = As/17,400

C_{WT} = WEIGHTED RUNOFF =

C_{WT} = ((Roof 0.00 + Paved 3,660.10 + Asph 0.00 + Green Roof 0.00 + Grass 0.00 + Std. RD) 5,995.45) / Area 10,617.00 = **0.909**

DEVELOPED FLOW = $Q_{DEV} = C_{WS} A_S / 7.320$

where: Q_{DEV} = the developed flow rate in cfs
C_{WS} = the weighted runoff coefficient for the site area
A_S = the site area in ft²

Q_{DEV} = ((Cont. Roof 0.00 + Paved 3,660.10 + Asph 0.00 + Green Roof 0.00 + Grass 0.00 + Std. Roof 5,995.45) / 7,320.00 = **1.319**

Outflow will be controlled by an orifice tube and will vary with the depth of storage.

$tv = 0.27(C_{WT} A_T / Q_{DRR})^{0.6} - 15$

tv = 0.27[0.909)(10,617.00)/ 0.250]$^{0.6}$ -15 = 38.06 min.

$Vv = [0.19 C_{WT} A_T / (tv + 15) - 40 Q_{DRR}] tv$

Vv = [(0.19)(0.909)(10,617.00)/(38.06 + 15)-40(0.25)] 38.06 = **935 ft³**

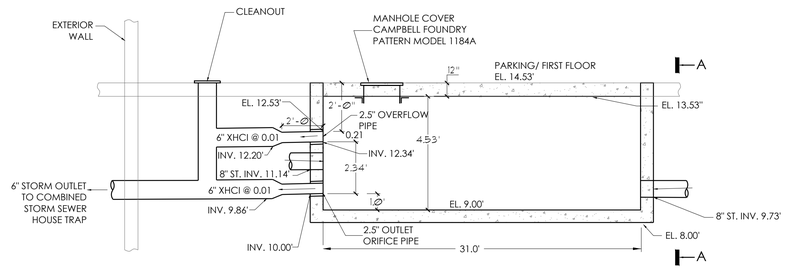
Flush orifice $So = 1.400(Q_{DRR})2 / (do)4 + do / 24$ **2.34 ft**

GENERAL DRAWING NOTES:

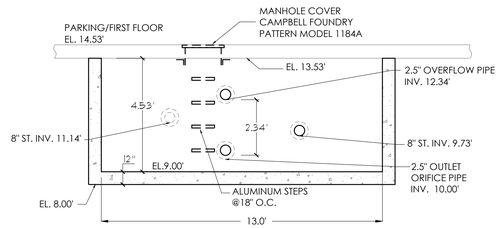
1. ELEVATIONS AND ESTABLISHED GRADES SHOWN REFER TO THE BOROUGH OF BROOKLYN HIGHWAY DEPARTMENT DATUM WHICH IS 2.56 FEET ABOUT MEAN SEA LEVEL DATUM.
2. ALL ELEVATIONS GIVEN THUS ( ) ARE IN RELATION TO DATUM (+/-0'-0")= 49.72' WHICH IS ACTUAL AND REFERS TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF BROOKLYN.
3. CONTRACTOR TO VERIFY EXISTING ELEVATIONS, DIMENSION AND CONDITIONS INDICATED ON DRAWINGS BEFORE PROCEEDING WITH WORK. ARCHITECT/ ENGINEER SHALL BE NOTIFIED OF ALL DISCREPANCIES IN WRITING
4. CONTRACTOR TO VERIFY THAT ELECTRIC SERVICE HAS BEEN DISCONNECTED AND WIRES HAVE BEEN PULLED FROM CONDUIT RUNS AND CONDUIT HAS BEEN PLUGGED BEFORE PROCEEDING WITH WORK IN THESE AREA
5. CONTRACTOR TO VERIFY DEPTH OF ALL EXISTING UTILITY SERVICES TO BE CROSSED OVER OR UNDER WITH NEW SERVICES AND NOTIFY GOVERNMENT OF ANY CONDITIONS WHICH WOULD PREVENT THE PROPER INSTALLATION OF THE UNDERGROUND SERVICES IN ACCORDANCE WITH CONTRACT DRAWINGS AND SPECIFICATIONS, IF A CLEARANCE OF 3" OR LESS EXISTS BETWEEN TWO UTILITIES AT A CROSSING, A STYROFOAM CUSHION SHALL BE PLACED BETWEEN THE RESPECTIVE UTILITIES.
6. SEWER RIM AND INVERT ELEVATIONS IN BROOKLYN SEWER DATUM SHOWN AS (RIM. INV.)

SYMBOL LIST

(S)	STREET SEWER LINE MANHOLE
S	SANITARY SEWER
ST	STORM SEWER
T	NEW CONNECTION TO EXISTING STREET SEWER
CI	CAST IRON
℄	CENTER LINE
EXIST.	EXISTING
INV. EL.	INVERT ELEVATION -NAVD 88
(INV. EL.)	INVERT ELEVATION -BROOKLYN HIGHWAY DATUM
MH	MANHOLE
T.O.S.	TOP OF SLAB
TD	TERRACE DRAIN
RD	ROOF DRAIN
OD	OVERFLOW DRAIN



DETAIL OF STORM WATER DETENTION TANK
NOT TO SCALE



VIEW A-A
NOT TO SCALE

NOTES:

1. MAIN AND STORAGE CHAMBERS SHALL BE POURED IN PLACE CONCRETE
2. REQUIRED TANK VOLUME = 935 CU. FT
   STORAGE TANK VOLUME = 933.66 CU. FT
3. STORM FLOW OF 1.319 CFS WILL BE RESTRICTED TO 0.250 CFS BY MEANS OF DETENTION FACILITIES AND CONTROLLED FLOW DEVICES.
4. ALL ELEVATIONS ARE INDICATED AS NAVD88.

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

PLUMBING SITE PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · JOSEPH PARTINAL · 083592 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: PROJECT NO: RC #1540

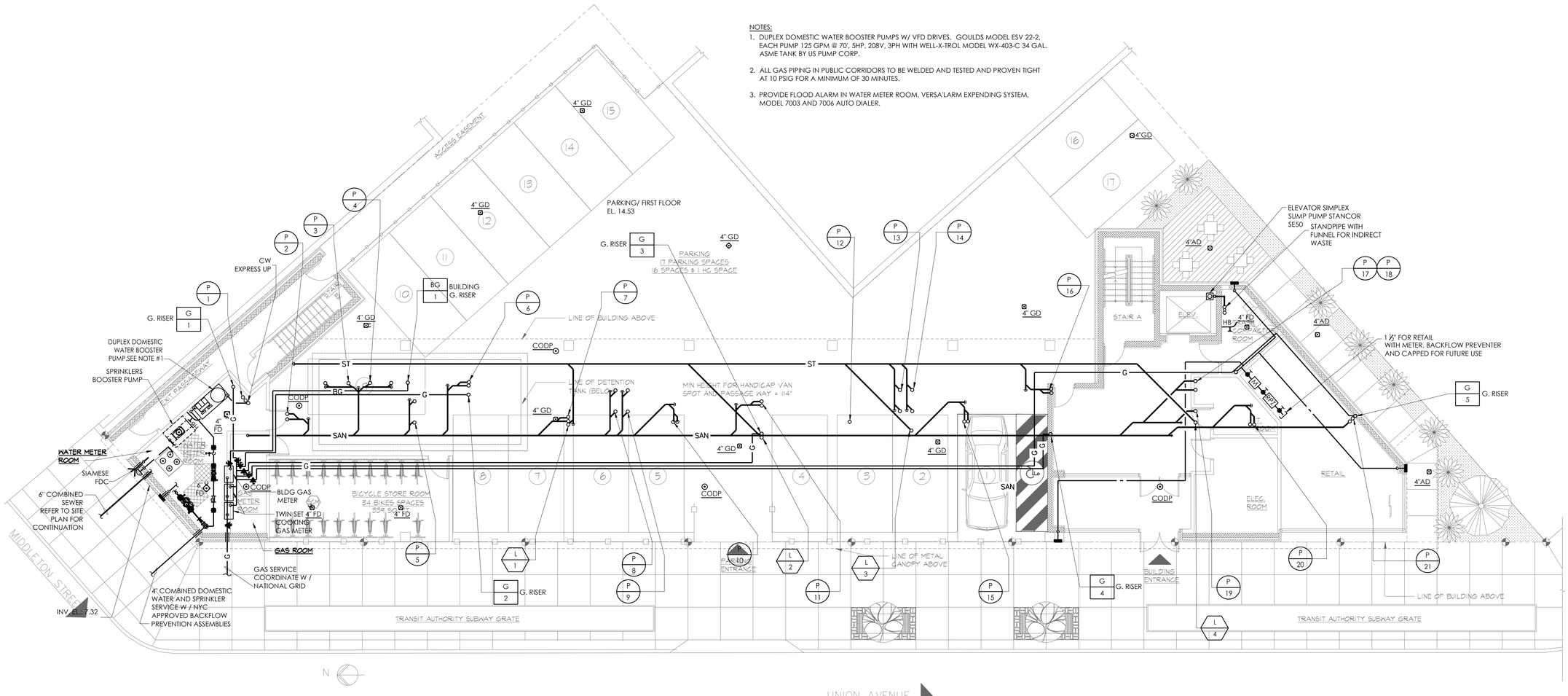
DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: **P-001.00**

NYC DOB NUMBER: NB # XXX XXX XXX

NOTES:
1. DUPLEX DOMESTIC WATER BOOSTER PUMPS W/ VFD DRIVES. GOULDS MODEL ESV 22-2, EACH PUMP 125 GPM @ 70', 5HP, 208V, 3PH WITH WELL-X-TROL MODEL WX-403-C 34 GAL. ASME TANK BY US PUMP CORP.
2. ALL GAS PIPING IN PUBLIC CORRIDORS TO BE WELDED AND TESTED AND PROVEN TIGHT AT 10 PSIG FOR A MINIMUM OF 30 MINUTES.
3. PROVIDE FLOOD ALARM IN WATER METER ROOM. VERSA'LARM EXPENDING SYSTEM, MODEL 7003 AND 7006 AUTO DIALER.



UNION AVENUE

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

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

PLUMBING 1ST FLOOR PLAN

SEAL & SIGNATURE
STATE OF NEW YORK · JOSEPH C. DIMALE · 085592 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: PROJECT NO: RC #1540
DRAWN BY: YP CHECKED BY: DC
SCALE: AS NOTED SHEET NO:
DRAWING NO: P-101.00
NYC DOB NUMBER: NB # XXX XXX XXX

PLUMBING PIPING CONNECTIONS:

1. WC.: 4" S., 2" V., ½" CW.
2. LAV.: 1½" W. & V., ½" H & CW.
3. BT.: 1½" W. & V., ½" H & CW.
4. SH.: 2" W., 1½" V., ½" H & CW.
5. K.SK.: 2" W., 1½" V., ½" H & CW.
6. D/W.: ⅜" FLEX.HOSE, ½" HW.
7. CL. W: 2" W., 1½" V., ½" H & CW.
8. SS.: 3" W. 1½" V., ¾" H & CW.

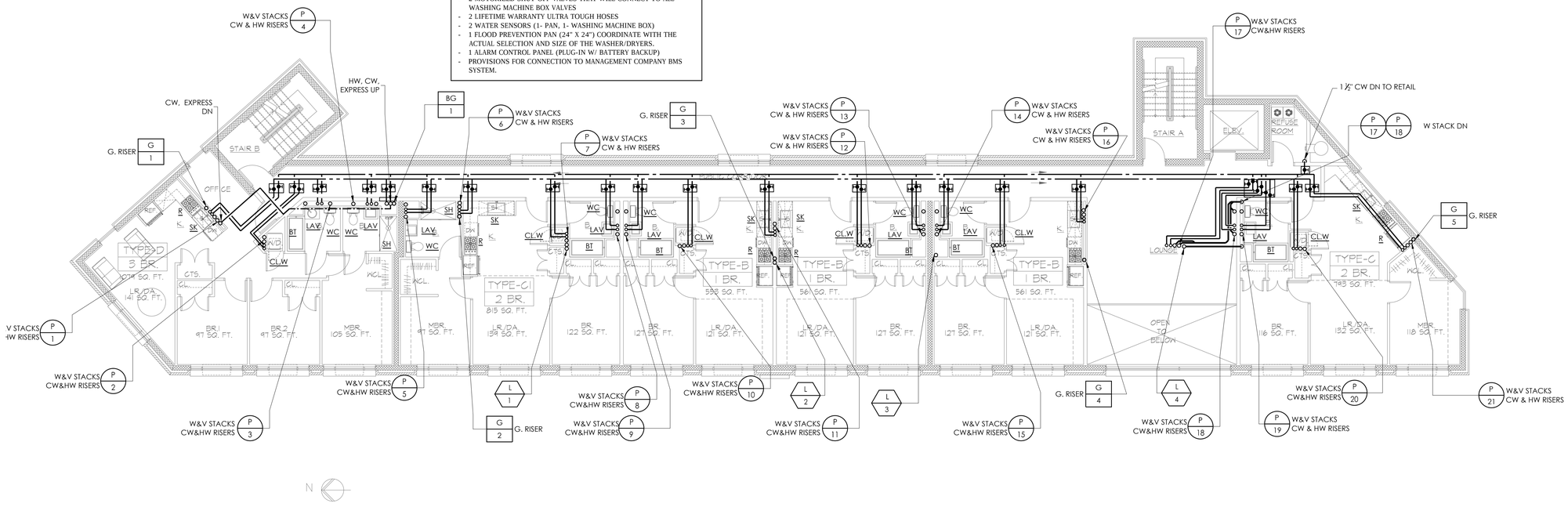
RANGE GAS RISER, REFER TO RISER DIAGRAM FOR SIZES, ¾" TO RANGE.

FOR HOT & COLD WATER PIPE SIZES REFER TO WATER RISER DIAGRAM.

NOTE:

PROVIDE AND INSTALL A WASHING MACHINE LEAK DETECTION SYSTEM AND CONTAINMENT PAN FOR EACH UNIT. THE LEAK DETECTION SYSTEM SHALL BE AS MANUFACTURED BY SAFE AND SOUND APPLIANCES COMPLETE WITH:

- 2 MOTORIZED SHUT-OFF VALVES THAT WILL CONNECT TO ALL WASHING MACHINE BOX VALVES
- 2 LIFETIME WARRANTY ULTRA TOUGH HOSES
- 2 WATER SENSORS (1- PAN, 1- WASHING MACHINE BOX)
- 1 FLOOD PREVENTION PAN (24" X 24") COORDINATE WITH THE ACTUAL SELECTION AND SIZE OF THE WASHER/DRYERS.
- 1 ALARM CONTROL PANEL (PLUG-IN W/ BATTERY BACKUP)
- PROVISIONS FOR CONNECTION TO MANAGEMENT COMPANY BMS SYSTEM.



2ND FLOOR PLAN

SCALE: 1/8" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

PLUMBING 2ND FLOOR PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · JOSEPH J. AUFGANG · 083592 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: P-102.00

NYC DOB NUMBER: NB # XXX XXX XXX

NOTE:

PROVIDE AND INSTALL A WASHING MACHINE LEAK DETECTION SYSTEM AND CONTAINMENT PAN FOR EACH UNIT. THE LEAK DETECTION SYSTEM SHALL BE AS MANUFACTURED BY SAFE AND SOUND APPLIANCES COMPLETE WITH:

- 2 MOTORIZED SHUT-OFF VALVES THAT WILL CONNECT TO ALL WASHING MACHINE BOX VALVES
- 2 LIFETIME WARRANTY ULTRA TOUGH HOSES
- 2 WATER SENSORS (1- PAN, 1- WASHING MACHINE BOX)
- 1 FLOOD PREVENTION PAN (24" X 24") COORDINATE WITH THE ACTUAL SELECTION AND SIZE OF THE WASHER/DRYERS.
- 1 ALARM CONTROL PANEL (PLUG-IN W/ BATTERY BACKUP)
- PROVISIONS FOR CONNECTION TO MANAGEMENT COMPANY BMS SYSTEM.

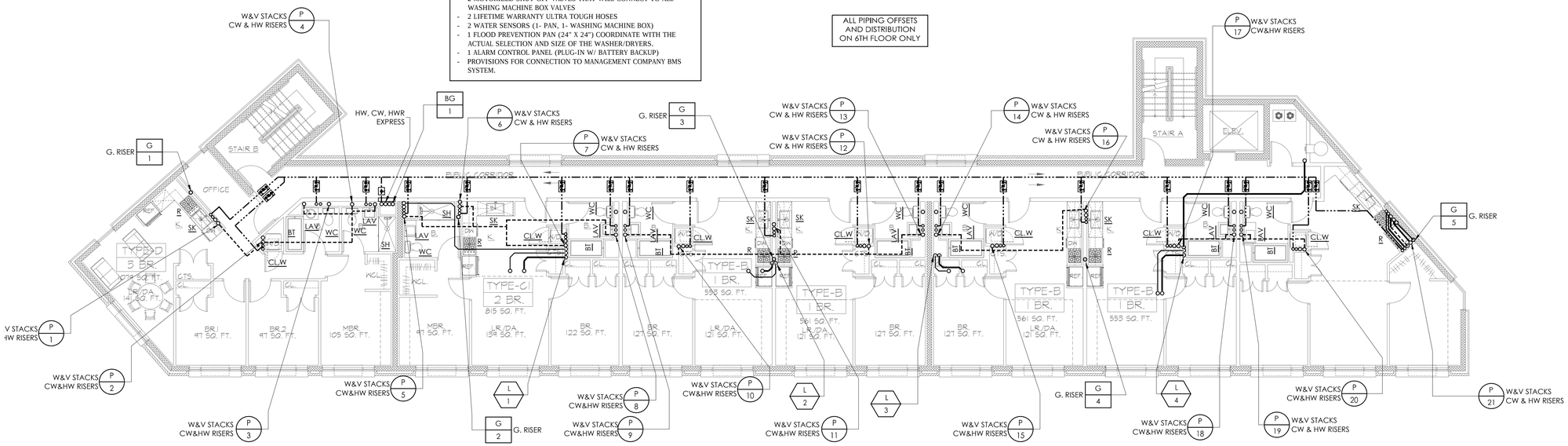
PLUMBING PIPING CONNECTIONS:

1. WC.: 4" S., 2" V., ½" CW.
2. LAV.: 1½" W. & V., ½" H & CW.
3. BT.: 1½" W. & V., ½" H & CW.
4. SH.: 2" W., 1½" V., ½" H & CW.
5. K.SK.: 2" W., 1½" V., ½" H & CW.
6. D/W.: ⅜" FLEX.HOSE, ½" HW.
7. CL. W: 2" W., 1½" V., ½" H & CW.
8. SS.: 3" W. 1½" V., ¾" H & CW.

RANGE GAS RISER, REFER TO RISER DIAGRAM FOR SIZES, ¾" TO RANGE.

FOR HOT & COLD WATER PIPE SIZES REFER TO WATER RISER DIAGRAM.

ALL PIPING OFFSETS AND DISTRIBUTION ON 6TH FLOOR ONLY



3RD-6TH FLOOR PLAN

SCALE: 1/8" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

PLUMBING 3RD-6TH FLOOR PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · DOMINIC JOSEPH SCALINGI · 083592 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:

PROJECT NO: RC #1540

DRAWN BY: YP

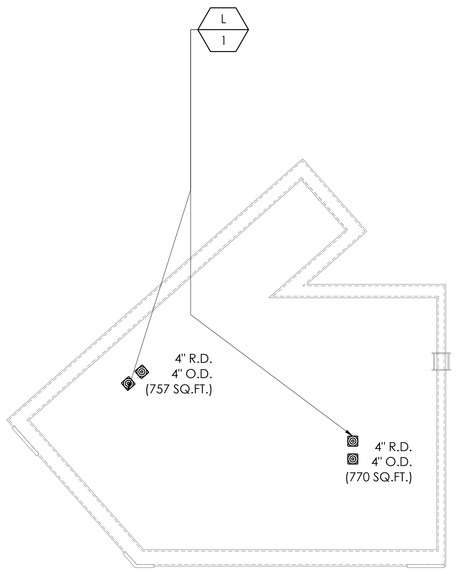
CHECKED BY: DC

SCALE: AS NOTED

SHEET NO:

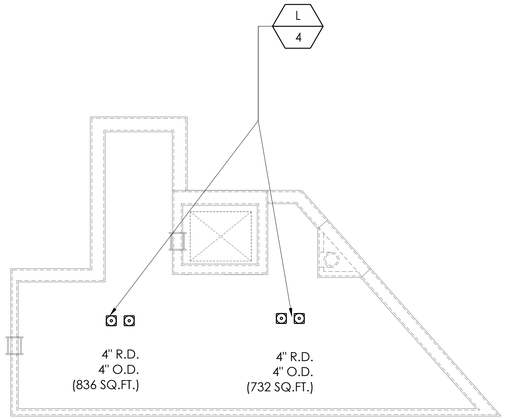
DRAWING NO: P-103.00

NYC DOB NUMBER: NB # XXX XXX XXX



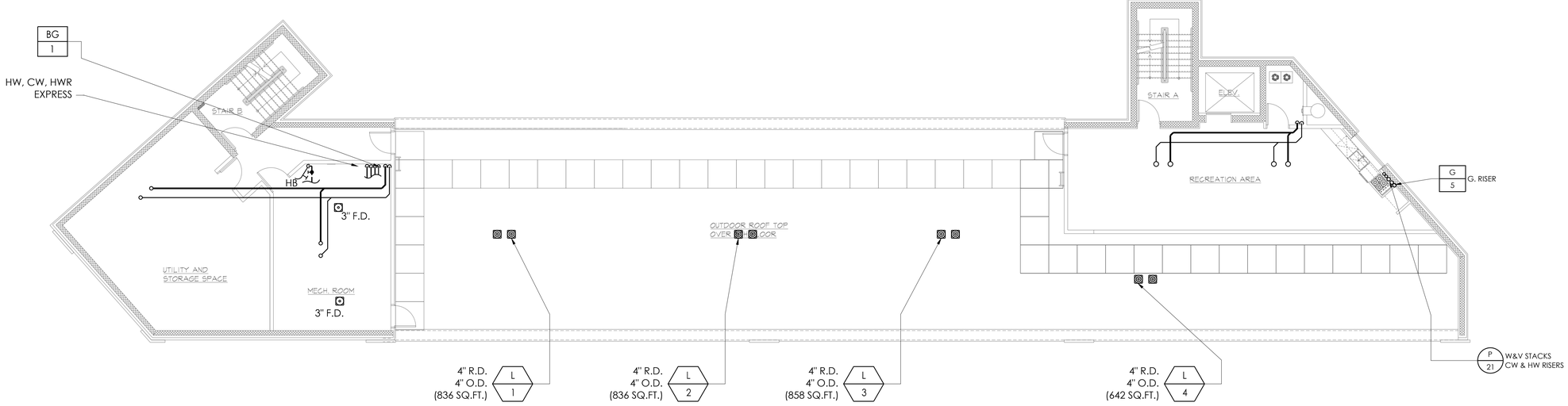
MECHANICAL BOILER ROOM AND
STAIR BULKHEAD ROOF PLAN

N



RECREATION AREA ROOF, STAIR BULKHEAD
AND ELEVATOR PENTHOUSE ROOF PLAN

N



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ROOF PLAN

SCALE: 1/8" = 1'-0"

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

PLUMBING ROOF PLAN

SEAL & SIGNATURE

STATE OF NEW YORK · JOSEPH ANTHONY DIMINICO · 089592 · LICENSED PROFESSIONAL ENGINEER

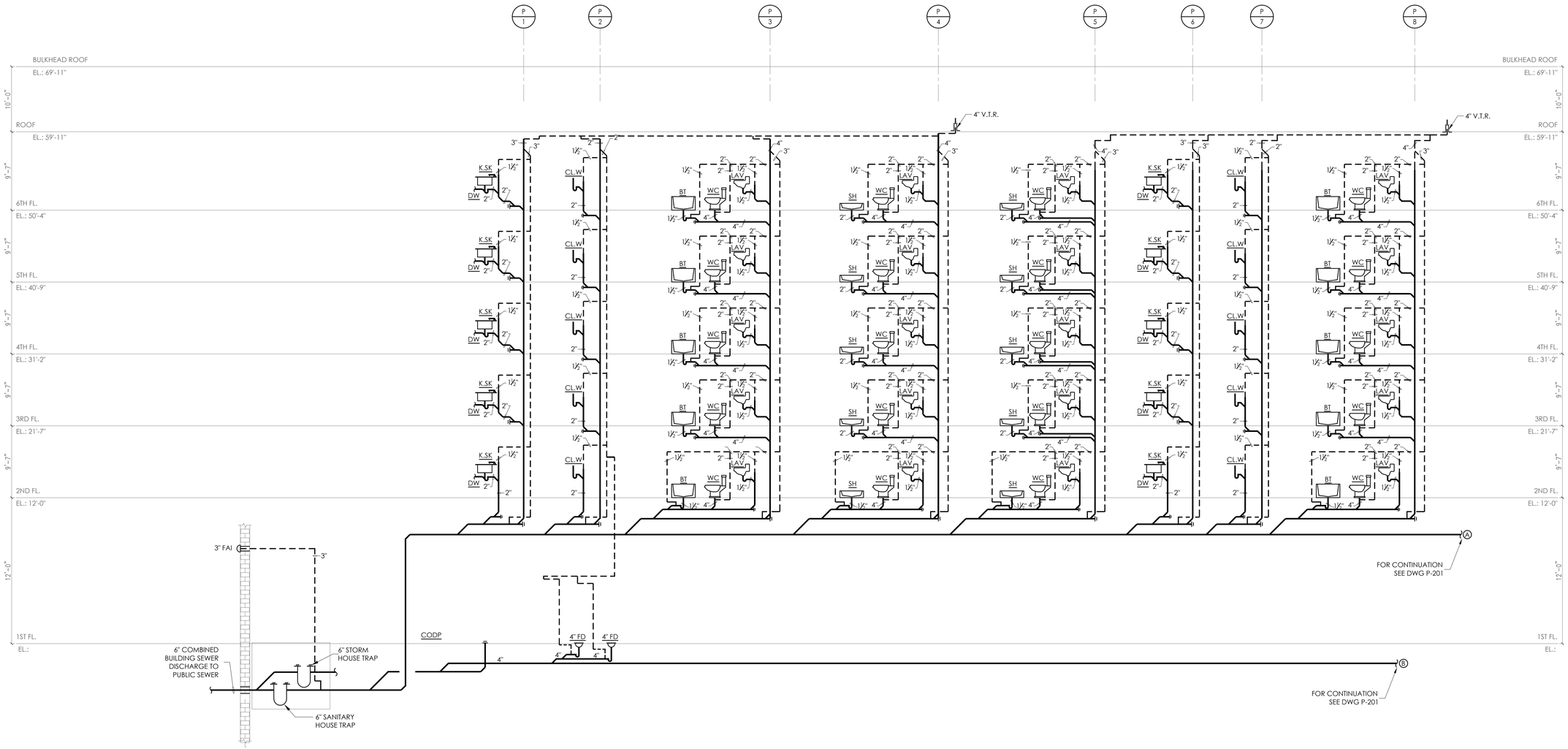
ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: P-104.00

NYC DOB NUMBER: NB # XXX XXX XXX



PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

PLUMBING SANITARY RISER DIAGRAM I

SEAL & SIGNATURE

JOSEPH M. ALTIMARI — STATE OF NEW YORK — 83592 — LICENSED PROFESSIONAL ENGINEER

ISSUE DATE: PROJECT NO:

RC #1540

DRAWN BY: CHECKED BY:

YP DC

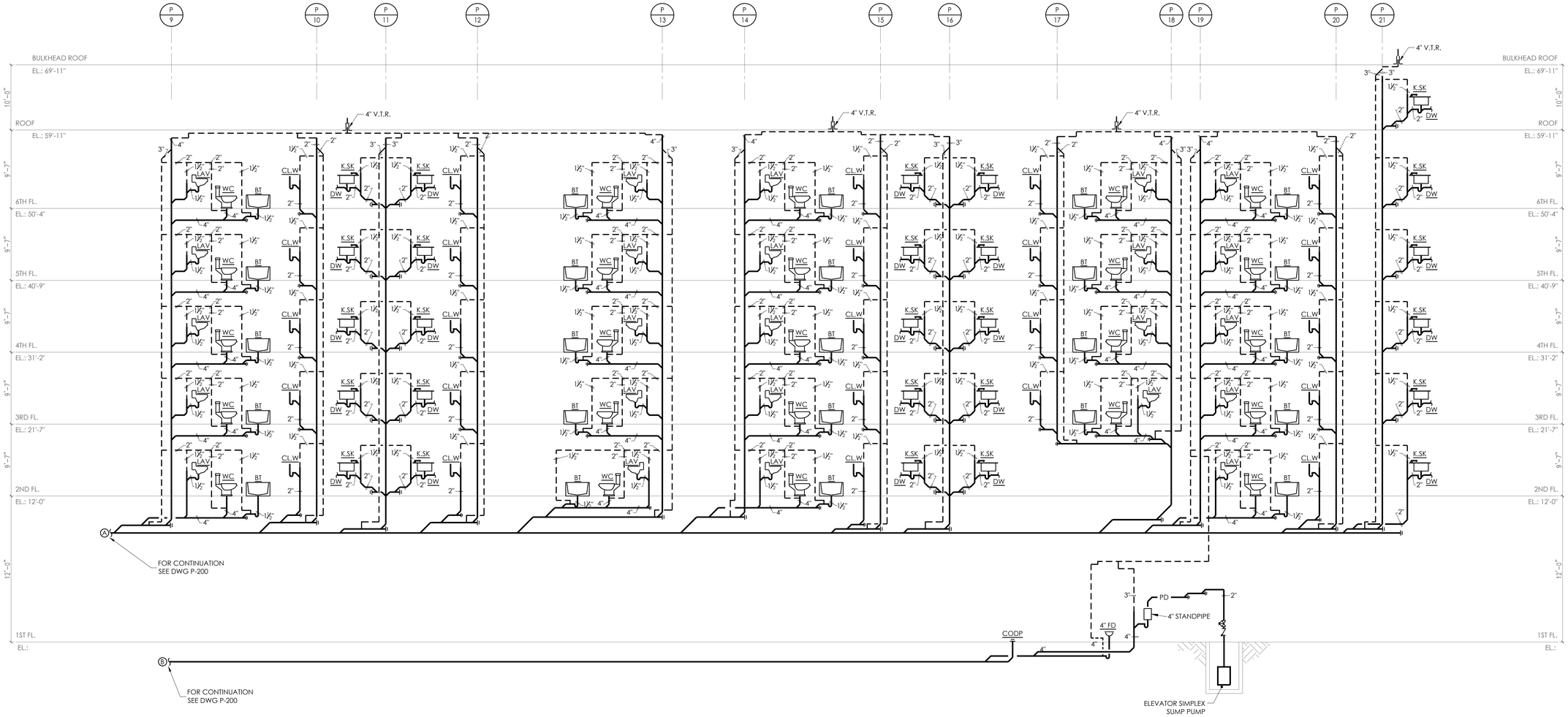
SCALE: SHEET NO:

AS NOTED

DRAWING NO:

P-200.00

NYC DOB NUMBER: NB # XXX XXX XXX



PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

PLUMBING SANITARY RISER DIAGRAM II

SEAL & SIGNATURE

STATE OF NEW YORK · DOMINIC JOSEPH GIGLIOTTI · 083592 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:

PROJECT NO:
RC #1540

DRAWN BY: YP

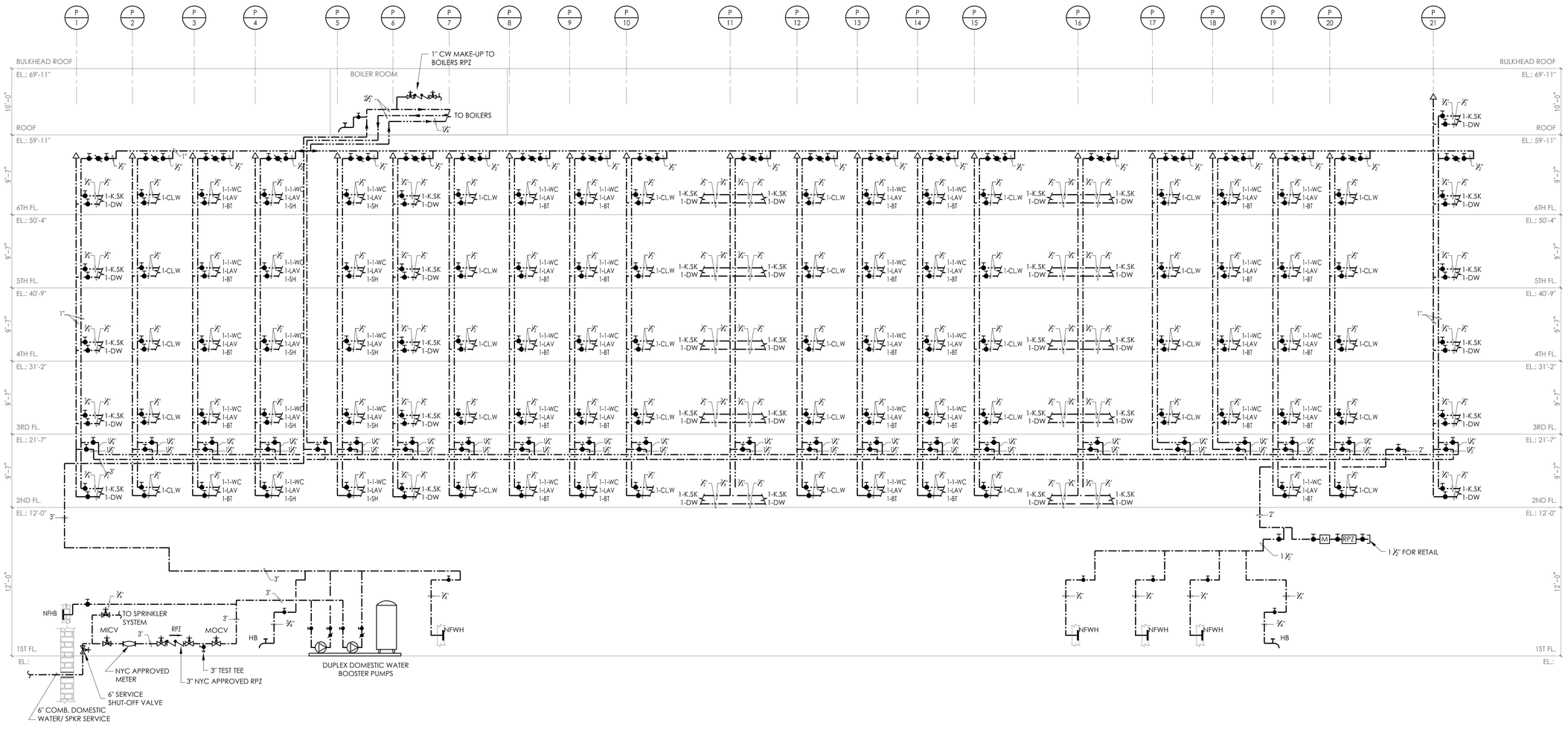
CHECKED BY: DC

SCALE: AS NOTED

SHEET NO:

DRAWING NO:
P-201.00

NYC DOB NUMBER: NB # XXX XXX XXX



PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

PLUMBING WATER RISER DIAGRAM

SEAL & SIGNATURE

STATE OF NEW YORK · DOMINIC JOSEPH ANDRIULE · 083592 · LICENSED PROFESSIONAL ENGINEER

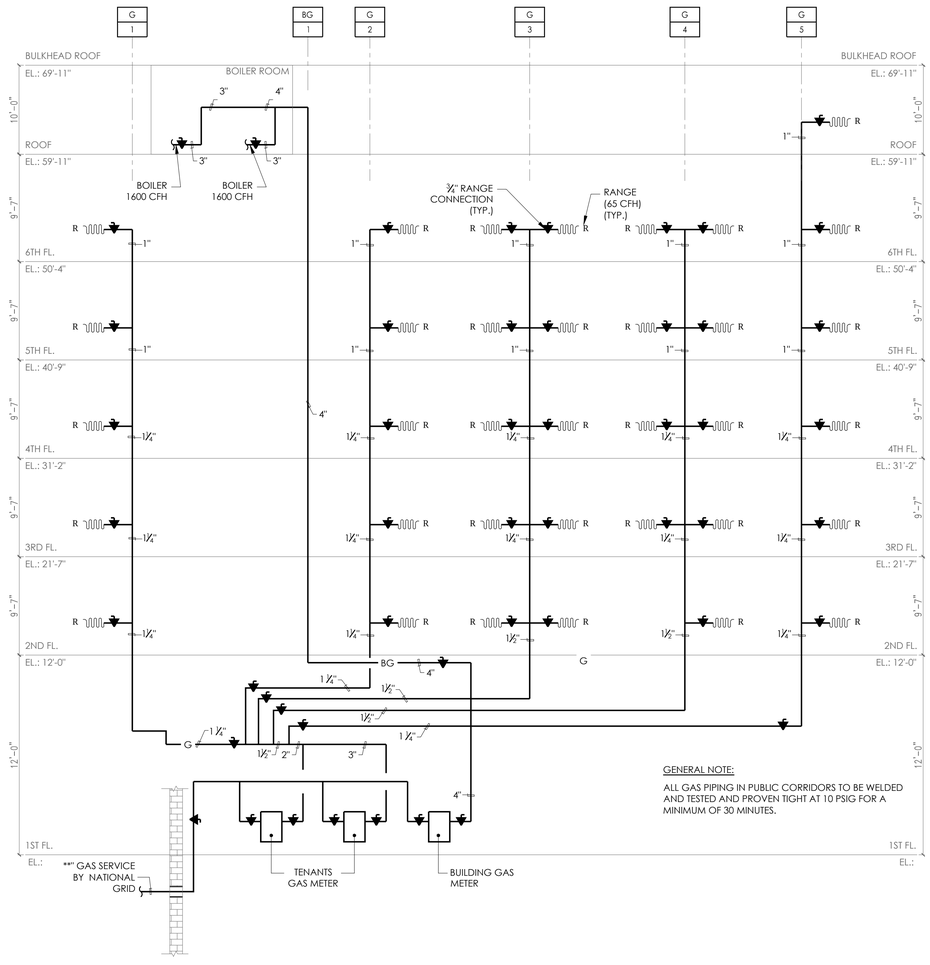
ISSUE DATE: PROJECT NO:
RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO:
P-202.00

NYC DOB NUMBER: NB # XXX XXX XXX



PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
09/02/15	ISSUED FOR DOB
08/28/15	PROGRESS SET

SHEET TITLE:

PLUMBING GAS RISER DIAGRAM

SEAL & SIGNATURE

STATE OF NEW YORK — JOSEPH ANTHONY ETTINGER — 83592 — LICENSED PROFESSIONAL ENGINEER

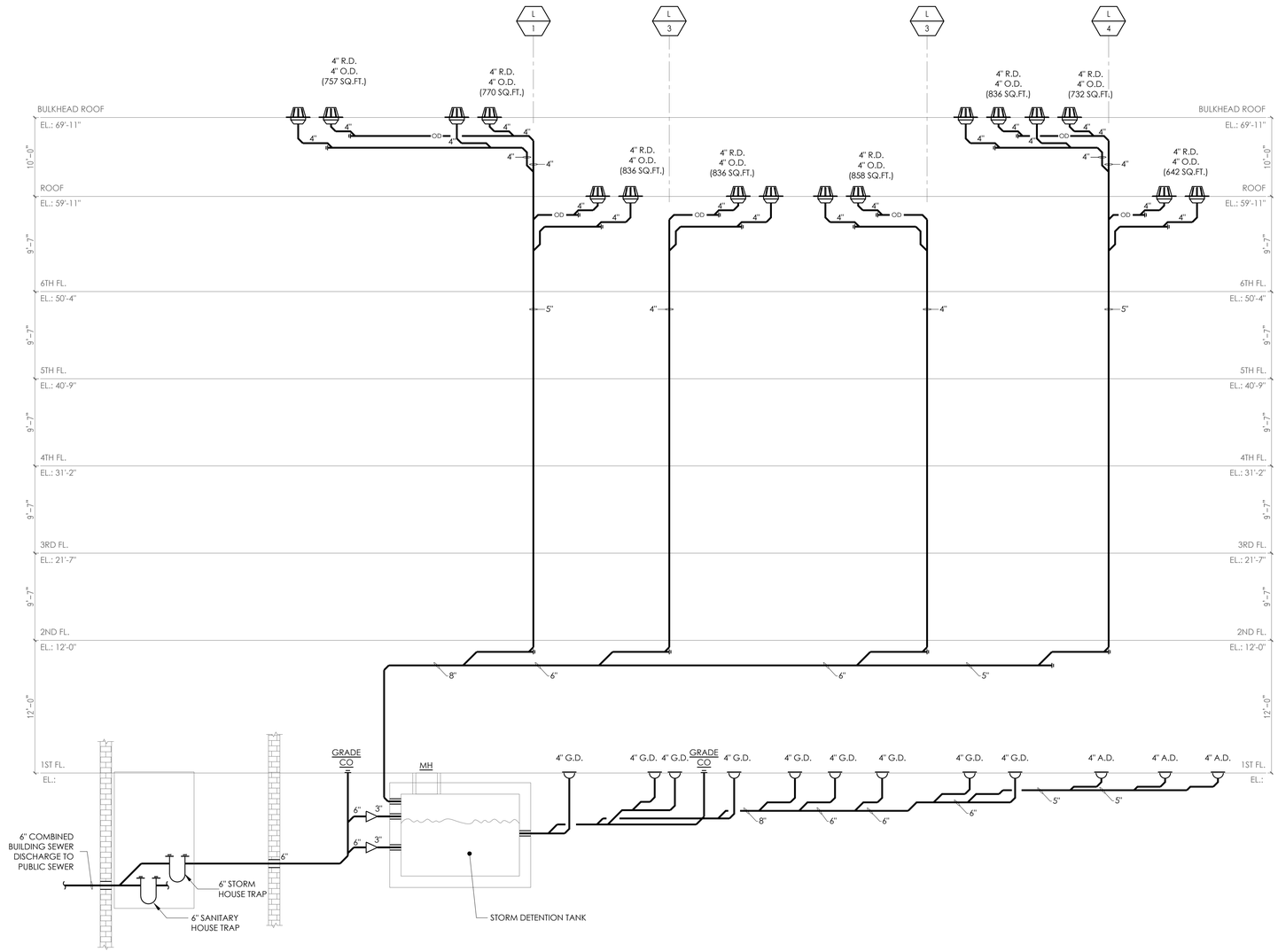
ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: P-203.00

NYC DOB NUMBER: NB # XXX XXX XXX



PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

AUFGANG ARCHITECTS

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

PLUMBING STORM RISER DIAGRAM

SEAL & SIGNATURE

STATE OF NEW YORK · MICHAEL JOSEPH AUFGANG · 18392 · LICENSED PROFESSIONAL ENGINEER

ISSUE DATE:

PROJECT NO:
RC #1540

DRAWN BY: YP

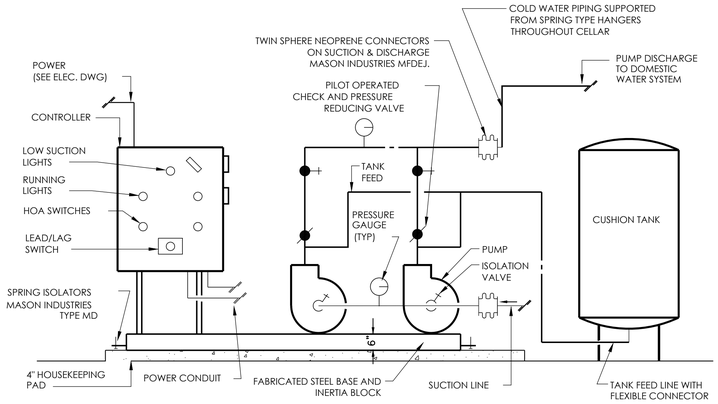
CHECKED BY: DC

SCALE: AS NOTED

SHEET NO:

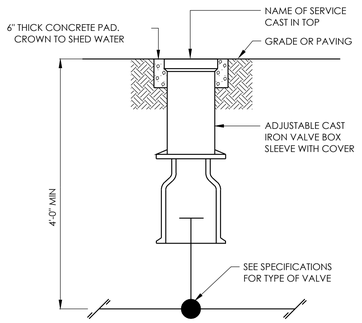
DRAWING NO:
P-204.00

NYC DOB NUMBER: NB # XXX XXX XXX



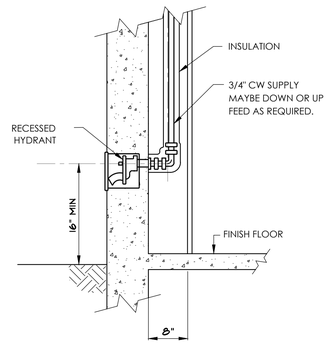
SCHEMATIC OF DUPLEX DOMESTIC WATER BOOSTER PUMPS

N.T.S.



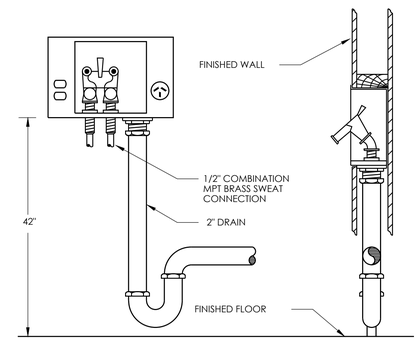
CURB VALVE BOX DETAIL

N.T.S.



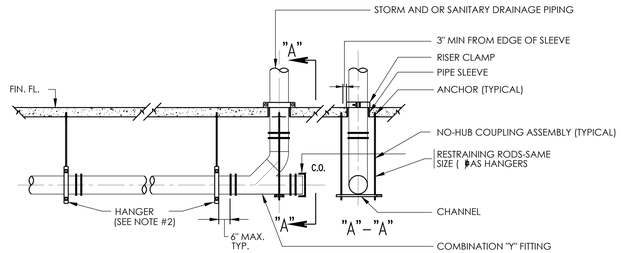
WALL HYDRANT

N.T.S.



WASHING MACHINE SUPPLY & DRAIN UNIT

N.T.S.



NOTES:

1. PROVIDE RESTRAINING ASSEMBLY AT THE BASE OF EACH STACK.
2. PROVIDE A HANGER AT EACH JOINT.
3. SIZE OF HANGER RODS AND RESTRAINING RODS SHALL BA AS PER CODE AND CAST IRON INSTITUTE STANDARDS.
4. FOR HORIZONTAL SOIL, WASTE, & VENT PIPING LARGER THAN 5" PROVIDE HANGER ON EACH SIDE OF EACH NO-HUB COUPLING SPACED NO FURTHER THAN 18" OR LESS THAN 3" FROM THE COUPLING ENDS.

NO-HUB PIPING RESTRAINING DETAIL

N.T.S.

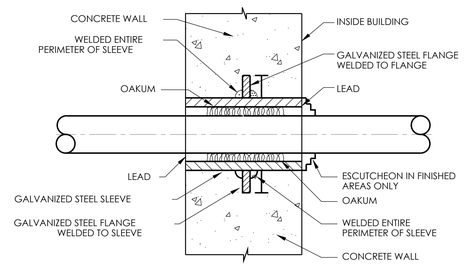
NEW YORK CITY BUILDING DEPARTMENT NOTES:

1. ALL PLUMBING WORK SHALL BE INSTALLED IN STRICT CONFORMITY WITH ALL REQUIREMENTS OF THE 2008 ADMINISTRATIVE CODE AND ALL PROVISIONS OF REFERENCE STANDARD.
2. ALL WATER SUPPLIES SHALL BE OVER THE RIM OR SHALL BE PROVIDED WITH APPROVED TYPE VACUUM BREAKERS AS SHALL ALL WATER CLOSET FLUSH VALVES AND HOSE CONNECTIONS AS PER RULES P107.18, P107.19, & P107.20.
3. ALL VENT BRANCHES ALL VENT STACKS ABOVE HORIZONTAL OFFSETS AND ALL SOIL & WASTE STACKS ABOVE HORIZONTAL OFFSETS ABOVE HIGHEST FIXTURE CONNECTION SHALL BE GALVANIZED PIPING AS PER RULE P109.3 (d) (e).
4. PROTECTION OF PIPES SHALL COMPLY WITH SECTION P-101.1, P101.2, & P101.3.
5. PIPING SYSTEM MATERIALS SHALL COMPLY WITH SECTION P102.4.
6. NUMBER AND TYPE OF PLUMBING FIXTURES SHALL COMPLY WITH SECTION P104.0.
7. FACILITIES FOR THE PHYSICALLY HANDICAPPED SHALL BE IN ACCORDANCE WITH SECTION P104.1 (c), (d).
8. FIXTURE TRAPS AND CLEANOUTS WILL BE PROVIDED AND INSTALLED ACCORDING TO ALL REGULATIONS OF SECTION P105.0.
9. SUPPORTS FOR PLUMBING PIPING WILL BE AS PER SECTION P106.0.
10. WATER SUPPLY AND DISTRIBUTION PIPING WILL COMPLY WITH ALL RULES AND REGULATIONS OF SECTION P107.0.
11. SANITARY DRAINAGE PIPING WILL BE IN ACCORDANCE WITH ALL RULES AND REGULATIONS OF SECTION P108.0.
12. VENT PIPING WILL BE IN ACCORDANCE WITH ALL RULES AND REGULATIONS OF SECTION P109.0.
13. STORM DRAINAGE PIPING WILL BE IN ACCORDANCE WITH ALL RULES AND REGULATIONS OF SECTION P110.0.

SYMBOL LIST

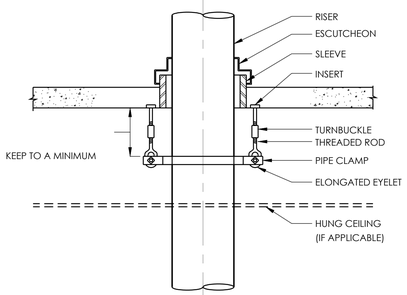
S	SANITARY DRAINAGE PIPING (S)
ST OR L	STORM WATER DRAINAGE PIPING (ST)
	UNDERGROUND DRAINAGE PIPING
	VENT PIPING (V)
	COLD WATER PIPING (CW)
	HOT WATER PIPING (HW)
	HOT WATER PIPING RETURN (HWR)
G	GAS PIPING (G)
BG	BOILER GAS LINE (BG)
DG	DRYERS GAS LINE (DG)
PD	EJECTOR DISCHARGE
SP	SPRINKLER PIPING

	CONTROL VALVE	GD	GARAGE DRAIN
	CHECK VALVE	GPM	GALLON PER MINUTE
	GAS VALVE	(H)WC (H)LAV (H)BT	HANDICAPED FIXTURES
	SOLENOID VALVE (SV)	HB	HOSE BIBB
CO	CLEANOUT	HP	HORSEPOWER
		HT	HOUSE TRAP
CODP	CLEANOUT DECKPLATE	HWH	HOT WATER HEATER
P 1	PLUMBING STACK	IE	INVERT ELEVATION
		K.SK	KITCHEN SINK
L 1	VERTICAL STORM LEADER	LAV	LAVATORY
		MH	MANHOLE
G 1	GAS RISER	NFWH	NONE FREEZE WALL HYDRANT
		PD	PLANTER DRAIN
AC	ACRES	PL	PROPERTY LINE
AD	AREA DRAIN	Q	FLOW RATE
BFP	BACKFLOW PREVENTER	R	RANGE
B.SK	BAR SINK	RCV	RISER CONTROL VALVE
BT	BATH TUB	RD	ROOF DRAIN
BWV	BACKWATER VALVE	RPM	REVOLUTIONS PER MINUTE
CFS	CUBIC FEET PER SECOND	SF.FT.	SQUARE FEET
℄ EL	CENTERLINE ELEVATION	SS	SERVICE SINK
CI	CAST IRON	T	TIME
CLG	CEILING	TD	TERRACE DRAIN
DIP	DUCTILE IRON PIPE	TYP	TYPICAL
(E)	EXISTING	VB	VACUUM BREAKER
F.A.I.	FRESH AIR INLET	VTR	VENT THRU ROOF
FD	FLOOR DRAIN	W	WASTE
FIN.FL.EL	FINISHED FLOOR ELEVATION	WC	WATER CLOSET
FU	FIXTURE UNIT	W/D	WASHER/DRYER
GAL.	GALLON	WH	WALL HYDRANT



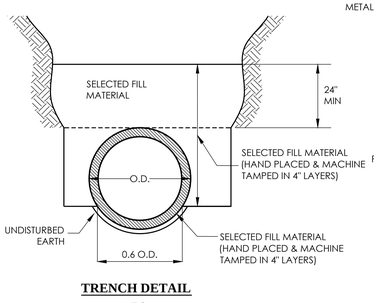
DETAIL OF WATERTIGHT SLEEVE

N.T.S.



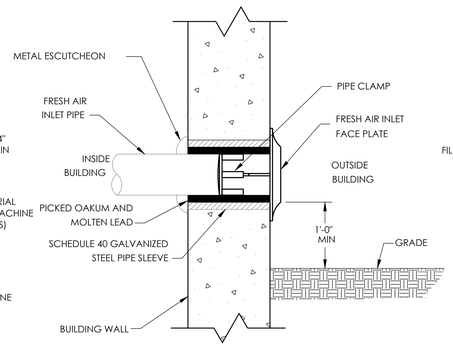
RISER SUPPORT - EXPOSED AREAS

N.T.S.



TRENCH DETAIL

N.T.S.



FRESH AIR INLET

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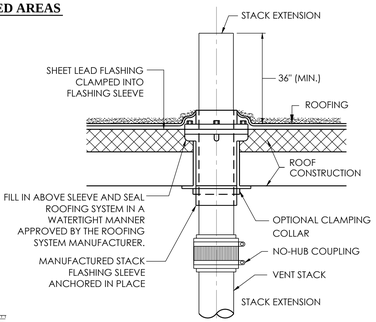


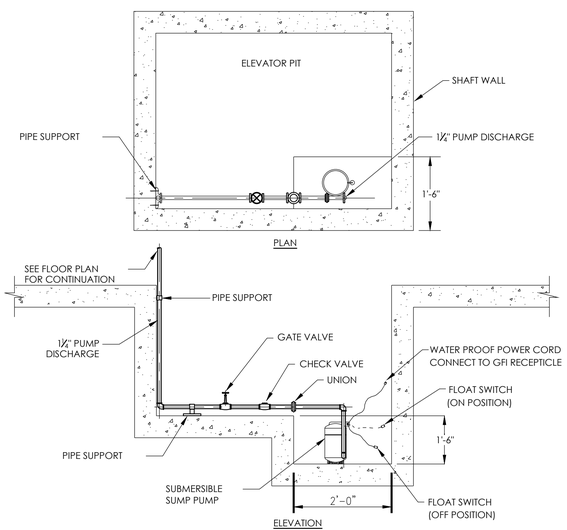
FLASHING SLEEVE

NOTE:

FINAL VENT STACK OUTLET LOCATION TO BE 15 FEET (MIN.) AWAY FROM ANY OUTSIDE VENTILATION AIR INTAKE LOCATION, 10 FEET (MIN.) FROM ANY WALL OR STRUCTURE AND 3 (MIN.) FEET ABOVE STRUCTURE.

VENT THRU ROOF

N.T.S.



ELEVATOR SUMP PUMP DETAIL

N.T.S.

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

PLUMBING DETAILS SHEET #1

SEAL & SIGNATURE

STATE OF NEW YORK · JOHN C. JOSEPH AUFGANG · 083592 · LICENSED PROFESSIONAL ENGINEER

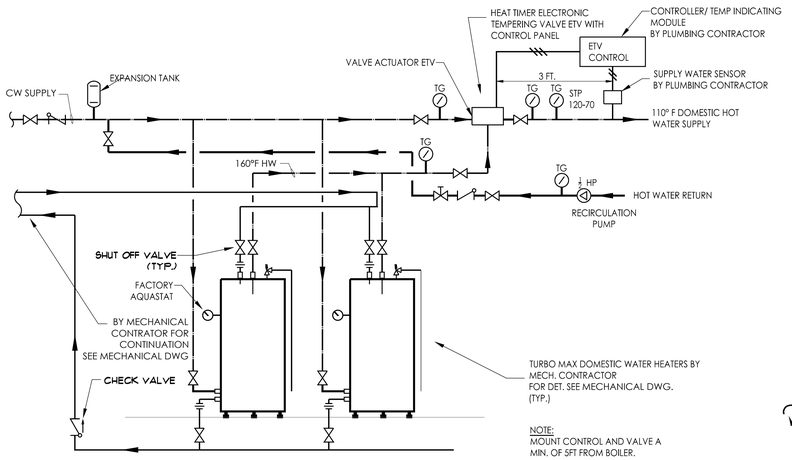
ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: P-300.00

NYC DOB NUMBER: NB # XXX XXX XXX



DOMESTIC HOT WATER HEATERS AND ELECTRONIC MIXING VALVE DETAIL

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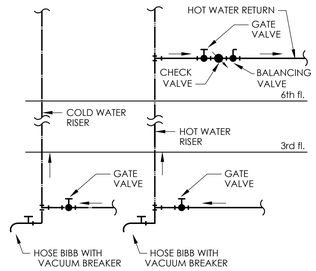


DIAGRAMMATIC VALVES ARRANGEMENT AT CONNECTION TO WATER RISERS

N.T.S.

INSULATION REQUIREMENTS:

A. COLD WATER PIPING
1. COLD WATER - ALL SIZES - 1" INSULATION, A.S. JACKET.
2. STORM DRAINAGE PIPING ALL HORIZONTAL RUNS AND DRAIN BODY - MINIMUM 1" INSULATION, A.S. JACKET.

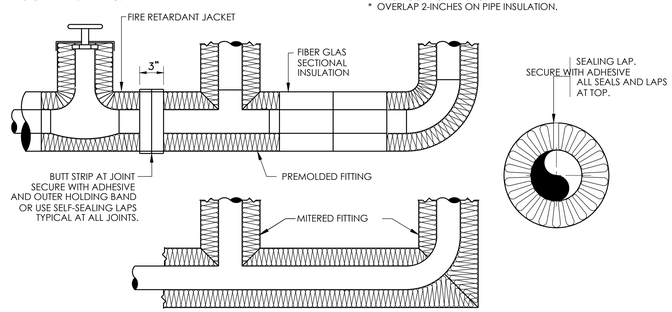
B. HOT WATER PIPING
1. HOT WATER - ½" TO 2" I.D. - 1" INSULATION, A.S. JACKET.
2. HOT WATER SUPPLY - 2-½" AND LARGER - 1-½" INSULATION, A.S. JACKET.
3. HOT WATER CIRCULATING - ALL SIZES - 1" INSULATION, A.S. JACKET.

ENERGY CODE COMPLIANCE NOTES:

1. SERVICE WATER HEATING EQUIPMENT PERFORMANCE EFFICIENCY:
WATER HEATING EQUIPMENT AND HOT WATER STORAGE TANKS SHALL MEET THE REQUIREMENTS OF TABLE 504.2 OF THE ENERGY CONSERVATION CODE OF NYS. THE EFFICIENCY SHALL BE VERIFIED THROUGH DATA FURNISH BY THE MANUFACTURER OR THROUGH CERTIFICATION UNDER AN APPROVED CERTIFICATION PROGRAM.
2. TEMPERATURE CONTROLS:
SERVICE WATER HEATING EQUIPMENT SHALL BE PROVIDED WITH CONTROLS TO ALLOW A SET POINT OF 110°F (43°C) FOR EQUIPMENT SERVING DWELLING UNITS AND 90°F (32°C) FOR EQUIPMENT SERVING OTHER OCCUPANCIES. THE OUTLET TEMPERATURE OF LAVATORIES IN PUBLIC FACILITY REST ROOMS SHALL BE LIMITED TO 110°F (43°C).
3. PIPE INSULATION:
FOR AUTOMATIC CIRCULATING HOT WATER SYSTEMS, PIPING SHALL BE INSULATED WITH 1 INCH (25mm) OF INSULATION HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/HxFT2x°F (1.53 W PER 25 mm/m2xK). REFER TO INSULATION REQUIREMENTS ABOVE. THE FIRST 8 FEET (2438mm) OF PIPING IN NONCIRCULATING SYSTEMAS SERVED BY EQUIPMENT WITHOUT INTEGRAL HEAT TRAPS SHALL BE INSULATED WITH 0.5 INCH (12.7mm) OF MATERIAL HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/HxFT2x°F (1.53 W PER 25mm/m2xK).
4. HOT WATER SYSTEM CONTROLS:
AUTOMATIC CIRCULATING HOT WATER SYSTEM PUMPS OR HEAT TRACE SHALL BE ARRANGED TO BE CONVENIENTLY TURNED OFF AUTOMATICALLY OR MANUALLY WHEN THE HOT WATER SYSTEM IS NOT IN OPERATION.

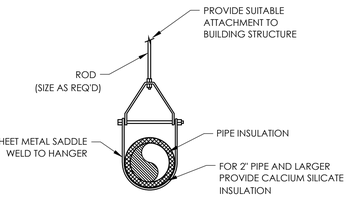
CONCEALED VALVES AND FITTINGS
* WRAP WITH 1-INCH THICK, 1-POUND DENSITY TO REQUIRED PIPE INSULATION THICKNESS.
* SECURE WITH WIRE OR TAPE.
* VAPOR SEAL COLD WATER, CHILLED WATER AND STORM WATER PIPING.

EXPOSED VALVES AND FITTINGS
* PREMOLDED FIBER GLASS OR RADIAL MITERED PIPE INSULATION.
* SKIM COAT OF INSULATING CEMENT.
* WRAP WITH FIBER GLASS REINFORCING CLOTH.
* FINISH COAT OF MASTIC.
* OVERLAP 2-INCHES ON PIPE INSULATION.



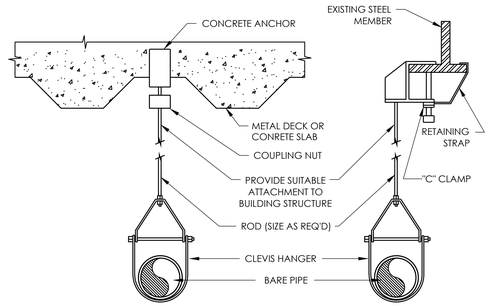
INSULATION OF PIPING,VALVES AND FITTINGS FOR EXPOSED AND CONCEALED LOCATIONS

N.T.S.



CLEVIS HANGER WITH INSULATION SADDLE

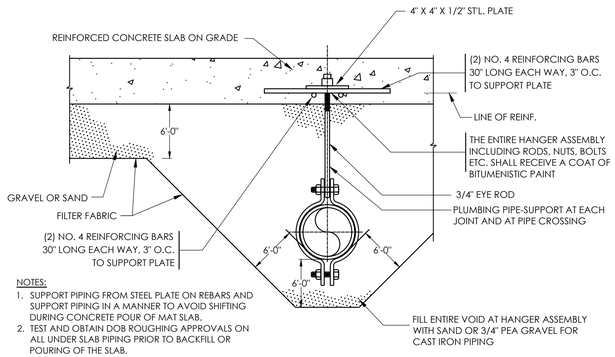
N.T.S.



NOTE:
CLEVIS HANGERS REQUIRED ON PIPING LARGER THAN 1", GENERAL PURPOSE HANGERS MAY BE USED ON 1"AND SMALLER PIPING ONLY

TYPICAL HANGER

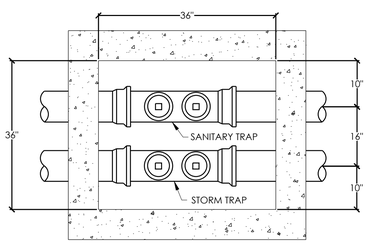
N.T.S.



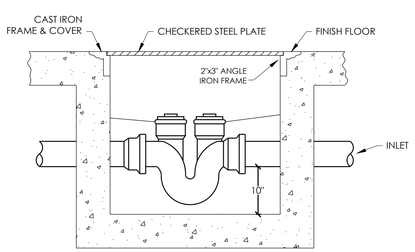
NOTES:
1. SUPPORT PIPING FROM STEEL PLATE ON REBARS AND SUPPORT PIPING IN A MANNER TO AVOID SHIFTING DURING CONCRETE POUR OF MAT SLAB.
2. TEST AND OBTAIN DOB ROUGHING APPROVALS ON ALL UNDER SLAB PIPING PRIOR TO BACKFILL OR POURING OF THE SLAB.

PIPE HANGER BELOW SLAB ON GRADE

SCALE: N.T.S.



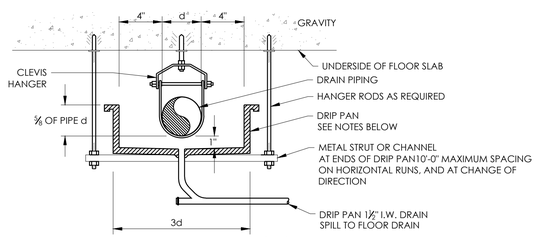
PLAN



SECTION

HOUSE TRAP PIT DETAIL

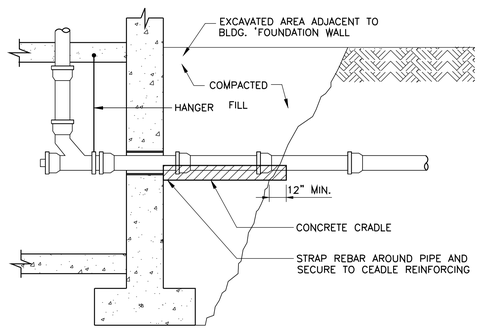
N.T.S.



NOTES
1. DRIP PAN SHALL BE FABRICATED OF 16 GAUGE GALVANIZED STEEL SHEET METAL WITH SOLDERED CORNERS, RETURNED BEND EDGES AND SOLDERED 1½" I.W. GALVANIZED STEEL PIPE WITH DRAINAGE FITTINGS.
2. PROVIDE TWO COATS OF RUST - OLEUM PAINT AT SOLDERED CORNERS AND I.W. CONNECTION.

DRIP PAN

N.T.S.



UNDERGROUND SUPPORT FOR PIPING AT FOUNDATION WALL

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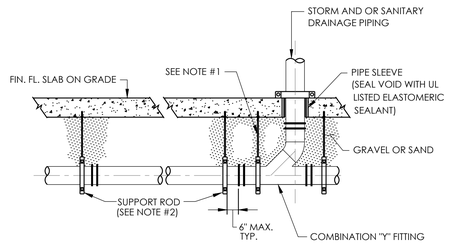

NOTES:
1. PROVIDE RESTRAINING SUPPORT ROD AT THE BASE OF EACH STACK.
2. PROVIDE A SUPPORT ROD AT EACH JOINT.
3. SIZE OF SUPPORT RODS SHALL BE AS PER CODE AND CAST IRON INSTITUTE STANDARDS.
4. FOR HORIZONTAL SOIL, WASTE, & VENT PIPING LARGER THAN 5" PROVIDE HANGER ON EACH SIDE OF EACH NO-HUB COUPLING SPACED NO FURTHER THAN 18" OR LESS THAN 3" FROM THE COUPLING ENDS.

UNDERSLAB PIPING SUPPORT DETAIL

N.T.S.

PROPOSED NEW DEVELOPMENT FOR:

100–118 UNION AVENUE

100-118 AVE., BROOKLYN , NY 10454

BLOCK: 2242 LOT: 3

ARCHITECT:
AUFGANG ARCHITECTS LLC
49 NORTH AIRMONT ROAD - SUFFERN, NY
INFO@AUFGANG.COM 845.368.0004

OWNER/DEVELOPER:
329 EAST 132nd ST. LLC
55 BRUCKNER BLVD
BRONX NY 10454
PH: (917) 509-1696

STRUCTURAL ENGINEER:
BROOKER ENGINEERING, PLLC
78 LAFAYYETTE AVE
SUFFERN, N.Y. 10901
PH: (845) 357-4411

MEP ENGINEER:
ETTINGER ENGINEERING ASSOCIATES
505 EIGHTH AVE, 24TH FL
NEW YORK, N.Y.10018
PH: (212) 244-2410

AUFGANG ARCHITECTS

DATE	SUBMISSIONS / REVISIONS
08/28/15	PROGRESS SET
09/02/15	ISSUED FOR DOB

SHEET TITLE:

PLUMBING DETAILS SHEET #2

SEAL & SIGNATURE

ISSUE DATE: PROJECT NO: RC #1540

DRAWN BY: YP CHECKED BY: DC

SCALE: AS NOTED SHEET NO:

DRAWING NO: P-301.00

NYC DOB NUMBER: NB # XXX XXX XXX

APPENDIX 2

CITIZEN PARTICIPATION PLAN

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

Brooklyn Public Library - Williamsburg Library

240 Division Ave. at Marcy Ave.
Brooklyn, NY 11211
718) 302-3485
Monday, Wednesday, Thursday and Friday: 10:00 AM to 6:00 PM
Tuesday: 1:00 AM to 8:00 PM
Saturday and 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: The major issues of concern to the public will be potential impacts of nuisance odors and dust during the disturbance of soil at the Site. This work will be performed in accordance with procedures that will be specified under a Remedial Program and considers and takes preventive measures for exposure to future residents of the property and those on adjacent properties during construction. Detailed plans to monitor the potential for exposure including a CHASP and a CAMP are required components of the remedial program. Implementation of these plans will be under the direct oversight of the NYCOER.

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.

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

Reduced Energy Consumption and Promotion of Greater Energy Efficiency: Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings. Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

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

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

Storm Water Retention: Storm water retention improves water quality by lowering the rate of combined storm water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.
An estimate of the enhanced storm water retention capability of the redevelopment project will be included in the RAR.

Linkage with Green Building: Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.
The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

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

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

Trees and Plantings: Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.
An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

APPENDIX 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 Storm Water Pollution Prevention

Applicable laws and regulations pertaining to storm water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this 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

CONSTRUCTION HEALTH AND SAFETY PLAN

CONSTRUCTION HEALTH & SAFETY PLAN

100 Union Avenue
E-238; Block 2242, Lot 3
Brooklyn, New York

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Figures
1. Directions to Hospital

Attachments
A. Health and Safety Fact Sheets

1.0 INTRODUCTION

This Construction Health & Safety Plan (CHASP) has been prepared by Hydro Tech Environmental, Corp. (Hydro Tech) as a part of the Remedial Action Work Plan (RAWP) for 100 Union Avenue (Block 2242, Lot 3) and situated in the borough of Brooklyn, New York.

This CHASP will conform to applicable regulations, safe work practices and the project's requirements, and addresses those activities associated with the development of a 6-story mixed use commercial and residential building with a slab on grade. Open landscaped and parking areas are proposed as part of this development in the eastern and southwestern portions of the property.

The Hydro Tech Project Manager (PM), Site Safety Officer (SSO) and field staff (when necessary) will implement the Plan during construction. Compliance with this HASP is required of all persons and third parties who perform the scope of work documented for this project. Assistance in implementing this CHASP can be obtained from the SSO. The content of this CHASP may change or undergo revisions based upon additional information that is made available to health and safety personnel, monitoring results, or changes in the technical scope of work.

It should be noted that this CHASP does not apply to any other scopes of work that may be performed at the Site that are not specifically outlined in this report. Through preparation of this HASP, Hydro Tech and all Subcontractors (if any) do not guarantee the health or safety of any person entering this Site. Due to the nature of this Site and the activities occurring thereon, it is not possible to discover, evaluate and provide protection for all possible hazards that may be encountered. Only those portions of this CHASP that specifically apply to authorized personnel of Hydro Tech will enact the activities at the Site. Strict adherence to the applicable portions of these health and safety guidelines set forth herein will reduce, but not eliminate the potential for injury at this Site. The health and safety guidelines in this CHASP were prepared specifically for this Site and should not be utilized for any other site without prior research and evaluation by trained health and safety specialists and approval by Hydro Tech.

2.0 SCOPE OF WORK

This Construction HASP has been prepared as a part of the RAWP to be implemented during the upcoming development of the Site. Prior environmental assessments identified Semi-Volatile Organic Compounds (SVOCs) and Metals including lead in soil/fill beneath the Site at concentrations exceeding their respective Unrestricted Use Soil Cleanup Objectives (SCOs). A range of vapors associated with organic chlorinated solvents and petroleum constituents were also detected beneath the Site.

The portions of the construction activities specifically addressed in this Construction HASP will include the following and will be performed in the following sequence:

- Supervision of the excavation of soil/fill and other material
- Supervision of the installation of concrete foundations
- Supervision of the installation of vapor barrier system

Prior to any fieldwork, the New York City One-Call Unit will be contacted so that all public utilities can be marked out. The proposed schedule of fieldwork will be coordinated with the developer and the OER.

3.0 STAFFING

This section briefly describes the personnel involved in Site remedial activities, their contact information and their health and safety responsibilities. This section also provides directions to hospital in the case of a health emergency.

EMERGENCY NUMBERS

Contact	Phone Number
Woodhull Medical Center	718.963-8000
New York City EMS	911
NYPD	911
NYFD	911
National Response Center	(800) 424-8802
Poison Information Center	(800) 562-8816
Chemtree	(800) 424-9555

Project Management/Health and Safety Personnel

Title	Contact	Phone Number	Cell Phone
Geologist	AJ Infante	(631) 462-5866	(631) 457-0033
Site Safety Officer	AJ Infante	(718) 636-0800	(631) 457-0033
Project Manager	AJ Infante	(718) 636-0800	(631) 457-0033

Directions To Woodhull Medical Center (See Attached Figure 1)
Upon leaving the Site, head north on Union Avenue. Turn right onto Lynch Street and then right onto Broadway. Continue southeast on Broadway toward Flushing Avenue. Destination will be on the right.

PROJECT MANAGER

As necessary, the Project Manager will perform the following:

- Has the overall responsibility for the health and safety of site personnel
- Ensures that adequate resources are provided to the field staff to carry out their responsibilities as outlined below.
- Ensures that fieldwork is scheduled with adequate personnel and equipment resources to complete the job in a safe manner.
- Ensures that adequate communication between field crews and emergency response personnel is maintained.
- Ensures that field site personnel are adequately trained and qualified to work at the Site.

SITE SAFETY OFFICER

As necessary, the Site Safety Officer will perform the following:

- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).

- Conducts initial on-Site, specific training prior to personnel and/or subcontractors proceeding to work.
- Conducts and documents periodic safety briefings; ensures that field team members comply with this Construction HASP.

- Completes and maintains Accident/Incident Report Forms.
- Notifies corporate administration of all accidents/incidents.
- Determines upgrade or downgrade of PPE based on site conditions and/or downgrade of PPE based on site conditions and/or real-time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as determined by manufacturer's suggested instructions.
- Maintains health and safety field log books.
- Develops and ensures implementation of the Construction HASP.
- Approves revised or new safety protocols for field operations.
- Coordinates revisions of this Construction HASP with field personnel and the SSO Division Contracting Officer.
- Responsible for the development of new company safety protocols and procedures and resolution of any outstanding safety issues which may arise during the conduction of site work.
- Reviews personnel and subcontractors current and up-to-date medical examination and acceptability of health and safety training.

FIELD PERSONNEL AND SUBCONTRACTORS (IF ANY)

- Reports any unsafe or potentially hazardous conditions to the SSO
- Maintains knowledge of the information, instructions, and emergency response actions contained in this Construction HASP.
- Comply with rules, regulations and procedures as set forth in this Construction HASP and any revisions that are instituted.
- Prevents admittance to work sites by unauthorized personnel.

4.0 CHEMICAL & WASTE DESCRIPTION/CHARACTERIZATION

The following list of compounds is based on the results of the recent subsurface investigation:

Semi Volatile Organic Compounds in soil:

- Benzo (a) Anthracene
- Benzo (a) Pyrene
- Chryzene
- Benzo (b) Fluoranthene
- Benzo (k) Fluoranthene
- Indeno(1,2,3-cd)pyrene

Pesticides in soil:

- 4,4-DDD
- 4,4-DDE
- 4,4-DD

Heavy Metals in soil:

- Arsenic
- Barium
- Cadmium

- Copper
- Lead
- Nickel
- Zinc
- Silver

Volatile Organic Compounds in groundwater:
- Methl-Tert-Buthyl-Ether

Volatile Organic Compounds in soil vapors:
- BTEX and associated petroleum related compounds
- Methylene Chloride
- PCE
- Chloroform
- Acetone

Appendix A contains Material Safety Data Sheets

The following information references are presented in order to identify the properties, characteristics and hazards of the compounds and metals that may/will be encountered at the Site.

* Dangerous Properties of Industrial Materials - Sax
* Chemical Hazards of the Workplace - Proctor/Hughes
* Condensed Chemical Dictionary - Hawley
* Rapid Guide to Hazardous Chemical in the Workplace - Lewis 1990.
* NIOSH Guide to Chemical Hazards – 1990.
* ACGIH TLV Values and Biological Exposure Indices - 1991-1992.

5.0 HAZARD ASSESSMENT AND MITIGATION

The potential hazards associated with planned site activities include chemical, physical and biological hazards associated with the construction. This section discusses those hazards that are anticipated to be encountered during the activities listed in the scope of work.

The potential to encounter chemical hazards is dependent upon the work activity performed (invasive or non-invasive), the duration, and location of the work activity. Such hazards could include inhalation or skin contact with chemicals that could cause: dermatitis, skin burn, being overcome by vapors, or asphyxiation. In addition, the handling of contaminated materials and chemicals could result in fire and/or explosion.

The potential to encounter physical hazards during site work includes: heat stress, exposure to excessive noise, loss of limbs, being crushed, head injuries, cuts and bruises, and other physical hazards due to motor vehicle operation, heavy equipment and power tools.

CHEMICAL HAZARDS

The potential for personnel and subcontractors to come in contact with chemical hazards may occur during the following tasks:

- Excavation

- Installation of vapor barrier
- Pouring of concrete foundation(s)

Exposure Pathways
Exposure to these compounds during ongoing activities may occur through inhalation of contaminated dust particles, inhalation of volatile vapor fume compounds, by way of dermal absorption, and accidental ingestion of the contaminant by either direct or indirect cross contamination activities (eating, smoking, poor hygiene). Indirectly, inhalation of contaminated dust particles can occur during adverse weather conditions (high or changing wind directions) or during operations that may generate airborne dust such as excavation.

Dust Suppression
The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities.

1. Applying water on haul roads.
2. Wetting equipment and excavation faces.
3. Spraying water on buckets during excavation and dumping.
4. Hauling materials in properly sealed or watertight containers.
5. Restricting vehicle speeds to 10mph.
6. Covering excavated areas and material after excavation activity ceases.
7. Reducing the excavation size and/or number of excavations.
8. Applying a dust suppressant, such as calcium chloride, in high vehicle traffic areas.

To evaluate the effectiveness if the dust suppression measures, air monitoring will be performedutilizing real-time dust-monitoring equipment. The requirements for air monitoring during post-remediation soil disturbance activities are presented in Section 5.0.

Additional Precautions
Dermal absorption or skin contact with chemical compounds is possible during invasive activities at the Site, including the excavation and/or capping of soils. The use of PPE in accordance with Section 9.0 and strict adherence to proper decontamination procedures should significantly reduce the risk of skin contact.

The potential for accidental ingestion of potentially hazardous chemicals is expected to be remote, when good hygiene practices are used. Unauthorized personnel, including all children, will not be allowed access to the Site.

PHYSICAL HAZARDS
A variety of physical hazards may be present during Site activities. These hazards are similar to those associated with any construction type project and include digging or boring operations and excavation activities in the vicinity of underground utility locations. These physical hazards are due to motor vehicles, and heavy equipment operation, the use of improper use of power and hand tools, misuse of pressurized cylinders, walking on objects, tripping over objects, working on surfaces which have the potential to promote falling, mishandling and improper storage of solid and hazardous materials, skin burns, crushing of fingers, toes, limbs, hit on the head by falling objects or hit one's head due to not seeing the object of concern, temporary loss of one's hearing and/or eyesight. Theses hazards are not unique and are generally familiarly to most hazardous waste site workers at construction sites. Additional task specific safety requirements will be covered during safety briefings.

6.0 SPILL PREVENTION AND CONTROL PLAN

Accidental spill and leaks of hazardous and non-hazardous materials will be properly controlled so that they do not adversely impact storm drain systems or receiving waters. A spill prevention and control plan will include the following:

Spill/Leak Prevention Measures;
-Place any material under cover (tarp) and away from storm drains or sensitive water bodies
-Properly label all containers so that the contents are easily identifiable
-Berm storage areas so that if a spill or leak occur they are easily contained

Spill Response Procedures
- Assessment of the Site and potential impacts by the SSO
- Containment of the material
- Notification of the personnel present at the Site and ensure evacuation procedure if necessary.

Spill Cleanup Procedures
-If small non-hazardous spill, use cleanup materials such as absorbents or rags and damp cloths and dispose of properly;
-If large non-hazardous spill or hazardous spill, a private hazmat team may need to be contacted to assess the situation and conduct the cleanup and proper disposal of the material.

Reporting
-Petroleum spills will be reported immediately to the NYSDEC Spill Hotline.
-If material is unknown or hazardous, contact the local Fire Department.

Training
-The SSO is responsible for providing refreshment training to all employees working on-site about spill prevention, spill response and cleanup on a routine basis.
-The SSO will identify key spill response personnel to assist in the spill control and cleanup procedures.

7.0 TRAINING

GENERAL HEALTH AND SAFETY TRAINING

In accordance with 29 CFR 1910.120, all construction personnel involved with the portions of the scope of work described in Section 2.0 will be briefed by the Project Manager on the potential hazards and the overall requirements in meeting the specifications of this Construction HASP.

The SSO will have the responsibility of ensuring that personnel assigned to this project comply with these requirements. Written certification of completion of any required training, if necessary, will be provided to the SSO.

MANAGER/SUPERVISOR TRAINING

In accordance with 29 CFR 1910.120, on-Site management and supervisors who will be directly responsible for, or who supervise employees engaged in hazardous waste operation shall receive training as required in this Construction HASP and at least eight (8) additional hours of specialized training on managing such operations at the time of job assignment.

ANNUAL 8-HOUR REFRESHER TRAINING
Annual 8-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualification for fieldwork. The following topics will be reviewed: toxicology, respiratory protection, including air purifying devices and self-contained breathing apparatus (SCBA), medical surveillance, decontamination procedures and personnel protective clothing. In addition, topics deemed necessary by the SSO may be added to the above list.

SITE SPECIFIC TRAINING
Prior to commencement of field activities, all personnel assigned to the project will be provided training that will specifically address the activities, procedures, monitoring, and equipment for the site operations. It will include Site and facility layout, hazards, and emergency services at the Site, and will highlight all provisions contained within this Construction HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

ON-SITE SAFETY BRIEFINGS
Project personnel and visitors will be given periodic on-site health and safety briefings by the SSO, or their designee, to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices, or changes in the Site's environmental conditions. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety audits.

ADDITIONAL TRAINING
Additional training may be required by the SSO for participation in certain field tasks during the course of the project. Such additional training could be in the safe operation of heavy or power tool equipment or hazard communication training.

HAZWOPER TRAINING
All remedial personnel that will be in direct contact with the native soil/fill materials must complete an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course and, where necessary, a current 8-hour refresher course

SUBCONTRACTOR TRAINING
Subcontractor personnel working on-site may be exempted from the contents of this Construction HASP. The SSO will determine if this exemption is allowed. In any case, the subcontractor personnel who are exposed to hazards are not exempted from the contents of this Construction HASP.

8.0 MEDICAL SURVEILLANCE

GENERAL
No general or specific medical surveillance or other medical requirements are set forth in this Construction HASP.

9.0 SITE CONTROL, PPE & COMMUNICATIONS

SITE CONTROL

The area where the activities of the scope of work will be performed is considered to be the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered the EZ. This zone will be clearly delineated by cones, tape, or other means. The SSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy
- Appropriate personal protective equipment (as necessary)

The remaining portions of the Site outside of the EZ will consist of a Support Zone (SZ) and a Contamination Reduction Zone (CRZ). Appropriate sanitary facilities, safety equipment, packaged/decontaminated and labeled samples will be located in SZ. Potentially contaminated personnel or materials will be allowed in the CRZ for decontamination as necessary.

PERSONAL PROTECTIVE EQUIPMENT

General

The level of protection worn by field personnel will be enforced by the SSO. Levels of protection may be upgraded or downgraded at the discretion of the SSO. The decision shall be based on real-time air monitoring, site history data, and prior site experience. Any changes in the level of protection shall be recorded in the health and safety field logbook.

PPE Specifications

For tasks requiring Level C PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Disposable outer coveralls (Poly-coated Tyvek)
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC), steel toe/shank
- Boot covers (as needed)
- Hard Hat
- Hearing protection (as needed)
- Splash suit and face shield for decontamination operations (as needed)

For tasks requiring Level D PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC) steel toe/shank
- Boot covers (as needed)

- Hard hat
- Hearing protection (as needed)
- Safety glasses

For tasks requiring Level D PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC) steel toe/shank
- Boot covers (as needed)
- Hard hat
- Hearing protection (as needed)
- Safety glasses

For tasks requiring respiratory protection, the following equipment shall be used:

Level D - No respiratory protective equipment necessary except for a dust mask
Level C - A full-face air-purifying respirator equipped with organic vapor/pesticide-HEPA cartridges
Level B - An air line respirator or a self-contained breathing apparatus (SCBA)

LEVEL OF PERSONAL PROTECTIVE EQUIPMENT REQUIRED

Activity	**Level of Protection Respiratory/PPE**
Excavations	C/D
Foundation Construction	C/D

COMMUNICATIONS
Communications is the ability to talk with others. While working in Level C Protection, personnel may find that communication become a more difficult task and process to accomplish. This is further complicated by distance and space. In order to address this problem, electronic instruments, mechanical devices or hand signals will be used as follows:

- Walkie-Talkies - Hand held radios would be utilized as much as possible by field teams for communication between downrange operations and the Command Post base station.

- Telephones - A mobile telephone will be located in the Command Post vehicle in the Support Zone for communication with emergency support services/facilities. If a telephone is demobilized, the nearest public phones will be identified.

- Air Horns - A member of the downrange field team will carry an air horn and another will be evident in the Support Zone to alert field personnel to an emergency situation.

- Hand Signals - Members of the field team using the buddy system will employ this communication method. Signals become especially important when in the vicinity of heavy moving equipment and when using Level B respiratory equipment. The signals shall become familiar to the entire field team before site operations commence and they will be reinforced and reviewed during site-specific training.

HAND SIGNALS FOR ON-SITE COMMUNICATION

Signal	Meaning
Hand gripping throat	Out of air, can't breathe
Grip partners' wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK, I'm all right; I understand
Thumbs down	No; negative, unable to understand you. I'm not all right

10.0 AIR MONITORING PLAN

GENERAL

Continuous air monitoring in the EZ during invasive tasks will accompany site operations, as indicated in this HASP or as required by the SSO. Monitoring will be performed to verify the adequacy of respiratory protection, to aid in site layout and to document work exposure. All monitoring instruments shall be operated by qualified personnel only and will be calibrated daily prior to use, or more often as necessary. For additional references and information, see Hydro Tech's Site-Specific Air Monitoring Program.

REAL-TIME MONITORING

Instrumentation

A PID (to monitor total volatile organic concentrations) will be used to measure worker breathing zone ambient on-site concentrations during on-site activities. The equipment will be calibrated daily and the results noted in the project field book. A background level will be established, at a minimum, on a daily basis, and recorded in the field book.

The following response actions will be taken based on PID readings in the breathing zone. All work will be performed in level D PPE unless breathing zone volatile organic concentrations exceed 5 ppm. Once levels of 25 ppm are measured, work will be stopped.

Volatile Organics	Photoionization Detector (PID)	>5ppm	Temporarily halt work activities & monitor until readings decrease to below 5ppm.
		>5ppm<25ppm	Halt work activities, upgrade to level C continue monitoring.
		>25ppm	Shut down work activities

During soil excavation, particulate monitoring will be performed using a real-time particulate monitor that will monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

Object to be measured: Dust. Mists, Aerosols
Size range: < 0.1 to 10 microns
Sensitivity: 0.001 mg/m3
Overall Accuracy: = 10% as compared to gravimetric analysis of stearic acid or reference dust.

Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. The action level will be established at 150 ug/m3 over the integrated period not to exceed 15 minutes.

Action Levels
Action levels for upgrading of PPE in this Construction HASP will apply to all site work during the duration of field activities at the Site. The action level is the presence of visible airborne dust. When airborne dust is observed, specific dust-mitigating procedures will be implemented. These dust-mitigating procedures are documented in Section 6.0.

11.0 SAFETY CONSIDERATIONS

GENERAL
In addition to the specific requirements of this HASP, common sense should be used at all times. The general safety rules and practices below will be in effect at the Site at the discretion of the Project Manager, SSO or other authorized personnel.

- The site will be suitably marked or barricaded as necessary to prevent unauthorized visitors but not hinder emergency services if needed.

- As needed, all open holes, trenches, and obstacles will be properly barricaded in accordance with local site requirements. These requirements will be determined by proximity to traffic ways, both pedestrian and vehicular, and site of the hole, trench, or obstacle. If holes are required to be left open during non-working hours, they will be adequately decked over or barricaded and sufficiently lighted.

- Before any digging or boring operations are conducted, underground utility locations will be identified. All boring, excavation, and other site work will be planned and performed with consideration for underground lines. Any excavation work will be performed in accordance with Hydro Tech's Standard Operating Procedures for Excavations.

- Either workers or other people will enact dust-mitigating procedures when the potential for the inhalation of dust particles is present.

- The act of smoking and/or ignition sources in the vicinity of potentially flammable or contaminated material is strictly prohibited.

- Drilling, boring, and use of cranes and drilling rigs, erection of towers, movement of vehicles and equipment and other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs; canopies; building and other structures and construction; and natural features such as trees, boulders, bodies of water, and terrain.

- When working in areas where flammable vapors may be present, particular care shall be exercised with tools and equipment that may be sources of ignition. All tools and equipment provided must be properly bonded and/or grounded. Metal buttons and zippers are prohibited on safety clothing for areas that may contain a flammable or explosive atmosphere.

- Approved and appropriate safety equipment (as specified in this Construction HASP), such as eye protection, hard hats, foot protection, and respirators, must be worn in areas where required. In addition, eye protection must be worn when sampling soil or water that may be contaminated.

- No smoking, eating, chewing tobacco, gum chewing, or drinking will be allowed in the contaminated areas.

- Contaminated tools and hands must be kept away from the face.

- Personnel must use personal hygiene safe guards (washing up) at the end of the shift or as soon as possible after leaving the Site.

- Each sample must be treated and handled as though it were contaminated.

- Persons with long hair and/or loose fitting clothing that could become entangled in power equipment must take adequate precautions.

- Horseplay is prohibited in the work area.

- Work while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

POSTED SIGNS
Posted danger signs will be used where an immediate hazard exists. Caution signs will be posted to warn against potential hazards and to caution against unsafe practices. Traffic control methods and barricades will be used as needed. Wooden stakes and flagging tape, or equally effective material will be used to demarcate all restricted areas.

Other postings may include the OSHA poster, emergency hospital route, and telephone numbers of contact personnel.

INVASIVE OPERATIONS
The SSO will be present on-Site during all invasive work (e.g. excavations and capping). The SSO will ensure that appropriate monitoring, levels of protection, and safety procedures are followed. No personnel will enter any excavations for any reasons. All non-essential personnel will stay at least 10 feet back from the edge of the excavation and out of the swing radius of the backhoe. No drums or other potential sources will be sampled or removed during this phase without further additions to the Construction HASP.

The proximity of water, sewer, and electrical lines will be identified prior to invasive operations. The possibility of the presence of underground conduits or vessels containing materials under pressure will also be investigated prior to invasive operations. Properly-sized containment systems will be utilized and consideration of the potential volume of liquid or waste released during operations will be discussed with members of the field team to minimize the potential for spills and provide a method for collection of waste materials. Emergency evacuation procedures and the location of safety equipment will be established prior to start up operations. The use of protective clothing, especially hard hats, boots, and gloves will be required during drilling and other heavy equipment work.

SOIL, GROUNDWATER AND LIQUID WASTE SAMPLING
During Site invasive excavation, soil sampling for waste characterization may be required for disposal purposes. No groundwater or liquid waste sampling is anticipated during site remediation.

HEAVY EQUIPMENT DECONTAMINATION
Personnel steam cleaning heavy equipment, if necessary shall use the prescribed level of protection and adhere to the buddy system. Initially this task usually employs Level C. The heavy equipment decontamination shall be restricted to authorized personnel only. Special consideration will be given to wind speed and direction. Downwind areas are to be kept free of personnel to avoid unnecessary exposure to potential airborne contamination.

ADDITIONAL SAFETY CONSIDERATIONS
No other additional safety considerations at this time.

12.0 DECONTAMINATION AND DISPOSAL PROCEDURES

CONTAMINATION PREVENTION
One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel:
Do not walk through areas of obvious or known contamination.
Do not directly handle or touch contaminated materials.
Make sure that there are no cuts or tears on PPE.
Fasten all closures in suits; cover with tape if necessary.
Particular care should be taken to prevent any skin injuries.
Stay upwind of airborne contaminants.
Do not carry cigarettes, cosmetics, gum, etc. into contaminated areas.

Sampling and Monitoring:
When required by the SSO, cover instruments with clear plastic, leaving openings for sampling ports. Keep all decontaminated sampling materials in bags prior to emplacement of sample matrix.

Heavy Equipment:
Care should be taken to limit the amount of contamination that comes in contact with heavy equipment (tires). Dust control measures may be needed on roads inside the site boundaries.

PERSONNEL DECONTAMINATION
All personnel shall pass through an outlined decontamination procedure when exiting the hot zone at each location. A field wash for equipment and PPE shall be set up at each work location. The system will include a gross wash and rinse for all disposable clothing and boots worn in the EZ. Upon exiting the EZ, all personnel will wash their hands, arms, neck, and face before entering the Support Zone.

EQUIPMENT DECONTAMINATION
Equipment used at the Site that is potentially contaminated shall be decontaminated to prevent hazardous materials from leaving the Site. All heavy equipment will be decontaminated at the decontamination pad and inspected by the SSO and Project Manager before it leaves the Site. The decontamination area will provide for the containment of all wastewater from the decontamination process. Respirators, airline and any other personnel equipment that comes in contact with contaminated soils shall pass through a field wash.

DECONTAMINATION DURING MEDICAL EMERGENCIES

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or omitted. The Site SSO or designee will accompany contaminated victims to the medical facility to provide advice on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances and /or medical personnel. Outer garments are then removed at the medical facility.

No attempt will be made to wash or rinse the victim, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material that could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed. Note that heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing must be promptly removed. Less serious forms of heat stress also require prompt attention and removal of protective clothing immediately. Decontamination should be omitted or minimized and treatment begun immediately unless the victim is obviously contaminated.

DISPOSAL PROCEDURES

The SSO and Project Manager will develop a segregating system of non-hazardous waste and hazardous waste. All discarded material, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating sanitary hazards, orcausing litter to be left on site. All potentially contaminated materials, e.g. clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste.

13.0 EMERGENCY PLAN

The potential for the development of an emergency situation is low considering the low concentrations of hazardous substances at the work site. Nevertheless, an emergency situation could occur. All personnel, prior to the start of work, will know the emergency plan outlined in this section. The emergency plan will be available for use at all times during site work.

Various individual site characteristics will determine preliminary actions taken to assure that this emergency plan is successfully implemented in the event of a site emergency. Careful consideration must be given to the proximity of neighborhood housing or places of employment, and to the relative possibility of site fire, explosion or release of vapors or gases that could affect the surrounding community.

The Project Manager shall make contact with local fire, police, and other emergency units prior to beginning work on site. In these contacts, the Project Manager will inform the emergency units about the nature and duration of work expected to the Site and the type of contaminants and the possible health or safety effects of emergencies involving these contaminants. At this time, the Project Manager and the emergency response units shall make the necessary arrangements to be prepared for any emergencies that could occur.

The Project Manager shall implement the contingency plan whenever conditions at the Site warrant such action. The Project Manager will be responsible for coordination of the evacuation emergency treatment, and transportation of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

EVACUATION
In the event of an emergency situation, such as fire, explosion, or significant release of toxic gases, an air horn or other appropriate device will be sounded for approximately 10 second intervals indicating the initiation of evacuation procedures. All personnel will evacuate and assemble near the entrance to the site. The location shall be upwind of the Site where possible.

For efficient and safe site evacuation and assessment of the emergency situation, the Project Manager will have authority to initiate action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SSO or designated SSO must ensure that access for emergency equipment is provided and that all combustion apparatuses have been shut down once the alarm has been sounded. Once the safety of all personnel is established, the Fire Department and other emergency response groups as necessary will be notified by telephone of the emergency.

POTENTIAL OR ACTUAL FIRE OR EXPLOSION
Immediately evacuate the Site (air horn will sound for 10-second intervals), notify the local fire and police departments, and other appropriate emergency response groups if an actual fire or explosion has taken place.

PERSONNEL INJURY
Emergency first aid shall be applied on site as deemed necessary. If necessary, the individual shall be decontaminated and transported to the nearest medical facility.

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. However, since some situations may require transport of an injured party by other means, the hospital route is identified below. A map to this facility provided with this HASP in Section 2.2.3.

ACCIDENT/INCIDENT REPORTING
As soon as first aid and/or emergency response needs have been met, the employer of the injured party must be immediately notified of any incident. Written confirmation of verbal reports is to be submitted within 24 hours. A standard report form entitled "Accident Data Report" is to be used for this purpose.

For reporting purposes, the term accident refers to fatalities, lost time injuries, spill, or exposure to hazardous materials (toxic materials, explosive or flammable materials).

Any information released from the health care provider, which is not deemed confidential patient information, is to be attached to the appropriate form. Any medical information that is released by patient consent is to be filed in the individuals' medical records and treated as confidential.

OVERT PERSONNEL EXPOSURE

SKIN CONTACT:	Use copious amounts of soap and water. Wash/rinse affected area thoroughly, and then provide appropriate medical attention.

	Eyes should be rinsed for 15 minutes upon chemical contamination.
INHALATION:	Move personnel to fresh air and if necessary, decontaminate and transport to hospital.
INGESTION:	Decontamination and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION:	Decontaminate and transport to emergency medical facility.

ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the SSO or designee will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

* Potential for heat stress and heat-related injuries
* Potential for cold stress and cold-related injuries
* Treacherous weather-related conditions
* Limited visibility
* Potential for electrical storms

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lighting. Observe daily weather reports and evacuate if necessary in case of inclement weather conditions.

EMERGENCY RESPONSE EQUIPMENT LIST

Some or all of the following will either be available on-Site or be able to be brought to the Site within a 2-hour period:

* 55 Gallon Drums
* 85 Gallon Drums
* Absorbent Pads
* Absorbent Booms
* Speedy-Dry
* Plastic Sheeting
* Hay Bales
* Pneumatic Nibbler
* Back Hoe
* Pressure Washer
* Air Compressor
* Wilden Pumps
* Equipment Storage Trailer
* Submersible Pumps
* Miscellaneous Hand Tools
* Portable Lighting

LARGE EQUIPMENT

If necessary, the following large equipment will be brought to the Site within 2-hours:

* Large Vacuum Truck
* Super Sucker
* Dump Trucks
* Drill Rig
* Utility Vehicle

14.0 LOGS, REPORTS AND RECORD KEEPING

Medical and Training Records

The Site Superintendent keeps medical and training records. All subcontractors must provide verification of training and medical qualifications to the Site Superintendent. The Site Superintendent will keep a log of personnel meeting appropriate training and medical qualifications for site work. The log will be kept in the project file. Medical records will be maintained in accordance with 29 CFR 1910.20.

Onsite Log

A log of personnel onsite each day will be kept by the Site Superintendent. Originals will be kept in the project file.

Exposure Records

Any monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR 1910.20. The originals will be sent to the Hydro Tech records coordinator. For subcontractor employees, the original will be sent to the subcontractor employer and a copy kept in the project file.

Accident/Incident Reports

An accident/incident report must be completed for all accidents and incidents. Hydro Tech will send the originals to the appropriate Hydro Tech records coordinator for maintenance. Copies will be distributed as stated. A copy of the forms will be kept in the project file.

OSHA Form 200

An OSHA Form 200 (Log of Occupational Injuries and Illnesses) will be kept at the Site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the Hydro Tech corporate records administrator for maintenance. Subcontractor employers must also meet the requirements of maintaining an OSHA 200 form. The Hydro Tech accident/incident report meets the requirements of the OSHA Form 101 (Supplemental Record) and must be maintained with the OSHA Form 200 for all recordable injuries or illnesses.

Health and Safety Field Log Book

The SSO or designee will maintain the logbook in accordance with standard Hydro Tech procedures. Daily site conditions, activities, personnel, calibration records, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

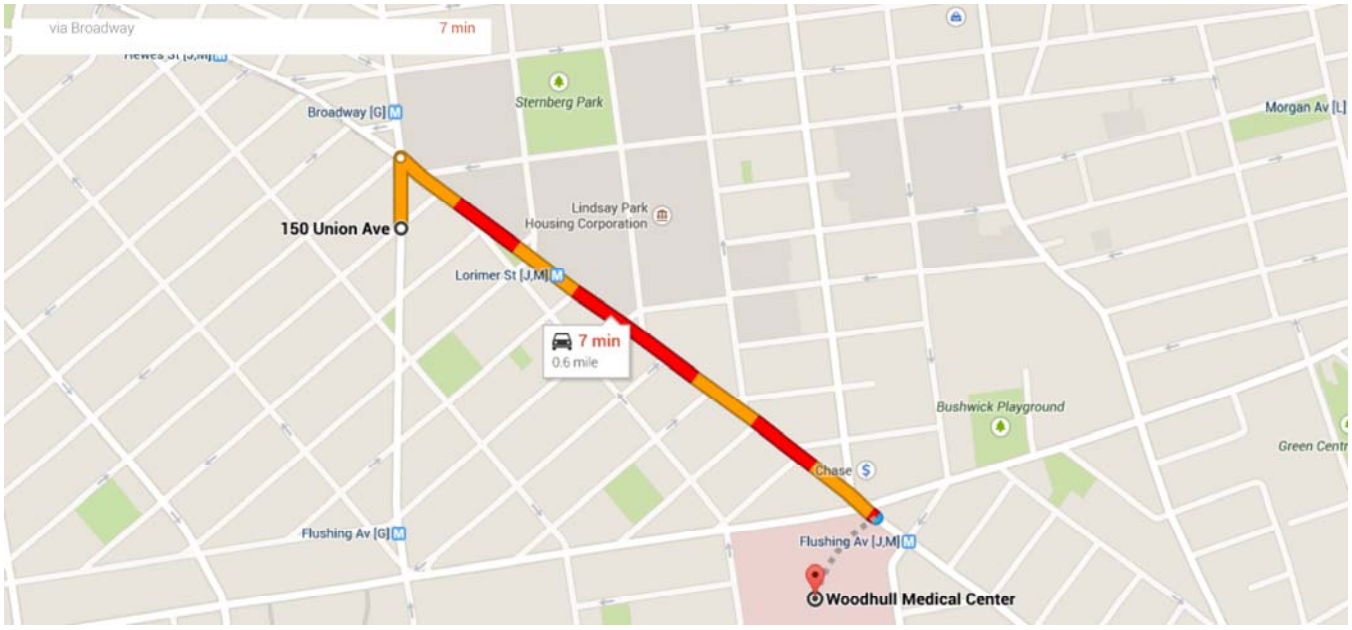
15.0 SANITATION

Since sanitary sewer connection has not been established, provisions shall be made for access to sanitary systems by using nearby public facilities consistent with provisions of governing local ordinance codes. This will include the use of outside firms providing and maintaining "Porta Potties" or similar devices.

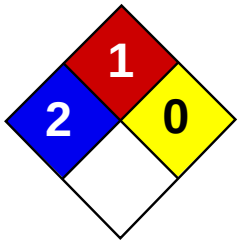
If a commercial/industrial laundry is used to clean or launder clothing that is potentially contaminated, they shall be informed of the potential harmful effects of exposure to hazardous substances related to the affected clothing.

Personnel and subcontractors sites shall follow decontamination procedures described in the Construction HASP. This will generally include, when necessary, site-specific training in shower usage and cleanup, personal hygiene requirements and the donning of protective equipment/clothing.

FIGURE 1
DIRECTIONS TO HOSPITAL


via Broadway
7 min
Broadway [G]
Sternberg Park
Morgan Av [L]
150 Union Ave
Lindsay Park
Housing Corporation
Lorimer St [J,M]
7 min
0.6 mile
Bushwick Playground
Chase
Flushing Av [G]
Flushing Av [J,M]
Woodhull Medical Center

ATTACHMENT A
HEALTH AND SAFETY FACT SHEETS



Material Safety Data Sheet
Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C2HCl3

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
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, the nervous system, liver, heart, 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. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep 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 gas/fumes/ vapour/

spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m3) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Easily soluble in methanol, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity:
Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene 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: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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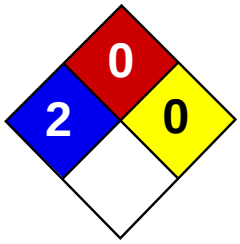

Material Safety Data Sheet
Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolvel; Tetrachloroethene; Tetraleno; Tetralex; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C2-Cl4

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
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. 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 if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States] TWA: 170 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Miscible with alcohol, ether, chloroform, benzene, hexane. It dissolves in most of the fixed and volatile oils. Solubility in water: 0.015 g/100 ml @ 25 deg. C It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Oxidized by strong oxidizing agents. Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium , barium. Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2629 mg/kg [Rat]. Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Publishe Lethal Dose/Conc: LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg LDL [Dog] - Route: Oral; Dose: 4000 mg/kg LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects(teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation with possible dermal blistering or burns. Symtoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain. Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorentiation, seizures, enotional instability, stupor, coma). It may cause pulmonary edema Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation. Ingestion/Inhalation: Chronic exposure can affect the liver(hepatitis,fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/ central nervous system/peripheral nervous system (impaired memory, numbness of extremeties, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fatthead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

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: Tetrachloroethylene 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: Tetrachloroethylene Connecticut hazardous material survey.: Tetrachloroethylene Illinois toxic substances disclosure to employee act: Tetrachloroethylene Illinois chemical safety act: Tetrachloroethylene New York release reporting list: Tetrachloroethylene Rhode Island RTK hazardous substances: Tetrachloroethylene Pennsylvania RTK: Tetrachloroethylene Minnesota: Tetrachloroethylene Michigan critical material: Tetrachloroethylene Massachusetts RTK: Tetrachloroethylene Massachusetts spill list: Tetrachloroethylene New Jersey: Tetrachloroethylene New Jersey spill list: Tetrachloroethylene Louisiana spill reporting: Tetrachloroethylene California Director's List of Hazardous Substances: Tetrachloroethylene TSCA 8(b) inventory: Tetrachloroethylene TSCA 8(d) H and S data reporting: Tetrachloroethylene: Effective date: 6/1/87; Sunset date: 6/1/97 SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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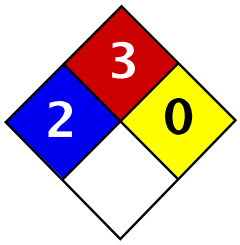

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
p-Xylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: p-Xylene

Catalog Codes: SLX1120

CAS#: 106-42-3

RTECS: ZE2625000

TSCA: TSCA 8(b) inventory: p-Xylene

CI#: Not applicable.

Synonym: p-Methyltoluene

Chemical Name: 1,4-Dimethylbenzene

Chemical Formula: C6H4(CH3)2

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
{p-}Xylene	106-42-3	100

Toxicological Data on Ingredients: p-Xylene: ORAL (LD50): Acute: 5000 mg/kg [Rat.]. DERMAL (LD50): Acute: 12400 mg/kg [Rabbit.]. VAPOR (LC50): Acute: 4550 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to blood, kidneys, the nervous system, liver.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

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: Flammable.

Auto-Ignition Temperature: 527°C (980.6°F)

Flash Points: CLOSED CUP: 25°C (77°F). OPEN CUP: 28.9°C (84°F) (Cleveland).

Flammable Limits: LOWER: 1.1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV)
TWA: 434 STEL: 651 (mg/m3) from ACGIHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 138°C (280.4°F)

Melting Point: 12°C (53.6°F)

Critical Temperature: Not available.

Specific Gravity: 0.86 (Water = 1)

Vapor Pressure: 9 mm of Hg (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.62 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Easily soluble in methanol, diethyl ether.
Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 5000 mg/kg [Rat.].
Acute dermal toxicity (LD50): 12400 mg/kg [Rabbit.].
Acute toxicity of the vapor (LC50): 4550 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to blood, kidneys, the nervous system, liver.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

0347 Animal: embryotoxic, foetotoxic, passes through the placental barrier.
0900 Detected in maternal milk in human.
Narcotic effect; may cause nervous system disturbances.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Xylene : UN1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: p-Xylene
Florida: p-Xylene
Massachusetts RTK: p-Xylene
New Jersey: p-Xylene
TSCA 8(b) inventory: p-Xylene
SARA 313 toxic chemical notification and release reporting: p-Xylene
CERCLA: Hazardous substances.: p-Xylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.
R48/20- Harmful: danger of serious

damage to health by prolonged exposure through inhalation.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Material safety data sheet emitted by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du rÃ¨glement sur le transport des marchandises dangeureuses au canada. Centre de conformitÃ© internatinal LtÃ©e. 1986.

Other Special Considerations: Not available.

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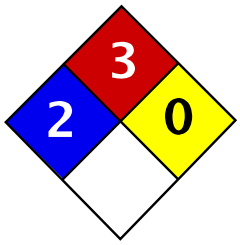

Health	2
Fire	3
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
m-Xylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: m-Xylene

Catalog Codes: SLX1066

CAS#: 108-38-3

RTECS: ZE2275000

TSCA: TSCA 8(b) inventory: m-Xylene

CI#: Not applicable.

Synonym: m-Methyltoluene

Chemical Name: 1,3-Dimethylbenzene

Chemical Formula: C6H4(CH3)2

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
{m-}Xylene	108-38-3	100

Toxicological Data on Ingredients: m-Xylene: ORAL (LD50): Acute: 5000 mg/kg [Rat.]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit.].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to blood, kidneys, the nervous system, liver.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 527°C (980.6°F)

Flash Points: CLOSED CUP: 25°C (77°F). OPEN CUP: 28.9°C (84°F) (Cleveland).

Flammable Limits: LOWER: 1.1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid, insoluble in water.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Splash goggles. Lab coat. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV)
TWA: 434 STEL: 651 (mg/m3) from ACGIHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 139.3°C (282.7°F)

Melting Point: -47.87°C (-54.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.86 (Water = 1)

Vapor Pressure: 6 mm of Hg (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.62 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Easily soluble in methanol, diethyl ether.
Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact.

Toxicity to Animals:
Acute oral toxicity (LD50): 5000 mg/kg [Rat.].
Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit.].

Chronic Effects on Humans: The substance is toxic to blood, kidneys, the nervous system, liver.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant).
Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
0347 Animal: embryotoxic, foetotoxic, passes through the placental barrier.
0900 Detected in maternal milk in human.
Narcotic effect; may cause nervous system disturbances.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Xylene : UN1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: m-Xylene
Massachusetts RTK: m-Xylene
TSCA 8(b) inventory: m-Xylene
SARA 313 toxic chemical notification and release reporting: m-Xylene
CERCLA: Hazardous substances.: m-Xylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Material safety data sheet emitted by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du rÃ¨glement sur le transport des marchandises dangeureuses au canada. Centre de conformitÃ© internatinal LtÃ©e. 1986.

Other Special Considerations: Not available.

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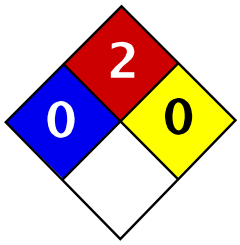

Health	0
Fire	2
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Mesitylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Mesitylene

Catalog Codes: SLM2410

CAS#: 108-67-8

RTECS: OX6825000

TSCA: TSCA 8(b) inventory: Mesitylene

CI#: Not available.

Synonym: 1,3,5-Trimethylbenzene

Chemical Formula: C9H12

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
Mesitylene	108-67-8	100

Toxicological Data on Ingredients: Mesitylene: VAPOR (LC50): Acute: 4881.9 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation (lung irritant). Slightly hazardous in case of skin contact (irritant, permeator), .

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes,

keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 559°C (1038.2°F)

Flash Points: CLOSED CUP: 43°C (109.4°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a

concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with eyes Wear suitable protective clothing If ingested, seek medical advice immediately and show the container or the label.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 CEIL: 35 (ppm)
TWA: 125 CEIL: 170 (mg/m3)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 120.2 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 164.7°C (328.5°F)

Melting Point: -44.8°C (-48.6°F)

Critical Temperature: Not available.

Specific Gravity: 0.8637 (Water = 1)

Vapor Pressure: 1.86 mm of Hg (@ 20°C)

Vapor Density: 4.14 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.23 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute toxicity of the vapor (LC50): 4881.9 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation (lung irritant).
Slightly hazardous in case of skin contact (irritant, permeator), .

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : 1,3,5-Trimethylbenzene : UN2325 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Florida: Mesitylene
New Jersey: Mesitylene
TSCA 8(b) inventory: Mesitylene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

DSCL (EEC):
R10- Flammable.
R36/37- Irritating to eyes and respiratory system.

HMIS (U.S.A.):

Health Hazard: 0

Fire Hazard: 2

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 10/09/2005 06:06 PM

International Chemical Safety Cards

BENZO(B)FLUORANTHENE

ICSC: 0720

BENZO(B)FLUORANTHENE
Benzo(e)acephenanthrylene
2,3-Benzofluoroanthene
$C_{20}H_{12}$
Molecular mass: 252.3

CAS # 205-99-2
RTECS # CU1400000
ICSC # 0720

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• **INHALATION**		Local exhaust or breathing protection.	Fresh air, rest.
• **SKIN**	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• **EYES**		Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**		Do not eat, drink, or smoke during work.	Wear protective gloves when inducing vomiting. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Tightly closed.	Unbreakable packaging; put breakable packaging into closed unbreakable container.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

International Chemical Safety Cards

BENZO(B)FLUORANTHENE

ICSC: 0720

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS TO YELLOW CRYSTALS. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Melting point: 168°C Solubility in water: none	Vapour pressure, Pa at 20°C: <10 Octanol/water partition coefficient as log Pow: 6.04
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.	

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home.

ADDITIONAL INFORMATION

ICSC: 0720 **BENZO(B)FLUORANTHENE**

International Chemical Safety Cards

BENZO(K)FLUORANTHENE

ICSC: 0721

BENZO(K)FLUOROANTHENE
11,12-Benzofluoroanthene
Dibenzo(b,j,k)fluorene
$C_{20}H_{12}$
Molecular mass: 252.3

CAS # 207-08-9
RTECS # DF6350000
ICSC # 0721

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, powder.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• **INHALATION**		Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
• **SKIN**	MAY BE ABSORBED!	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention. Wear protective gloves when administering first aid.
• **EYES**		Safety goggles or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**		Do not eat, drink, or smoke during work.	Wear protective gloves when inducing vomiting. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Separated from strong oxidants. Tightly closed.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0721

International Chemical Safety Cards

BENZO(K)FLUORANTHENE

ICSC: 0721

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** YELLOW CRYSTALS. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. Reacts with strong oxidants. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and through the skin. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 480°C Melting point: 215.7°C	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.84
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to the total environment. In the food chain important to humans, bioaccumulation takes place, specifically in oils and fats.	

NOTES

Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home.

ADDITIONAL INFORMATION

ICSC: 0721 **BENZO(K)FLUORANTHENE**

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

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

CAS # 56-55-3
RTECS # CV9275000
ICSC # 0385
EC # 601-033-00-9

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

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

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0385

International Chemical Safety Cards

BENZ(a)ANTHRACENE

ICSC: 0385

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS TO YELLOW-BROWN FLUORESCENT FLAKES OR POWDER.

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

CHEMICAL DANGERS:

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV not established.

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

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

EFFECTS OF SHORT-TERM EXPOSURE:

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

PHYSICAL PROPERTIES

Sublimation point: 435°C
Melting point: 162°C
Relative density (water = 1): 1.274
Solubility in water: none
Vapour pressure, Pa at 20°C: 292
Octanol/water partition coefficient as log Pow: 5.61

ENVIRONMENTAL DATA

In the food chain important to humans, bioaccumulation takes place, specifically in seafood.

NOTES

This substance is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, it may be encountered as a laboratory chemical in its pure form. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT take working clothes home. Tetraphene is a common name.

ADDITIONAL INFORMATION

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Material Safety Data Sheet

Benzo[a]pyrene, 98%

ACC# 37175

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzo[a]pyrene, 98%
Catalog Numbers: AC105600000, AC105600010, AC105601000, AC377200000, AC377200010, AC377201000 AC377201000
Synonyms: 3,4-Benzopyrene; 3,4-Benzpyrene; Benzo[def]chrysene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
50-32-8	Benzo[a]pyrene	>96	200-028-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow to brown powder.
Danger! May cause harm to the unborn child. May impair fertility. May cause eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Cancer hazard. May cause allergic skin reaction. May cause heritable genetic damage.
Target Organs: Reproductive system, skin.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. May be harmful if absorbed through the skin. May cause an allergic reaction in certain individuals.
Ingestion: May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. May be harmful if inhaled.
Chronic: May cause cancer in humans. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

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

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs

Benzo[a]pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Benzo[a]pyrene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: yellow to brown
Odor: faint aromatic odor
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 495 deg C @ 760 mm Hg
Freezing/Melting Point:175 - 179 deg C
Decomposition Temperature: Not available.
Solubility: 1.60x10-3 mg/l @25°C
Specific Gravity/Density: Not available.
Molecular Formula:C20H12
Molecular Weight:252.31

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 50-32-8: DJ3675000
LD50/LC50:

Not available.

Carcinogenicity:
CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.
Mutagenicity: Mutagenic effects have occurred in humans.Mutagenic effects have occurred in experimental animals.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 50-32-8: waste number U022.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NOT REGULATED FOR DOMESTIC TRANSPORT	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL (Benzo{a} pyrene)
Hazard Class:		9
UN Number:		UN3077
Packing Group:		III

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 50-32-8 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 50-32-8: immediate, delayed.

Section 313

This material contains Benzo[a]pyrene (CAS# 50-32-8, >96%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[a]pyrene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 50-32-8: 0.06 æg/day NSRL

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 43 May cause sensitization by skin contact.
R 45 May cause cancer.
R 46 May cause heritable genetic damage.
R 60 May impair fertility.
R 61 May cause harm to the unborn child.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou
s waste.
S 61 Avoid release to the environment. Refer to special instructions
/safety data sheets.

WGK (Water Danger/Protection)
CAS# 50-32-8: No information available.

Canada - DSL/NDSL
CAS# 50-32-8 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #7 Date: 6/30/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet

Chrysene, 98%

ACC# 95251

Section 1 - Chemical Product and Company Identification

MSDS Name: Chrysene, 98%
Catalog Numbers: AC224140000, AC224140010, AC224140050, AC224145000
Synonyms: 1,2-Benzophenanthrene; Benzo(a)phenanthrene; 1,2,5,6-Dibenzonaphthalene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
218-01-9	Chrysene	98	205-923-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: very light beige solid.
Caution! May cause eye and skin irritation. May cause respiratory tract irritation. May cause cancer in humans.
Target Organs: Liver, skin.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: May cause respiratory tract irritation.
Chronic: May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air

immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: Not applicable.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: ; Flammability: 1; Instability:

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash hands before eating. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Avoid breathing dust.
Storage: Store in a tightly closed container. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Chrysene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Chrysene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: very light beige
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 448 deg C @ 760 mm Hg
Freezing/Melting Point:250-255 deg C
Decomposition Temperature: Not available.
Solubility: insoluble
Specific Gravity/Density: Not available.
Molecular Formula:C18H12
Molecular Weight:228.29

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 218-01-9: GC0700000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 218-01-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans

- **California:** carcinogen, initial date 1/1/90
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: Chrysene was mutagenic to S. Typhimurium in the presence of an exogenous metabolic system.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Water flea LC50 = 1.9 mg/L; 2 Hr.; Unspecified Fish toxicity : LC50 (96hr) Neauthes arenacedentata >1ppm.(Rossi,S.S. et al Marine Pollut. Bull. 1978) Invertebrate toxicity : lethal treshold concentration (24hr) Daphnia Magna 0,7æg/l.(* Newsted,J.L. et al Environ. Toxicol. Chem. 1987) Bioaccumulation : 24hr Daphnia Magna log bioconcentration factor 3.7845 (*)
Environmental: Degradation studies : biodegradated by white rot fungus (Proc.Annu.Meet.Am.Wood-Preserv.Assoc.1989) May be utilised by axenic cultures of microorganisms e.g. Pseudomonas pancimobilis EPA505, which may have novel degradative systems(Mueller,J.G. et al ppl.Environ.Microbiol.1990; Mueller, J.G. et al Environ.Sci.Technol.1991).
Physical: Not found.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 218-01-9: waste number U050.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 218-01-9 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313

This material contains Chrysene (CAS# 218-01-9, 98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Chrysene, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 218-01-9: 0.35 æg/day NSRL (oral)

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 45 May cause cancer.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou s waste.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 218-01-9: No information available.

Canada - DSL/NDSL

CAS# 218-01-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/30/1999
Revision #4 Date: 10/03/2005

Material Safety Data Sheet

Fluoranthene, 98%

ACC# 80991

Section 1 - Chemical Product and Company Identification

MSDS Name: Fluoranthene, 98%
Catalog Numbers: AC119170000, AC119170250, AC119171000, AC119175000
Synonyms: 1,2-(1,8-Naphthalenediyl)benzene; 1,2-(1,8-Naphthylene)benzene; 1,2-Benzacenaphthene; Benzene, 1,2-(1,8-naphthylene)-; Benzo(j,k)fluorene; Benzo(jk)fluoranthene; Benzo(jk)fluorene
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
206-44-0	Fluoranthene	98	205-912-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow needles.
Caution! Harmful. Causes eye and skin irritation and possible burns. May be harmful if absorbed through the skin. May be harmful if swallowed. May cause heart and liver injury.
Target Organs: Heart, liver, lungs.

Potential Health Effects

Eye: Causes eye irritation and possible burns.
Skin: May be harmful if absorbed through the skin. Causes severe skin irritation and possible burns.
Ingestion: May be harmful if swallowed. May cause rapid heartbeat and cardiac arrythmias. May cause liver injury, pulmonary edema, and respiratory arrest. May cause gastrointestinal disturbances such as nausea.
Inhalation: May cause effects similar to those described for ingestion. May produce cardiac failure and pulmonary edema.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the

upper and lower eyelids. Get medical aid imme diately. Do NOT allow victim to rub eyes or keep eyes closed. Extensiv e irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Remove contaminated clothing and shoes.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood. Do not breathe dust.
Storage: Keep containers tightly closed. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

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

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Fluoranthene	none listed	none listed	none listed

OSHA Vacated PELs: Fluoranthene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves and clothing to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Needles
Appearance: yellow
Odor: None reported.
pH: Not available.
Vapor Pressure: 0.01 mm Hg @ 20 deg C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 384 deg C @ 760.00mmHg
Freezing/Melting Point:107.00 - 110.00 deg C
Decomposition Temperature: Not available.
Solubility: insoluble
Specific Gravity/Density:1.252 g/cm3
Molecular Formula:C16H10
Molecular Weight:202.25

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, strong oxidants.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, acrid smoke and fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 206-44-0: LL4025000
LD50/LC50:
CAS# 206-44-0:
Oral, rat: LD50 = 2 gm/kg;

Skin, rabbit: LD50 = 3180 mg/kg;
.

Carcinogenicity:
CAS# 206-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: IARC Group 3: Limited or insufficient evidence for carcinogenicity in both animals and humans.Experimental tumorigenic data has been reported.
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: Mutation in microorganisms: Salmonella typhimurium = 5ug/plate.Mutation in mammalian somatic cells: Human Lymphocyte = 2 umol/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 3980 um/L; 96 H; (not specified) No data available.
Environmental: Remains in the upper few cm of soil, but can be transported to groundwater. Biodegrades from soil in a few years. Will not volatilize from soil or water. Rapidly absorbed to sediment and particulates and will readily bioconcentrate. Unadsorbed substance in water will degrade by photolysis in a days to weeks. Stable in sediment for decades or more. In the atmostphere, photodegrades with half life of 4 - 5 days, but may transport long distances without settling or raining out.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 206-44-0: waste number U120.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 206-44-0 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 206-44-0: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 206-44-0: immediate.

Section 313

This material contains Fluoranthene (CAS# 206-44-0, 98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 206-44-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 206-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:

R 21/22 Harmful in contact with skin and if swallowed.

Safety Phrases:

S 22 Do not breathe dust.
S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 206-44-0: No information available.

Canada - DSL/NDSL

CAS# 206-44-0 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 206-44-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #5 Date: 10/03/2005

MSDS Number: **L2347** * * * * * *Effective Date:* ***08/10/04*** * * * * * *Supercedes:* ***11/02/01***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

LEAD METAL

1. Product Identification

Synonyms: Granular lead, pigment metal; C.I. 77575
CAS No.: 7439-92-1
Molecular Weight: 207.19
Chemical Formula: Pb
Product Codes:
J.T. Baker: 2256, 2266
Mallinckrodt: 5668

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Lead	7439-92-1	95 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. See also Ingestion.

Ingestion:
POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

Skin Contact:
Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, redness and pain.

Eye Contact:
Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.

Chronic Exposure:
Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted.

Aggravation of Pre-existing Conditions:
Persons with pre-existing kidney, nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. Powder/dust is flammable when heated or exposed to flame.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Can produce toxic lead fumes at elevated temperatures and also react with oxidizing materials.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Areas in which exposure to lead

metal or lead compounds may occur should be identified by signs or appropriate means, and access to the area should be limited to authorized persons. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For lead, metal and inorganic dusts and fumes, as Pb:
-OSHA Permissible Exposure Limit (PEL): 0.05 mg/m3 (TWA)
For lead, elemental and inorganic compounds, as Pb:
-ACGIH Threshold Limit Value (TLV): 0.05 mg/m3 (TWA), A3 animal carcinogen
ACGIH Biological Exposure Indices (BEI): 30 ug/100ml, notation B (see actual Indices for more information).
For lead, inorganic:
-NIOSH Recommended Exposure Limit (REL): 0.1 mg/m3 (TWA)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face high efficiency particulate respirator (NIOSH type N100 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency particulate respirator (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1025).

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9. Physical and Chemical Properties

Appearance:
Small, white to blue-gray metallic shot or granules.
Odor:
Odorless.
Solubility:
Insoluble in water.
Density:
11.34
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
1740C (3164F)
Melting Point:
327.5C (622F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
1.77 @ 1000C (1832F)
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Does not decompose but toxic lead or lead oxide fumes may form at elevated temperatures.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Ammonium nitrate, chlorine trifluoride, hydrogen peroxide, sodium azide, zirconium, disodium acetylide, sodium acetylide and oxidants.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Lead and other smelter emissions are human reproductive hazards. (Chemical Council on

Environmental Quality; Chemical Hazards to Human Reproduction, 1981).
Carcinogenicity:
EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Lead (7439-92-1)	No	No	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to leach into groundwater. This material may bioaccumulate to some extent.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Lead (7439-92-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

	--Canada--

Ingredient	Korea	DSL	NDSL	Phil.
Lead (7439-92-1)	Yes	Yes	No	Yes

\-------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Lead (7439-92-1)	No	No	Yes	No

\-------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Lead (7439-92-1)	10	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Solid)

WARNING:
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not

breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
No Changes.

Disclaimer:
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **M1599** * * * * * *Effective Date:* ***12/19/05*** * * * * * *Supercedes:* ***08/10/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

MERCURY

1. Product Identification

Synonyms: Quicksilver; hydrargyrum; Liquid Silver
CAS No.: 7439-97-6
Molecular Weight: 200.59
Chemical Formula: Hg
Product Codes:
J.T. Baker: 2564, 2567, 2569
Mallinckrodt: 1278, 1280, 1288

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Mercury	7439-97-6	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Mercury vapor is highly toxic via this route. Causes severe respiratory tract damage. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis. Can be absorbed through inhalation with symptoms similar to ingestion.

Ingestion:
May cause burning of the mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea. May be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure. Gastrointenstinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort.

Skin Contact:
Causes irritaton and burns to skin. Symptoms include redness and pain. May cause skin allergy and sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.

Eye Contact:
Causes irritation and burns to eyes. Symptoms include redness, pain, blurred vision; may cause serious and permanent eye damage.

Chronic Exposure:
Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn gray in color. A suspected reproductive hazard; may damage the developing fetus and decrease fertility in males and females.

Aggravation of Pre-existing Conditions:
Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Undergoes hazardous reactions in the presence of heat and sparks or ignition. Smoke may contain toxic mercury or mercuric oxide. Smoke may contain toxic mercury or mercuric oxide.

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6. Accidental Release Measures

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapor.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate misting. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Do not flush to sewer. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker CINNASORB® and RESISORB® are recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Do not use or store on porous work surfaces (wood, unsealed concrete, etc.). Follow strict hygiene practices. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Acceptable Ceiling Concentration:
mercury and mercury compounds: 0.1 mg/m3 (TWA), skin
- ACGIH Threshold Limit Value (TLV):
inorganic and metallic mercury, as Hg: 0.025 mg/m3 (TWA) skin, A4 Not classifiable as a human carcinogen.
- ACGIH Biological Exposure Indices:
total inorganic mercury in urine (preshift): 35 ug/g creatinine;
total inorganic mercury in blood (end of shift): 15 ug/l.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face respirator with a mercury vapor or chlorine gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with a mercury vapor or chlorine gas cartridge may be worn up to 50 times the exposure limit, or the maximum use concentraiton specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Silver-white, heavy, mobile, liquid metal.
Odor:
Odorless.
Solubility:
Insoluble in water.
Density:
13.55
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
356.7C (675F)
Melting Point:
-38.87C (-38F)
Vapor Density (Air=1):
7.0
Vapor Pressure (mm Hg):
0.0018 @ 25C (77F)
Evaporation Rate (BuAc=1):
4

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
At high temperatures, vaporizes to form extremely toxic fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Acetylenes, ammonia, ethylene oxide, chlorine dioxide, azides, metal oxides, methyl silane, lithium, rubidium, oxygen, strong oxidants, metal carbonyls.
Conditions to Avoid:
Heat, flames, ignition sources, metal surfaces and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
All forms of mercury can cross the placenta to the fetus, but most of what is known has

been learned from experimental animals. See Chronic Health Hazards.
Carcinogenicity:
EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Mercury (7439-97-6)	No	No	3

12. Ecological Information

Environmental Fate:
This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material is expected to significantly bioaccumulate.
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are less than 1 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

International (Water, I.M.O.)

Proper Shipping Name: MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

International (Air, I.C.A.O.)

Proper Shipping Name: MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

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15. Regulatory Information

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--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
--------------------------------------------  ----  ---  -----  ---------
Mercury (7439-97-6)                            Yes  Yes   No       Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
--------------------------------------------  -----  ---   ----  -----
Mercury (7439-97-6)                            Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Mercury (7439-97-6)                       No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
Ingredient                                CERCLA      261.33     8(d)
----------------------------------------  ------      ------    ------
Mercury (7439-97-6)                       1           U151       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2Z
Poison Schedule: S7
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

Phenanthrene, 90%

ACC# 59921

Section 1 - Chemical Product and Company Identification

MSDS Name: Phenanthrene, 90%
Catalog Numbers: AC130100000, AC130100010, AC130102500
Synonyms:
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
85-01-8	Phenanthrene	90.0	201-581-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: brown solid.
Caution! Powdered material may form explosive dust-air mixtures. May cause allergic skin reaction. May cause eye and skin irritation. May cause respiratory tract irritation. Cancer suspect agent.
Target Organs: None.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause photosensitive skin reactions in certain individuals.
Ingestion: May cause irritation of the digestive tract.
Inhalation: Inhalation of dust may cause respiratory tract irritation.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Dusts at sufficient concentrations can form explosive mixtures with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Use water spray or dry chemical.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Phenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Phenanthrene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: brown
Odor: none reported
pH: Not available.
Vapor Pressure: 1 mm Hg @116c
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 340 deg C
Freezing/Melting Point:101 deg C
Decomposition Temperature: Not available.
Solubility: insoluble
Specific Gravity/Density:1.0630g/cm3
Molecular Formula:C14H10
Molecular Weight:178.23

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, dust generation, strong oxidants.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 85-01-8: SF7175000
LD50/LC50:
CAS# 85-01-8:
Oral, mouse: LD50 = 700 mg/kg;
Oral, rat: LD50 = 1.8 gm/kg;
.

Carcinogenicity:
CAS# 85-01-8:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 85-01-8 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 85-01-8: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 85-01-8: immediate.

Section 313

This material contains Phenanthrene (CAS# 85-01-8, 90.0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 85-01-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 45 May cause cancer.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 85-01-8: No information available.

Canada - DSL/NDSL

CAS# 85-01-8 is listed on Canada's DSL List.

Canada - WHMIS

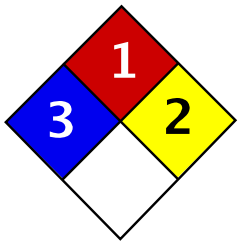
This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 85-01-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/14/1998
Revision #3 Date: 10/03/2005



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, lungs, the nervous system, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.
Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation.
Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic
Pennsylvania RTK: Arsenic
Massachusetts RTK: Arsenic
TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed.
R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec.
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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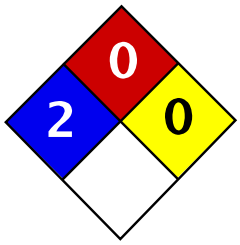

Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer).
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to skin.
The substance may be toxic to kidneys, lungs, liver, upper respiratory tract.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion.
Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode.
Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion.
Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable.
TWA: 0.5 (mg/m3) [United Kingdom (UK)]
TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water.
Insoluble in Ammonia.
Soluble in dilute Nitric Acid.
Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
Causes damage to the following organs: skin.
May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:

Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc:
LDL [Rat] - Route: Oral; Dose: 5000 mg/kg
LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Nickel dust and fume can irritate skin.
Eyes: Nickel dust and fume can irritate eyes.
Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis.
Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation).
Chronic Potential Health Effects:
Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis.
Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count).
Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy. Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis.
Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal
Connecticut hazardous material survey.: Nickel metal
Illinois toxic substances disclosure to employee act: Nickel metal
Illinois chemical safety act: Nickel metal
New York release reporting list: Nickel metal
Rhode Island RTK hazardous substances: Nickel metal
Pennsylvania RTK: Nickel metal
Michigan critical material: Nickel metal
Massachusetts RTK: Nickel metal
Massachusetts spill list: Nickel metal
New Jersey: Nickel metal
New Jersey spill list: Nickel metal
Louisiana spill reporting: Nickel metal
California Director's List of Hazardous Substances: Nickel metal
TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects.
R43- May cause sensitization by skin contact.
S22- Do not breathe dust.
S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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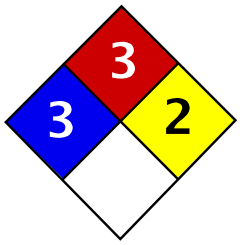

Health	3
Fire	3
Reactivity	2
Personal Protection	J

Material Safety Data Sheet
Calcium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Calcium

Catalog Codes: SLC2782

CAS#: 7440-70-2

RTECS: EV8040000

TSCA: TSCA 8(b) inventory: Calcium

CI#: Not available.

Synonym:

Chemical Formula: Ca

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
Calcium	7440-70-2	100

Toxicological Data on Ingredients: Calcium 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 ingestion, of inhalation. Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. 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. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: 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:
Corrosive solid. Flammable solid that, in contact with water, emits flammable gases.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep under inert atmosphere. Keep container dry. Do not breathe dust. Never add water to this product Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as acids, moisture.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Vapor and 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. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 40.08 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 1484°C (2703.2°F)

Melting Point: 839°C (1542.2°F)

Critical Temperature: Not available.

Specific Gravity: 1.54 (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: Not available.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances:
Highly reactive with acids.
Reactive with moisture.
The product reacts violently with water to emit flammable but non toxic gases.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.3: Material that emits flammable gases on contact with water.

Identification: : Calcium : UN1401 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Calcium
Massachusetts RTK: Calcium
TSCA 8(b) inventory: Calcium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-6: Reactive and very flammable material.
CLASS E: Corrosive solid.

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 3

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 3

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/06/2008 12:00 PM

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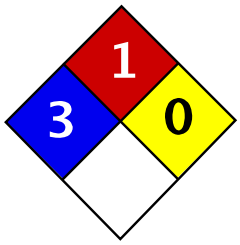

Health	3
Fire	1
Reactivity	0
Personal Protection	E

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**

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CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cadmium	7440-43-9	100

Toxicological Data on Ingredients: Cadmium: ORAL (LD50): Acute: 2330 mg/kg [Rat.]. 890 mg/kg [Mouse]. DUST (LC50): Acute: 50 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to kidneys, lungs, liver.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 570°C (1058°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Non-flammable in presence of open flames and sparks, of heat, of oxidizing materials, of reducing materials, of combustible materials, of moisture.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 (ppm)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 112.4 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 765°C (1409°F)

Melting Point: 320.9°C (609.6°F)

Critical Temperature: Not available.

Specific Gravity: 8.64 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water, methanol, diethyl ether, n-octanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Reacts violently with potassium.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 890 mg/kg [Mouse].
Acute toxicity of the dust (LC50): 229.9 mg/m3 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH, 2 (Reasonably anticipated.) by NTP.
The substance is toxic to kidneys, lungs, liver.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation.
Slightly hazardous in case of skin contact (irritant, sensitizer).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: An allergen. 0047 Animal: embryotoxic, passes through the placental barrier.

Special Remarks on other Toxic Effects on Humans: May cause allergic reactions, exzema and/or dehydration of the skin.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

Identification:

Special Provisions for Transport:

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cadmium
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cadmium
Pennsylvania RTK: Cadmium
Massachusetts RTK: Cadmium
TSCA 8(b) inventory: Cadmium
SARA 313 toxic chemical notification and release reporting: Cadmium
CERCLA: Hazardous substances.: Cadmium

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R26- Very toxic by inhalation.
R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec.
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec.
-SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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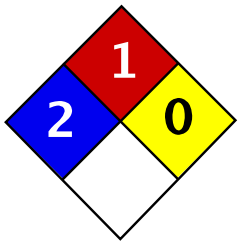
Last Updated: 11/06/2008 12:00 PM



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Copper MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper

Catalog Codes: SLC4939, SLC2152, SLC3943, SLC1150, SLC2941, SLC4729, SLC1936, SLC3727, SLC5515

CAS#: 7440-50-8

RTECS: GL5325000

TSCA: TSCA 8(b) inventory: Copper

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Cu

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Copper	7440-50-8	100

Toxicological Data on Ingredients: Copper LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH [1990]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 63.54 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 2595°C (4703°F)

Melting Point: 1083°C (1981.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.94 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion.
Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Human: passes through the placenta, excreted in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Copper
Massachusetts RTK: Copper
TSCA 8(b) inventory: Copper
CERCLA: Hazardous substances.: Copper

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator

when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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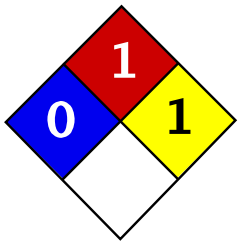
Last Updated: 11/06/2008 12:00 PM



Health	1
Fire	3
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Magnesium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Magnesium

Catalog Codes: SLM4408, SLM2263, SLM3637

CAS#: 7439-95-4

RTECS: OM2100000

TSCA: TSCA 8(b) inventory: Magnesium

CI#: Not applicable.

Synonym: Magnesium ribbons, turnings or sticks

Chemical Name: Magnesium

Chemical Formula: Mg

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Magnesium	7439-95-4	100

Toxicological Data on Ingredients: Magnesium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at

least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat.
Flammable in presence of acids, of moisture.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Explosive in presence of acids, of moisture.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Magnesium turnings, chips or granules, ribbons, are flammable. They can be easily ignited. They may reignite after fire is extinguished. Produces flammable gases on contact with water and acid. May ignite on contact with water or moist air.
Magnesium fires do not flare up violently unless moisture is present.

Special Remarks on Explosion Hazards: Reacts with acids and water to form hydrogen gas with is highly flammable and eplosive

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid.
Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage:
Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Moisture sensitive. Dangerous when wet.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 24.31 g/mole

Color: Silver-white

pH (1% soln/water): Not applicable.

Boiling Point: 1100°C (2012°F)

Melting Point: 651°C (1203.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.74 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in hot water.
Insoluble in cold water.
Insoluble in chromium trioxides, and mineral acids, alkalies.
Slightly soluble with decomposition in hot water.
Soluble in concentrated hydrogen fluoride, and ammonium salts.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, incompatible materials, water or moisture, moist air.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Violent chemical reaction with oxidizing agents.
Reacts with water to create hydrogen gas and heat. Must be kept dry.
Reacts with acids to form hydrogen gas which is highly flammable and explosive.
Magnesium forms hazardous or explosive mixtures with aluminum and potassium perchlorate; ammonium nitrate; barium nitrate, barium dioxide and zinc; beryllium oxide; boron phosphodiiodide; bromobenzyl trifluoride; cadmium cyanide; cadmium oxide; calcium carbide; carbonates; carbon tetrachloride; chlorine; chlorine trifluoride; chloroform; cobalt cyanide; copper cyanide; copper sulfate(anhydrous), ammonium nitrate, potassium chlorate and water; cupric oxide; cupric sulfate; fluorine; gold cyanide; hydrogen and calcium carbonate; hydrogen iodide; hydrogen peroxide; iodine; lead cyanide; mercuric oxide; mercury cyanide; methyl chloride; molybdenum trioxide; nickel cyanide; nitric acid; nitrogen dioxide; oxygen (liquid); performic acid; phosphates; potassium chlorate; potassium perchlorate; silver nitrate; silver oxide; sodium perchlorate; sodium peroxide; sodium peroxide and carbon dioxide; stannic oxide; sulfates; trichloroethylene; zinc cyanide; zinc oxide.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation by mechanical action. May get mechanical injury or embedding of chips/particles in skin. The particles that are embedded in the wounds may retard healing.
Eyes: May cause eye irritation by mechanical action. Mechanical injury may occur. Particles or chips may embed in eye and retard healing.
Inhalation: Low hazard for ususal industrial handling. It may cause respiratory tract irritation. However, it is unlikely due to physical form. When Magnesium metal is heated during welding or smelting process, Metal Fume Fever may result from inhalation of magnesium fumes. Metal Fume Fever is a flu-like condition consisting of fever, chills, sweating, aches, pains, cough, weakness, headache, nausea, vomiting, and breathing difficulty. Other symptoms may include metallic taste, increased white blood cell count. There is no permanent ill-effect.
Ingestion: Low hazard for usual industrial handling. There are no known reports of serious industrial poisonings with Magnesium. Ingeston of large amounts of chips, turnings or ribbons may cause gastrointestinal tract irritation with nausea, vomiting, and diarrhea. Acute ingestion may also result in Hypermagnesia. Hypermagnesia may cause hypotension, bradycardia, CNS depression, respiratory depression, and impairment of neuromuscular transmission (hyporeflexia, paralysis).

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Magnesium UNNA: 1869 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Magnesium
Rhode Island RTK hazardous substances: Magnesium
Pennsylvania RTK: Magnesium

Massachusetts RTK: Magnesium
Massachusetts spill list: Magnesium
New Jersey: Magnesium
TSCA 8(b) inventory: Magnesium

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid.
CLASS B-6: Reactive and very flammable material.

DSCL (EEC):
R11- Highly flammable.
R15- Contact with water liberates extremely flammable gases.
S7/8- Keep container tightly closed and dry.
S43- In case of fire, use dry chemical. Never use water.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 3

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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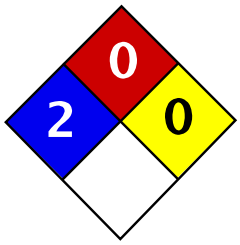

Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Nickel metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nickel metal

Catalog Codes: SLN2296, SLN1342, SLN1954

CAS#: 7440-02-0

RTECS: QR5950000

TSCA: TSCA 8(b) inventory: Nickel metal

CI#: Not applicable.

Synonym: Nickel Metal shot; Nickel metal foil.

Chemical Name: Nickel

Chemical Formula: Ni

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Nickel metal	7440-02-0	100

Toxicological Data on Ingredients: Nickel metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung sensitizer).
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to skin.
The substance may be toxic to kidneys, lungs, liver, upper respiratory tract.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Material in powder form, capable of creating a dust explosion. This material is flammable in powder form only.

Special Remarks on Explosion Hazards:
Material in powder form, capable of creating a dust explosion.
Mixtures containing Potassium Perchlorate with Nickel & Titanium powders & infusorial earth can explode.
Adding 2 or 3 drops of approximately 90% peroxyformic acid to powdered nickel will result in explosion.
Powdered nickel reacts explosively upon contact with fused ammonium nitrate at temperatures below 200 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, combustible materials, metals, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation Respirable.
TWA: 0.5 (mg/m3) [United Kingdom (UK)]
TWA: 1 (mg/m3) from OSHA (PEL) [United States] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid. Lustrous solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 58.71 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: 2730°C (4946°F)

Melting Point: 1455°C (2651°F)

Critical Temperature: Not available.

Specific Gravity: Density: 8.908 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water.
Insoluble in Ammonia.
Soluble in dilute Nitric Acid.
Slightly soluble in Hydrochloric Acid, Sulfuric Acid.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, combustible materials, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong acids, selenium, sulfur, wood and other combustibles, nickel nitrate, aluminum, aluminum trichloride, ethylene, p-dioxan, hydrogen, methanol, non-metals, oxidants, sulfur compounds, aniline, hydrogen sulfide, flammable solvents, hydrazine, and metal powders (especially zinc, aluminum, and magnesium), ammonium nitrate, nitryl fluoride, bromine pentafluoride, potassium perchlorate + titanium powder + indusorial earth.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP.
Causes damage to the following organs: skin.
May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:

Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant, sensitizer), of ingestion.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose/Conc:
LDL [Rat] - Route: Oral; Dose: 5000 mg/kg
LDL [Guinea Pig] - Route: Oral; Dose: 5000 mg/kg

Special Remarks on Chronic Effects on Humans: May cause cancer based on animal test data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Nickel dust and fume can irritate skin.
Eyes: Nickel dust and fume can irritate eyes.
Inhalation: Inhalation of dust or fume may cause respiratory tract irritation with non-productive cough, hoarseness, sore throat, headache, vertigo, weakness, chest pain, followed by delayed effects, including tachypnea, dyspnea, and ARDS. Death due to ARDS has been reported following inhalation of high concentrations of respirable metallic nickel dust. Later effects may include pulmonary edema and fibrosis.
Ingestion: Metallic nickel is generally considered not to be acutely toxic if ingested. Ingestion may cause nausea, vomiting, abdominal , and diarrhea. Nickel may damage the kidneys(proteinuria), and may affect liver function. It may also affect behavior (somnolence), and cardiovascular system (increased cornary artery resistance, decreased myocardial contractility, myocardial damage, regional or general arteriolar or venus dilation).
Chronic Potential Health Effects:
Skin: May cause skin allergy. Nickel and nickel compounds are among the most common sensitizers inducing allergic contact dermatitis.
Inhalation: Chronic inhalation nickel dust or fume can cause chronic hypertrophic rhinitis, sinusitis, nasal polyps, perforation of the nasal septum, chronic pulmonary irritation, fibrosis, pulmonary edema, pulmonary eosinophilia, Pneumoconiosis, allergies (asthma-like allergy), and cancer of the nasal sinus cavities, lungs, and possibly other organs. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness. Chronic inhalation of nickel dust or fume may also affect the liver (impaired liver function tests), and blood (changes in red blood cell count).
Ingestion: Prolonged or repeated ingestion of nickel can be a source chronic urticaria and other signs of allergy. Chronic ingestion of NIckel may also affect respiration and cause pneumoconiosis or fibrosis.
Note: In the general population, sensitization occurs from exposure to nickel-containing coins, jewelry, watches,

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Nickel metal
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Nickel metal
Connecticut hazardous material survey.: Nickel metal
Illinois toxic substances disclosure to employee act: Nickel metal
Illinois chemical safety act: Nickel metal
New York release reporting list: Nickel metal
Rhode Island RTK hazardous substances: Nickel metal
Pennsylvania RTK: Nickel metal
Michigan critical material: Nickel metal
Massachusetts RTK: Nickel metal
Massachusetts spill list: Nickel metal
New Jersey: Nickel metal
New Jersey spill list: Nickel metal
Louisiana spill reporting: Nickel metal
California Director's List of Hazardous Substances: Nickel metal
TSCA 8(b) inventory: Nickel metal

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R40- Possible risks of irreversible effects.
R43- May cause sensitization by skin contact.
S22- Do not breathe dust.
S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:42 PM

Last Updated: 11/06/2008 12:00 PM

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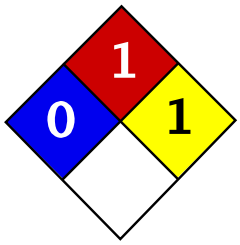

Health	1
Fire	1
Reactivity	1
Personal Protection	E

Material Safety Data Sheet
Zinc Metal MSDS

Section 1: Chemical Product and Company Identification

Product Name: Zinc Metal

Catalog Codes: SLZ1054, SLZ1159, SLZ1267, SLZ1099, SLZ1204

CAS#: 7440-66-6

RTECS: ZG8600000

TSCA: TSCA 8(b) inventory: Zinc Metal

CI#: Not applicable.

Synonym: Zinc Metal Sheets; Zinc Metal Shot; Zinc Metal Strips

Chemical Name: Zinc Metal

Chemical Formula: Zn

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
Zinc Metal	7440-66-6	100

Toxicological Data on Ingredients: Zinc Metal LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat, of oxidizing materials, of acids, of alkalis, of moisture.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Zinc + NaOH causes ignition.
Oxidation of zinc by potassium proceeds with incandescence.
Residues from zinc dust /acetic acid reduction operations may ignite after long delay if discarded into waste bins with paper.
Incandescent reaction when Zinc and Arsenic or Tellurium, or Selenium are combined.
When hydrazine mononitrate is heated in contact with zinc, a flamming decomposition occurs at temperatures a little above its melting point.
Contact with acids and alkali hydroxides (sodium hydroxide, postasium hydroxide, calcium hydroxide, etc.) results in evolution of hydrogen with sufficient heat of reaction to ignite the hydrogen gas.
Zinc foil ignites if traces of moisture are present.
It is water reactive and produces flammable gases on contact with water. It may ignite on contact with water or

moist air.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Flammable solid that, in contact with water, emits flammable gases.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Cover with dry earth, sand or other non-combustible material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not breathe dust. Keep away from incompatibles such as oxidizing agents, acids, alkalis, moisture.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Keep from any possible contact with water. Do not allow water to get into container because of violent reaction.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid. Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 65.39 g/mole

Color: Bluish-grey

pH (1% soln/water): Not applicable.

Boiling Point: 907°C (1664.6°F)

Melting Point: 419°C (786.2°F)

Critical Temperature: Not available.

Specific Gravity: Not available.

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, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials, moisture

Incompatibility with various substances:
Reactive with oxidizing agents, acids, alkalis.
Slightly reactive to reactive with moisture.
The product may react violently with water to emit flammable but non toxic gases.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with acids, halogenated hydrocarbons, NH_4NO_3, barium oxide, $Ba(NO_3)_2$, Cadmium, CS_2, chlorates, Cl_2, CrO_3, F_2, Hydroxylamine, $Pb(N_3)_2$, $MnCl_2$, HNO_3, performic acid, $KClO_3$, KNO_3, N_2O_2, Selenium, $NaClO_3$, Na_2O_2, Sulfur, Te, water, $(NH_4)_2S$, As_2O_3, CS_2, $CaCl_2$, chlorinated rubber, catalytic metals, halocarbons, o-nitroanisole, nitrobenzene, nonmetals, oxidants, paint primer base, pentacarbonoyliron, transition metal halides, seleninyl bromide, HCl, H_2SO_4, (Mg +$Ba(NO_3)_2$ +BaO_2), (ethyl acetoacetate +tribromoneopentyl alcohol.
Contact with Alkali Hydroxides(Sodium Hydroxide, Potassium Hydroxide, Calcium Hydroxide, etc) results in evolution of hydrogen.
Ammonium nitrate + zinc + water causes a violent reaction with evolution of steam and zinc oxide.
May react with water.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available.
LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation. Dermal exposure to zinc may produce leg pains, fatigue, anorexia and weight loss.
Eyes: May cause eye irritation.
Ingestion: May be harmul if swallowed. May cause digestive tract irritation with tightness in throat, nausea, vomiting, diarrhea, loss of appetite, malaise, abdominal pain. fever, and chills. May affect behavior/central nervous system and autonomic nervous system with ataxia, lethargy, staggering gait, mild derrangement in cerebellar function, lightheadness, dizzness, irritability, muscular stiffness, and pain. May also affect blood.
Inhalation: Inhalation of zinc dust or fumes may cause respiratory tract and mucous membrane irritation with cough and chest pain. It can also cause "metal fume fever", a flu-like condition characterized appearance of chills, headached fever, maliase, fatigue, sweating, extreme thirst, aches in the legs and chest, and difficulty in breathing. A sweet taste may also be be present in metal fume fever, as well as a dry throat, aches, nausea, and vomiting, and pale grey cyanosis.
The toxicological properties of this substance have not been fully investisgated.

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: Not available.

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:

New York release reporting list: Zinc Metal
Rhode Island RTK hazardous substances: Zinc Metal
Pennsylvania RTK: Zinc Metal
Florida: Zinc Metal
Michigan critical material: Zinc Metal
Massachusetts RTK: Zinc Metal
New Jersey: Zinc Metal
California Director's List of Hazardous Substances: Zinc Metal
TSCA 8(b) inventory: Zinc Metal
TSCA 12(b) one time export: Zinc Metal
SARA 313 toxic chemical notification and release reporting: Zinc Metal
CERCLA: Hazardous substances.: Zinc Metal: 1000 lbs. (453.6 kg)

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not Available

DSCL (EEC):
R15- Contact with water liberates
extremely flammable gases.
R17- Spontaneously flammable in air.
S7/8- Keep container tightly closed and dry.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 1

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 0

Flammability: 1

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an
approved/certified respirator or
equivalent.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Department of Health and Human Services
Agency for Toxic Substances & Disease Registry

ToxFAQs™: Chemical Agent Briefing Sheets (CABS)

Lead

January 2006

PDF Version

What is lead?

Lead is a heavy, bluish-gray metal that has a low melting point. It occurs naturally in the Earth' s crust, but it is not a particularly abundant element. It is rarely found naturally as a metal, but rather in its divalent (2+) oxidative state in ore deposits widely distributed throughout the world. The most im portant lead containing ores are galena (PbS), anglesite ($PbSO_4$), and cerussite ($PbCO_3$). Natural lead is a mixture of four stable isotopes: ^{208}Pb (51%–53%), ^{206}Pb (23.5%–27%), ^{207}Pb (20.5%–23%), and ^{204}Pb (1.35%–1.5%).

What are the forms of lead?

- Metallic lead
- Inorganic lead and lead compounds (or lead salts)
- Organic lead (containing carbon)

What are the common uses of lead?

The largest use for lead is in storage batteries in cars and other vehicles. Lead may be used as a pure metal, alloyed with other metals, or as chemical compounds.

Lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). However, most lead today is obtained from recovery of recycled scrap, mostly lead-a cid batteries.

Human activities, such as lead mining and smelting operations and manufacturing and use of lead products (*e.g.*, leaded gasoline, lead-based paint), have resulted in the contamination of many industrial and residential areas with lead.

Form	Uses
Metallic lead **Lead and lead compounds (or lead salts), such as** • **lead acetate** • **lead chloride** • **lead nitrate** • **lead oxide** • **lead phosphate** • **lead acetate**	Certain uses of lead, such as leaded gasoline, lead-based paints for domestic use, lead-based solder in food cans and water pipes, lead sinkers, and ammunition, have been reduced or banned to minimize lead's harmful effects on people and animals. • **Cosmetics and hair dye** - Some hair dyes and some non-Western cosmetics, such as kohl and surma, contain lead. • **Fishing equipment** - Most fishing weights and sinkers are made from lead. • **Folk remedies** - Many non-Western folk remedies used to treat diarrhea or other ailments may contain substantial amounts of lead. Examples of these include alarcon, ghasard, alkohl, greta, azarcon,

• **lead sulfate** • **lead sulfide**	liga, bali goli, pay-loo-ah, coral, and rueda. • **Glazing** - Applied to some ceramicware can contain lead. • **Lead based paint** - Although the sale of residential lead-based paint was banned in the United States in 1978, it remains a major source of lead exposure for young children residing in older houses. • **Lead batteries** - Production of lead-acid batteries is the major use of lead. • **Lead-based solder** - Has been banned for use in water distribution systems, but many buildings and homes contain lead pipes or lead-based solder. Lead-based solder also is used for electrical circuitry applications. • **Lead-shot** and **ammunition** - It is the second highest production use of lead. • Other uses of lead include the production of lead alloys, soldering materials, shielding for x-ray machines, and manufacturing of corrosion- and acid-resistant materials used in the building industry.
Organic • **tetraethyl lead** • **tetramethyl lead**	The use of lead in gasoline was phased out in the 1980s, and has been banned since January 1, 1996. The use of lead in gasoline has contributed to its dispersion throughout the environment. During the combustion of gasoline containing these alkyllead compounds, significant amounts of inorganic lead can be released to the surrounding areas. **Current Uses** • Gasoline for off-road vehicles, farm equipment, and airplanes **Past Uses** • Gasoline additives (to increase octane rating)

What are the routes of exposure for lead?

People are most likely to be exposed to lead by consuming contaminated food and drinking water. Exposure can also occur by inadvertently ingesting contaminated soil, dust, or lead-based paint.

Form	Routes of Exposure
Metallic lead **Lead and lead compounds (or lead salts), such as** • **lead acetate** • **lead chloride** • **lead nitrate** • **lead oxide** • **lead phosphate** • **lead subacetate** • **lead sulfate** • **lead sulfide**	• Ingestion is the primary source of exposure to the general population. • Lead paint is a major source of environmental exposure for children who ingest flaking paint, paint chips, and weathered powdered paint (mostly from deteriorated housing units in urban areas). Lead paint can also contribute to soil/dust lead which can be inadvertently ingested via hand-to-mouth activity of young children. • Lead can leach into drinking water from lead-based solder used in water pipes. • Lead can leach into foods or liquids stored in ceramic containers made with lead glazing. • Engaging in hobbies such as casting ammunition, making fishing weights, and stained glass can result in exposure to lead. • Exposure by inhalation can result during activities such as soldering with lead solder or sanding or sandblasting lead-based paint.
Organic • **tetraethyl lead** • **tetramethyl lead**	• Inhalation • Dermal studies in animals have shown that organic lead is well absorbed through the skin

Who are the populations most at risk and how are they usually exposed?

People living near hazardous waste sites, lead smelters or refineries, battery recycling or crushi ng centers, or other industrial lead sources may be exposed to lead and chemicals that contain lead. Workers in occupations that have sources of lead exposure (*e.g.*, plumbers, miners, mechanics, and lead smelter or refinery workers).

Certain hobbies, folk remedies, home activities, and car repairs (*e.g.*, radiator repair) can contribute to lead exposure. Smoking cigarettes or breathing second-hand smoke increases exposure because tobacco smoke contains small amounts of lead.

Pregnant women, the developing fetuses, and young children are particularly vulnerable to the effe cts of lead. Young children are more likely to play in dirt and to place their hands and other objects in their

mouths, thereby increasing the opportunity for exposure via ingestion of lead-contaminated soil an d dust.

What are the possible toxic effects of lead?

The most sensitive targets for lead toxicity are the developing nervous system, the hematological and cardiovascular systems, and the kidney. However, because of lead's many modes of action in biologi cal systems, lead could potentially affect any system or organs in the body. The effects are the same whether it is breathed or swallowed.

Blood Lead Concentrations Corresponding to Adverse Health Effects

Life Stage	Effect	Blood lead (µg/dL)
Children	Depressed ALAD* activity	<5
	Neurodevelopmental effects	<10
	Sexual maturation	<10
	Depressed vitamin D	>15
	Elevated EP**	>15
	Depressed NCV***	>30
	Depressed hemoglobin	>40
	Colic	>60
Adults	Depressed GFR****	<10
	Elevated blood pressure	<10
	Elevated EP (females)	>20
	Enzymuria/proteinuria	>30
	Peripheral neuropathy	>40
	Neurobehavioral effects	>40
	Altered thyroid hormone	>40
	Reduced fertility	>40
	Depressed hemoglobin	>50
Elderly adults	Depressed ALAD*	<5
	Neurobehavioral effects	>4

*aminolevulinic acid dehydratase (ALAD)

**erythrocyte porphyrin (EP)

***nerve conduction velocity (NCV)

****glomerular filtration rate (GFR)

Source: ATSDR Toxicological Profile for Lead (Draft for Public Comment), 2005.

How can I reduce the risk of exposure to lead?

- Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint (homes built before 1978).
- If you have a water lead problem, the U.S. Environmental Protection Agency (EPA) recommends that you flush your cold water pipes if they have not been used in over 6 hours by running water until it is cold (5 seconds to 2 minutes) before drinking or cooking with it.
- Avoid some types of paints and pigments that contain lead and are used as make-up or hair coloring; keep these kinds of products away from children.
- Hire a professional contractor, who is required to follow certain health safety requirements for remediation or renovation involving lead-based paint, (www.epa.gov/lead/pubs/leadinfo.htm#remodeling).
- Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

What are the safety guidelines for lead exposure?

Air

- National Institute for Occupational Safety and Health (NIOSH)

  Recommended exposure limit (REL) time-weighted average (TWA) - 0.05 mg/m^3
  Immediately dangerous to life or health (IDLH) - 100 mg/m^3

- Occupational Safety and Health Administration (OSHA)

  Air - workplace 50 $\mu g/m^3$
  Action level - 40 µg/100 g of whole blood

- The American Conference of Governmental Industrial Hygienists (ACGIH)

Threshold limit values (TLV)/(TWA) - 0.05 mg/m^3
TLV/TWA guideline for lead arsenate - 150 µg/m^3
TLV/TWA guideline for other forms of lead - 50 µg lead/m^3

- U.S. Environmental Protection Agency (EPA)

  National Primary and Secondary Ambient Air Quality Standards - 1.5 µg/m^3

- World Health Organization (WHO)

  Air quality guidelines -- 0.5 µg/m^3

Water

- EPA

  Maximum contaminant level (MCL) - action level 0.015 mg/L
  Action level for public supplies - 15 µg/L

- WHO

  Drinking Water Quality Guidelines - 0.01 mg/L

Blood

- Centers for Disease Control and Prevention (CDC)

  Level of concern for children - 10 µg/dL

- OSHA

  Cause for written notification and medical exam - 40 µg/dL
  Cause for medical removal from exposure - 50 µg/dL

- ACGIH

  Advisory; biological exposure index - 30 µg/dL

Food

- Food and Drug Administration (FDA)

  Bottled drinking water - 0.005 mg/L

Other

- ACGIH

  Biological exposure indices (lead in blood) - 30 µg/100 mL

- Consumer Product Safety Commission

  Paint - 600 ppm

- FDA

  Ceramicware (µg/mL leaching solution) - 0.5-3.0 µg/mL

µg/m^3: micrograms per cubic meter
µg/dL: micrograms per deciliter
µg/L: micrograms per liter
g: gram
mg/L: milligrams per liter
mL: milliliter
ppm: parts per million

What are the most important or common mediating factors?

Factors that determine the severity of the health effects from lead exposure include

- Dose
- Age of the person exposed
  - the developing nervous system is the most sensitive system to the effects of lead
  - the efficiency of lead absorption from the gastrointestinal tract is greater in children than in adults
- Life stages of women (childbirth, lactating, menopause)
- Occupational exposures
- Duration of exposure
- Health and lifestyle of the person exposed
- Nutritional status of the person exposed
  - a diet adequate in calcium and iron may decrease lead absorption

The toxic effects of lead exposure may be worse in individuals with inherited genetic diseases or gene polymorphisms such as thalassemia, individuals with glucose-6-phosphate dehydrogenase (G6PD) deficiency, and carriers of certain gene polymorphic forms (*e.g.*, ALAD and vitamin D receptor). Research continues about this topic.

Is there a test to see if my child or I have been exposed to lead?

Blood	• The screening test of choice is blood lead levels. • Blood tests are commonly used to screen children for lead poisoning. • Analysis of lead in whole blood is the most common and accurate method of assessing lead exposure. • Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL).
Bone and Teeth	• X-ray fluorescence techniques have been used to determine lead concentration in bones and teeth. It is not widely available and is used mostly in research. • Lead partitions to bone over a lifetime of exposure; therefore, bone lead measurements may be a better indicator of cumulative exposure than blood lead.
Urine	• Measurements of urinary lead levels have been used to assess lead exposure. • The measurement of lead excreted in urine following chelation with calcium disodium EDTA (EDTA provocation) has been used to detect elevated body burden of lead in adults and children.
Hair and Nails	• These are not reliable for testing due to errors external contamination. They are relatively poor predictors of blood lead, particularly at low concentrations.

Future Research Needs

To close current gaps in the scientific database on the health effects of lead, a long–term resear ch program is needed that might include the following:

- Further short-term studies or studies in vitro designed to clarify mechanisms of action for the various toxicities might be useful.
- Studies identifying exposures during different developmental periods can help identify critical periods of vulnerability for immunocompetence, development of sex organs, or neurobehavioral parameters.
- Chronic-duration exposure studies in animals would expand information on the toxicity of lead. Special studies that examine biochemical and morphological effects of lead may provide new information on mechanisms of action of lead, particularly for the effects of greatest concern such as neurobehavioral changes in children.
- Development of new and more sensitive tests of specific neuropsychological functions.
- Further investigation of links between lead and amyotrophic lateral sclerosis, essential tremor, schizophrenia, and Parkinson's disease.
- Epidemiological studies designed in a manner that permits more rigorous assessments of effect modification.
- Studies about the long-term consequences of lead-related neurobehavioral deficits detected in infants and children and the manifestation of chronic neurobehavioral problems in adolescence and adulthood.
- Further characterization of bone lead concentration as a biomarker of exposure for various effect end points (*e.g.*, blood pressure and renal effects).
- Studies of the potential prevalence of elevated bone lead stores in women of reproductive age and the associated risk that this poses to fetal development by mobilization of maternal bone stores during pregnancy.
- Further clarification of the role of some genetic polymorphisms.
- Evaluation of cohorts from prospective studies into adulthood for potential late-appearing effects including cancer.

For more information

- Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for Lead

  http://www.atsdr.cdc.gov/toxprofiles/tp13.html

- ATSDR ToxFAQs™ for Lead

  http://www.atsdr.cdc.gov/tfacts13.html

- ATSDR Case Studies in Environmental Medicine Lead Toxicity

  http://www.atsdr.cdc.gov/csem/lead/

- ATSDR Interaction Profile for Chemical Mixtures for Arsenic, Cadmium, Chromium, and Lead

  http://www.atsdr.cdc.gov/interactionprofiles/ip04.html

- ATSDR Interaction Profile for Chemical Mixtures for Lead, Manganese, Zinc, and Copper

  http://www.atsdr.cdc.gov/interactionprofiles/ip06.html

- ATSDR Interaction Profile for Chemical Mixtures for Chlorpyrifos, Lead, Mercury, and Methylmercury

  http://www.atsdr.cdc.gov/interactionprofiles/ip11.html

- Centers for Disease Control and Prevention Lead Web Page

  http://www.cdc.gov/lead/

- U.S. Environmental Protection Agency Lead Web Page

  http://www.epa.gov/lead/

- U.S. Department of Labor, Occupational Safety & Health Administration

  http://www.osha.gov/SLTC/lead/

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental Medicine
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333
Phone: 1-800-CDC-INFO (800-232-4636)
TTY 888-232-6348

FAX: (770)-488-4178
Email: CDCINFO@cdc.gov

This page was updated on 01/04/2008

Mercury

Mercury is a naturally occurring metal found in air, water, and soil. It exists in several forms, including elemental (or metallic) mercury, inorganic mercury compounds, and organic mercury compounds:

- **Elemental mercury** is liquid at room temperature and is used in thermometers, fluorescent light bulbs, some electrical switches, and some industrial processes.
- **Inorganic mercury** compounds are formed when mercury combines with other elements to form salts, which are usually powders or crystals. Inorganic mercury compounds are found naturally in the environment. Some forms of inorganic mercury have been used in antiseptic creams, ointments, and preservatives.
- **Organic mercury** compounds are formed when mercury combines with carbon. Microscopic organisms can produce organic mercury compounds (methylmercury) in contaminated water and soil, which can accumulate in the food chain. Other special types of organomercurials have been used as medical preservatives and medicines.

How People Are Exposed to Mercury

- Eating fish or shellfish that is contaminated with methylmercury, which is the main source of general human exposures to mercury;
- Breathing air contaminated with elemental mercury vapors (e.g., in workplaces such as dental offices and industries that use mercury or in locations where a mercury spill or release has occurred);
- Having dental fillings that contain mercury; and
- Practicing cultural or religious rituals that use mercury.

How Mercury Affects People's Health

- Short-term exposure to extremely high levels of elemental mercury vapors can result in lung damage, nausea, diarrhea, increases in blood pressure or heart rate, skin rashes, eye irritation, and injury to the nervous system.
- Prolonged exposure to lower levels of elemental mercury can permanently damage the brain and kidneys.
- The developing brain of a fetus can be injured if the mother is exposed to methylmercury.

Levels of Mercury in U.S. Population

Scientists tested levels of mercury in the blood of 16,780 participants who took part in CDC's national study known as the National Health and Nutrition Examination Survey (NHANES). These findings are based on total blood mercury levels in the U.S. general

population for persons aged 1 year and older who participated in NHANES during 2003-2006, as well as trends in the total mercury of children aged 1–5 and females aged 16–49 during 1999–2006.

- In the total population during 2003–2006, the total blood mercury levels for non–Hispanic blacks and non–Hispanic whites were higher than those for Mexican Americans.
- Across the age groups in the total population during 2003-2006, total blood mercury levels increased with age, peaked at the fifth or sixth decade, depending on race/ethnicity, and then declined.
- In the most recent survey period of 2005–2006, the 95th percentile levels for total blood mercury in children aged 1-5 years and females aged 16-49 years were 1.43 µg/L and 4.48 µg/L, respectively. The 95th percentile means that 95 percent of the U.S. population's exposure is below this estimated level. Conversely, only 5 percent of the population will have values at this level or higher.
- Over the four survey periods from 1999-2006, blood mercury levels increased slightly for non–Hispanic white children and decreased slightly for non–Hispanic black and Mexican American children. Female children had slightly higher blood mercury levels than male children.

For More Information

- Agency for Toxic Substances and Disease Registry
  Detailed information about mercury and public health is available at
  http://www.atsdr.cdc.gov/alerts/970626.html and
  http://www.atsdr.cdc.gov/cabs/mercury/index.html
- CDC Emergency Preparedness and Response
  Case definitions of mercury, toxicology FAQs, and toxicological profile at
  http://emergency.cdc.gov/agent/mercury/

May 2009

Department of Health and Human Services
Agency for Toxic Substances & Disease Registry

ATSDR Home › ToxFAQs™ Arsenic

ToxFAQs™

ToxFAQs™
for
Arsenic
(*Arsénico*)
August 2007

PDF Version, 92 KB

CAS#: 7440-38-2

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

Highlights

Exposure to higher than average levels of arsenic occur mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found in at least 1,149 of the 1,684 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenate (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses; it is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton fields and orchards.

What happens to arsenic when it enters the environment?

- Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching.
- Arsenic cannot be destroyed in the environment. It can only change its form.
- Rain and snow remove arsenic dust particles from the air.
- Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
- Fish and shellfish can accumulate arsenic; most of this arsenic is in an organic form called arsenobetaine that is much less harmful.

How might I be exposed to arsenic?

- Ingesting small amounts present in your food and water or breathing air containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause naus ea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of “pins an d needles” in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of th e skin and the appearance of small “corns” or “warts” on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Almost nothing is known regarding health effects of organic arsenic compounds in humans. Studies i n animals show that some simple organic arsenic compounds are less toxic than inorganic forms. Ingestion of methyl and dimethyl compounds can cause diarrhea and damage to the kidneys.

How likely is arsenic to cause cancer?

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cance r and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for R esearch on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans.

How does arsenic affect children?

There is some evidence that long-term exposure to arsenic in children may result in lower IQ score s. There is also some evidence that exposure to arsenic in the womb and early childhood may increase mortality in young adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant fem ales, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal ti ssues. Arsenic is found at low levels in breast milk.

How can families reduce their risk for exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protecti ve clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner source s of water and limit contact with soil.
- If you work in a job that may expose you to arsenic, be aware that you may carry arsenic home on y our clothing, skin, hair, or tools. Be sure to shower and change clothes before going home.

Is there a medical test to show whether I've been exposed to arsenic?

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. The urin e test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of ars enic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict whether the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

The EPA has set limits on the amount of arsenic that industrial sources can release to the environ ment and has restricted or cancelled many of the uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Arsenic *(Update)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental Medicine
1600 Clifton Road NE, Mailstop F-62
Atlanta, GA 30333
Phone: 1-800-CDC-INFO • 888-232-6348 (TTY)
FAX: 770-488-4178
Email: cdcinfo@cdc.gov

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state heal th or environmental quality department if you have any more questions or concerns.

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U.S. Environmental Protection Agency

Pesticides: Topical & Chemical Fact Sheets

Assessing Health Risks from Pesticides

January 1999
735-F-99-002

The Federal Government, in cooperation with the States, carefully regulates pesticides to ensure that they do not pose unreasonable risks to human health or the environment. As part of that effort, the Environmental Protection Agency (EPA) requires extensive test data from pesticide producers that demonstrate pesticide products can be used without posing harm to human health and the environment. EPA scientists and analysts carefully review these data to determine whether to register (license) a pesticide product or a use and whether specific restrictions are necessary. This fact sheet is a brief overview of EPA's process for assessing potential risks to human health when evaluating pesticide products.

Background

There are more than 865 active ingredients registered as pesticides, which are formulated into thousands of pesticide products that are available in the marketplace. About 350 pesticides are used on the foods we eat, and to protect our homes and pets.

EPA plays a critical role in evaluating these chemicals prior to registration, and in reevaluating older pesticides already on the market, to ensure that they can be used with a reasonable certainty of no harm. The process EPA uses for evaluating the health impacts of a pesticide is called risk assessment.

EPA uses the National Research Council's four-step process for human health risk assessment:

Step One: Hazard Identification
Step Two: Dose-Response Assessment
Step Three: Exposure Assessment
Step Four: Risk Characterization

Step One: Hazard Identification (Toxicology)

The first step in the risk assessment process is to identify potential health effects that may occur from different types of pesticide exposure. EPA considers the full spectrum of a pesticide's potential health effects.

Generally, for human health risk assessments, many toxicity studies are conducted on animals by pesticide companies in independent laboratories and evaluated for acceptability by EPA scientists. EPA evaluates pesticides for a wide range of adverse effects, from eye and skin irritation to cancer and birth defects in laboratory animals. EPA may also consult the public literature or other sources of supporting information on any aspect of the chemical.

Step Two: Dose-Response Assessment

Paracelsus, the Swiss physician and alchemist, the "father" of modern toxicology (1493-1541) said,

> "The dose makes the poison."

In other words, **the amount of a substance a person is exposed to** is as important as **how toxic the chemical might be**. For example, small doses of aspirin can be beneficial to people, but at very high doses, this common medicine can be deadly. In some individuals, even at very low doses, aspirin may be deadly.

Dose-response assessment involves considering the dose levels at which adverse effects were observed in test animals, and using these dose levels to calculate an equal dose in humans.

Step Three: Exposure Assessment

People can be exposed to pesticides in three ways:

1. Inhaling pesticides (inhalation exposure),
2. Absorbing pesticides through the skin (dermal exposure), and
3. Getting pesticides in their mouth or digestive tract (oral exposure).

Depending on the situation, pesticides could enter the body by any one or all of these routes. Typical sources of pesticide exposure include:

- **Food**
  Most of the foods we eat have been grown with the use of pesticides. Therefore, pesticide residues may be present inside or on the surfaces of these foods.

- **Home and Personal Use Pesticides**
  You might use pesticides in and around your home to control insects, weeds, mold, mildew, bacteria, lawn and garden pests and to protect your pets from pests such as fleas. Pesticides may also be used as insect repellants which are directly applied to the skin or clothing.

- **Pesticides in Drinking Water**
  Some pesticides that are applied to farmland or other land structures can make their way in small amounts to the ground water or surface water systems that feed drinking water supplies.

- **Worker Exposure to Pesticides**
  Pesticide applicators, vegetable and fruit pickers and others who work around pesticides can be exposed due to the nature of their jobs. To address the unique risks workers face from occupational exposure, EPA evaluates occupational exposure through a separate program. All pesticides registered by EPA have been shown to be safe when used properly.

Step Four: Risk Characterization

Risk characterization is the final step in assessing human health risks from pesticides. It is the process of combining the hazard, dose-response and exposure assessments to describe the overall risk from a pesticide. It explains the assumptions used in assessing exposure as well as the uncertainties that are built into the dose-response assessment. The strength of the overall database is considered, and broad

conclusions are made. EPA's role is to evaluate both toxicity and exposure and to determine the risk associated with use of the pesticide.

Simply put,

RISK = TOXICITY x EXPOSURE.

This means that the risk to human health from pesticide exposure depends on both the toxicity of the pesticide and the likelihood of people coming into contact with it. At least *some* exposure and *some* toxicity are required to result in a risk. For example, if the pesticide is very poisonous, but no people are exposed, there is no risk. Likewise, if there is ample exposure but the chemical is non-toxic, there is no risk. However, usually when pesticides are used, there is some toxicity and exposure, which results in a potential risk.

EPA recognizes that effects vary between animals of different species and from person to person. To account for this variability, *uncertainty factors* are built into the risk assessment. These uncertainty factors create an additional margin of safety for protecting people who may be exposed to the pesticides. FQPA requires EPA to use an extra 10-fold safety factor, if necessary, to protect infants and children from effects of the pesticide.

Types of Toxicity Tests EPA Requires for Human Health Risk Assessments

EPA evaluates studies conducted over different periods of time and that measure specific types of effects. These tests are evaluated to screen for potential health effects in infants, children and adults.

Acute Testing: Short-term exposure; a single exposure (dose).

- Oral, dermal (skin), and inhalation exposure
- Eye irritation
- Skin irritation
- Skin sensitization
- Neurotoxicity

Sub-chronic Testing: Intermediate exposure; repeated exposure over a longer period of time (i.e., 30-90 days).

- Oral, dermal (skin), and inhalation
- Neurotoxicity (nerve system damage)

Chronic Toxicity Testing: Long-term exposure; repeated exposure lasting for most of the test animal's life span. Intended to determine the effects of a pesticide after prolonged and repeated exposures.

- Chronic effects (non-cancer)
- Carcinogenicity (cancer)

Developmental and Reproductive Testing: Identify effects in the fetus of an exposed pregnant female (birth defects) and how pesticide exposure affects the ability of a test animal to successfully reproduce.

Mutagenicity Testing: Assess a pesticide's potential to affect the cell's genetic components.

Hormone Disruption: Measure effects for their potential to disrupt the endocrine system. The endocrine system consists of a set of glands and the hormones they produce that help guide the development, growth, reproduction, and behavior of animals including humans.

Risk Management

Once EPA completes the risk assessment process for a pesticide, we use this information to determine if (when used according to label directions), there is a reasonable certainty that the pesticide will not harm a person's health.

Using the conclusions of a risk assessment, EPA can then make a more informed decision regarding whether to approve a pesticide chemical or use, as proposed, or whether additional protective measures are necessary to limit occupational or non-occupational exposure to a pesticide. For example, EPA may prohibit a pesticide from being used on certain crops because consuming too much food treated with the pesticide may result in an unacceptable risk to consumers. Another example of protective measures is requiring workers to wear personal protective equipment (PPE) such as a respirator or chemical resistant gloves, or not allowing workers to enter treated crop fields until a specific period of time has passed.

If, after considering all appropriate risk reduction measures, the pesticide still does not meet EPA's safety standard, the Agency will not allow the proposed chemical or use. Regardless of the specific measures enforced, EPA's primary goal is to ensure that legal uses of the pesticide are protective of human health, especially the health of children, and the environment.

Human Health Risk Assessment and the Law

Federal law requires detailed evaluation of pesticides to protect human health and the environment. In 1996, Congress made significant changes to strengthen pesticide laws through the Food Quality Protection Act (FQPA). Many of these changes are key elements of the current risk assessment process. FQPA required that EPA consider:

- **A New Safety Standard**: FQPA strengthened the safety standard that pesticides must meet before being approved for use. EPA must ensure with a reasonable certainty that no harm will result from the legal uses of the pesticide.
- **Exposure from All Sources**: In evaluating a pesticide, EPA must estimate the combined risk from that pesticide from all non-occupational sources, such as:
  - Food Sources
  - Drinking Water Sources
  - Residential Sources
- **Cumulative Risk**: EPA is required to evaluate pesticides in light of similar toxic effects that different pesticides may share, or "a common mechanism of toxicity." At this time, EPA is developing a methodology for this type of assessment.
- **Special Sensitivity of Children to Pesticides**: EPA must ascertain whether there is an increased susceptibility from exposure to the pesticide to infants and children. EPA must build an additional 10-fold safety factor into risk assessments to ensure the protection of infants and children, unless it is determined that a lesser margin of safety will be safe for infants and children.

For More Information

If you would like more information about EPA's pesticide programs, contact the Communication Service Branch at (703) 305-5017 or visit the Pesticides Web site.

For more information on specific pesticides, or to inquire about the symptoms of pesticide poisoning, call the National Pesticide Information Center (NPIC), a toll-free hotline information at: 1-800-858-7378, or visit their Web site EXIT Disclaimer .

Publications | Glossary | A-Z Index | Jobs

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Last updated on Tuesday, May 2nd, 2006
URL: http://www.epa.gov/pesticides/factsheets/riskassess.htm

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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February 2001

ToxFAQs™ for Polychlorinated Biphenyls (PCBs)

(Bifenilos Policlorados (BPCs))

This fact sheet answers the most frequently asked health questions about polychlorinated biphenyls (PCBs). For more information, you may call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are polychlorinated biphenyls (PCBs)?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors,

Contact Information

RELATED RESOURCES

ToxFAQ™ 35k

ToxFAQ™ en Español 32k

Public Health Statement 125k

Public Health Statement en Español 321k

Toxicological Profile 13.6MB

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ATSDR RESOURCES

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Priority List of Hazardous Substances

Division of Toxicology

and old microscope and hydraulic oils.

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What happens to polychlorinated biphenyls (PCBs) when they enter the environment?

- PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

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How might I be exposed to polychlorinated biphenyls (PCBs)?

- Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- Breathing air near hazardous waste sites and drinking contaminated well water.
- In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

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How can polychlorinated biphenyls (PCBs) affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

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How likely are polychlorinated biphenyls (PCBs) to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

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How do polychlorinated biphenyls (PCBs) affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported In most cases, the benefits of breast-feeding outweigh any risks from exposure to PCBs in mother's milk.

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How can families reduce the risk of exposure to polychlorinated biphenyls (PCBs)?

- You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.
- Children should be told not play with old appliances, electrical equipment, or transformers, since they may contain PCBs.
- Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.
- If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

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Is there a medical test to show whether I've been exposed to polychlorinated biphenyls (PCBs)?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

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Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

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References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333
Phone: 1-888-42-ATSDR (1-888-422-8737)
FAX: (770)-488-4178
Email: ATSDRIC@cdc.gov

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ATSDR Department of Health and Human Services
Agency for Toxic Substances & Disease Registry

2007 CERCLA Priority List of Hazardous Substances

2007 RANK	SUBSTANCE NAME	TOTAL POINTS	2005 RANK	CAS #
1	ARSENIC	1672.58	1	007440-38-2
2	LEAD	1534.07	2	007439-92-1
3	MERCURY	1504.69	3	007439-97-6
4	VINYL CHLORIDE	1387.75	4	000075-01-4
5	POLYCHLORINATED BIPHENYLS	1365.78	5	001336-36-3
6	BENZENE	1355.96	6	000071-43-2
7	CADMIUM	1324.22	8	007440-43-9
8	POLYCYCLIC AROMATIC HYDROCARBONS	1316.98	7	130498-29-2
9	BENZO(A)PYRENE	1312.45	9	000050-32-8
10	BENZO(B)FLUORANTHENE	1266.55	10	000205-99-2
11	CHLOROFORM	1223.03	11	000067-66-3
12	DDT, P,P'-	1193.36	12	000050-29-3
13	AROCLOR 1254	1182.63	13	011097-69-1
14	AROCLOR 1260	1177.77	14	011096-82-5
15	DIBENZO(A,H)ANTHRACENE	1165.88	15	000053-70-3
16	TRICHLOROETHYLENE	1154.73	16	000079-01-6
17	DIELDRIN	1150.91	17	000060-57-1
18	CHROMIUM, HEXAVALENT	1149.98	18	018540-29-9
19	PHOSPHORUS, WHITE	1144.77	19	007723-14-0
20	CHLORDANE	1133.21	21	000057-74-9
21	DDE, P,P'-	1132.49	20	000072-55-9
22	HEXACHLOROBUTADIENE	1129.63	22	000087-68-3
23	COAL TAR CREOSOTE	1124.32	23	008001-58-9
24	ALDRIN	1117.22	25	000309-00-2
25	DDD, P,P'-	1114.83	24	000072-54-8
26	BENZIDINE	1114.24	26	000092-87-5
27	AROCLOR 1248	1112.20	27	012672-29-6
28	CYANIDE	1099.48	28	000057-12-5
29	AROCLOR 1242	1093.14	29	053469-21-9
30	AROCLOR	1091.52	62	012767-79-2
31	TOXAPHENE	1086.65	30	008001-35-2
32	HEXACHLOROCYCLOHEXANE, GAMMA-	1081.63	32	000058-89-9
33	TETRACHLOROETHYLENE	1080.43	31	000127-18-4
34	HEPTACHLOR	1072.67	33	000076-44-8
35	1,2-DIBROMOETHANE	1064.06	34	000106-93-4
36	HEXACHLOROCYCLOHEXANE, BETA-	1060.22	37	000319-85-7
37	ACROLEIN	1059.07	36	000107-02-8
38	DISULFOTON	1058.85	35	000298-04-4
39	BENZO(A)ANTHRACENE	1057.96	38	000056-55-3
40	3,3'-DICHLOROBENZIDINE	1051.61	39	000091-94-1

41	ENDRIN	1048.57	41	000072-20-8
42	BERYLLIUM	1046.12	40	007440-41-7
43	HEXACHLOROCYCLOHEXANE, DELTA-	1038.27	42	000319-86-8
44	1,2-DIBROMO-3-CHLOROPROPANE	1035.55	43	000096-12-8
45	PENTACHLOROPHENOL	1028.01	45	000087-86-5
46	HEPTACHLOR EPOXIDE	1027.12	44	001024-57-3
47	CARBON TETRACHLORIDE	1023.32	46	000056-23-5
48	AROCLOR 1221	1018.41	47	011104-28-2
49	COBALT	1015.57	50	007440-48-4
50	DDT, O,P'-	1014.71	49	000789-02-6
51	AROCLOR 1016	1014.33	48	012674-11-2
52	DI-N-BUTYL PHTHALATE	1007.49	52	000084-74-2
53	NICKEL	1005.40	55	007440-02-0
54	ENDOSULFAN	1004.65	54	000115-29-7
55	ENDOSULFAN SULFATE	1003.56	53	001031-07-8
56	DIAZINON	1002.08	57	000333-41-5
57	ENDOSULFAN, ALPHA	1001.30	58	000959-98-8
58	XYLENES, TOTAL	996.07	59	001330-20-7
59	CIS-CHLORDANE	995.08	51	005103-71-9
60	DIBROMOCHLOROPROPANE	994.87	60	067708-83-2
61	METHOXYCHLOR	994.47	61	000072-43-5
62	BENZO(K)FLUORANTHENE	981.26	63	000207-08-9
63	ENDRIN KETONE	978.99	64	053494-70-5
64	TRANS-CHLORDANE	973.99	56	005103-74-2
65	CHROMIUM(VI) OXIDE	969.58	66	001333-82-0
66	METHANE	959.78	67	000074-82-8
67	ENDOSULFAN, BETA	959.19	65	033213-65-9
68	AROCLOR 1232	955.64	68	011141-16-5
69	ENDRIN ALDEHYDE	954.86	69	007421-93-4
70	BENZOFLUORANTHENE	951.48	70	056832-73-6
71	TOLUENE	947.50	71	000108-88-3
72	2-HEXANONE	942.02	72	000591-78-6
73	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	938.11	73	001746-01-6
74	ZINC	932.89	74	007440-66-6
75	DIMETHYLARSINIC ACID	922.06	75	000075-60-5
76	DI(2-ETHYLHEXYL)PHTHALATE	919.02	76	000117-81-7
77	CHROMIUM	908.52	77	007440-47-3
78	NAPHTHALENE	896.67	78	000091-20-3
79	1,1-DICHLOROETHENE	891.19	79	000075-35-4
80	METHYLENE CHLORIDE	888.96	81	000075-09-2
81	AROCLOR 1240	888.11	80	071328-89-7
82	2,4,6-TRINITROTOLUENE	883.59	82	000118-96-7
83	BROMODICHLOROETHANE	870.00	83	000683-53-4
84	HYDRAZINE	864.41	85	000302-01-2
85	1,2-DICHLOROETHANE	863.99	84	000107-06-2
86	2,4,6-TRICHLOROPHENOL	863.71	86	000088-06-2
87	2,4-DINITROPHENOL	860.45	87	000051-28-5
88	BIS(2-CHLOROETHYL) ETHER	859.88	88	000111-44-4
89	THIOCYANATE	849.21	89	000302-04-5
90	ASBESTOS	841.54	90	001332-21-4
91	CHLORINE	840.37	92	007782-50-5
92	CYCLOTRIMETHYLENETRINITRAMINE (RDX)	840.28	91	000121-82-4
93	HEXACHLOROBENZENE	838.34	93	000118-74-1

94	2,4-DINITROTOLUENE	837.88	96	000121-14-2
95	RADIUM-226	835.93	94	013982-63-3
96	ETHION	834.03	97	000563-12-2
97	1,1,1-TRICHLOROETHANE	833.81	95	000071-55-6
98	URANIUM	833.41	98	007440-61-1
99	ETHYLBENZENE	832.13	99	000100-41-4
100	RADIUM	828.07	100	007440-14-4
101	THORIUM	825.17	101	007440-29-1
102	4,6-DINITRO-O-CRESOL	822.78	102	000534-52-1
103	1,3,5-TRINITROBENZENE	820.17	103	000099-35-4
104	CHLOROBENZENE	819.69	105	000108-90-7
105	RADON	817.89	104	010043-92-2
106	RADIUM-228	816.76	106	015262-20-1
107	THORIUM-230	814.72	107	014269-63-7
107	URANIUM-235	814.72	107	015117-96-1
109	BARIUM	813.46	109	007440-39-3
110	FLUORANTHENE	812.40	113	000206-44-0
111	URANIUM-234	812.11	110	013966-29-5
112	N-NITROSODI-N-PROPYLAMINE	811.05	111	000621-64-7
113	THORIUM-228	810.36	112	014274-82-9
114	RADON-222	809.78	114	014859-67-7
115	HEXACHLOROCYCLOHEXANE, ALPHA-	809.56	116	000319-84-6
116	1,2,3-TRICHLOROBENZENE	808.41	143	000087-61-6
117	MANGANESE	807.90	115	007439-96-5
118	COAL TARS	807.07	117	008007-45-2
119	CHRYSOTILE ASBESTOS	806.68	119	012001-29-5
119	STRONTIUM-90	806.68	119	010098-97-2
121	PLUTONIUM-239	806.67	118	015117-48-3
122	POLONIUM-210	806.39	122	013981-52-7
123	METHYLMERCURY	806.39	121	022967-92-6
124	PLUTONIUM-238	806.01	123	013981-16-3
125	LEAD-210	805.90	124	014255-04-0
126	PLUTONIUM	805.23	125	007440-07-5
127	CHLORPYRIFOS	804.93	125	002921-88-2
128	COPPER	804.86	133	007440-50-8
129	AMERICIUM-241	804.55	128	086954-36-1
130	RADON-220	804.54	127	022481-48-7
131	AMOSITE ASBESTOS	804.07	129	012172-73-5
132	IODINE-131	803.48	130	010043-66-0
133	HYDROGEN CYANIDE	803.08	132	000074-90-8
134	TRIBUTYLTIN	802.61	131	000688-73-3
135	GUTHION	802.32	134	000086-50-0
136	NEPTUNIUM-237	802.13	135	013994-20-2
137	CHRYSENE	802.10	139	000218-01-9
138	CHLORDECONE	801.64	136	000143-50-0
138	IODINE-129	801.64	136	015046-84-1
138	PLUTONIUM-240	801.64	136	014119-33-6
141	S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	797.88	140	000078-48-8
142	BROMINE	789.15	142	007726-95-6
143	POLYBROMINATED BIPHENYLS	789.11	141	067774-32-7
144	DICOFOL	787.56	144	000115-32-2
145	PARATHION	784.14	145	000056-38-2
146	1,1,2,2-TETRACHLOROETHANE	782.15	146	000079-34-5

147	SELENIUM	778.98	147	007782-49-2	
148	HEXACHLOROCYCLOHEXANE, TECHNICAL GRADE	774.91	148	000608-73-1	
149	TRICHLOROFLUOROETHANE	770.74	149	027154-33-2	
150	TRIFLURALIN	770.12	150	001582-09-8	
151	DDD, O,P'-	768.73	151	000053-19-0	
152	4,4'-METHYLENEBIS(2-CHLOROANILINE)	766.66	152	000101-14-4	
153	HEXACHLORODIBENZO-P-DIOXIN	760.42	153	034465-46-8	
154	HEPTACHLORODIBENZO-P-DIOXIN	754.47	154	037871-00-4	
155	PENTACHLOROBENZENE	753.58	155	000608-93-5	
156	1,3-BUTADIENE	747.31	201	000106-99-0	
157	AMMONIA	745.55	156	007664-41-7	
158	2-METHYLNAPHTHALENE	743.24	157	000091-57-6	
159	1,4-DICHLOROBENZENE	737.32	159	000106-46-7	
160	1,1-DICHLOROETHANE	736.23	158	000075-34-3	
161	ACENAPHTHENE	731.25	160	000083-32-9	
162	1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	726.14	161	039001-02-0	
163	1,1,2-TRICHLOROETHANE	724.96	162	000079-00-5	
164	TRICHLOROETHANE	723.32	163	025323-89-1	
165	HEXACHLOROCYCLOPENTADIENE	719.01	164	000077-47-4	
166	HEPTACHLORODIBENZOFURAN	718.58	165	038998-75-3	
167	1,2-DIPHENYLHYDRAZINE	713.90	166	000122-66-7	
168	2,3,4,7,8-PENTACHLORODIBENZOFURAN	710.71	167	057117-31-4	
169	TETRACHLOROBIPHENYL	709.21	168	026914-33-0	
170	CRESOL, PARA-	707.83	169	000106-44-5	
171	OXYCHLORDANE	706.32	170	027304-13-8	
172	1,2-DICHLOROBENZENE	704.91	171	000095-50-1	
173	1,2-DICHLOROETHENE, TRANS-	704.04	178	000156-60-5	
174	INDENO(1,2,3-CD)PYRENE	703.30	180	000193-39-5	
175	GAMMA-CHLORDENE	702.59	172	056641-38-4	
176	CARBON DISULFIDE	702.55	174	000075-15-0	
177	TETRACHLOROPHENOL	702.54	173	025167-83-3	
178	AMERICIUM	701.62	175	007440-35-9	
178	URANIUM-233	701.62	175	013968-55-3	
180	PALLADIUM	700.66	177	007440-05-3	
181	HEXACHLORODIBENZOFURAN	700.56	179	055684-94-1	
182	PHENOL	696.96	183	000108-95-2	
183	CHLOROETHANE	693.90	182	000075-00-3	
184	ACETONE	693.31	181	000067-64-1	
185	P-XYLENE	690.20	185	000106-42-3	
186	DIBENZOFURAN	689.19	187	000132-64-9	
187	ALUMINUM	688.13	186	007429-90-5	
188	2,4-DIMETHYLPHENOL	685.76	189	000105-67-9	
189	CARBON MONOXIDE	684.49	188	000630-08-0	
190	TETRACHLOROETHANE	677.97	190	025322-20-7	
191	HYDROGEN SULFIDE	676.51	193	007783-06-4	
192	PENTACHLORODIBENZOFURAN	673.21	192	030402-15-4	
193	CHLOROMETHANE	670.19	191	000074-87-3	
194	BIS(2-METHOXYETHYL) PHTHALATE	666.08	194	034006-76-3	
195	BUTYL BENZYL PHTHALATE	659.38	195	000085-68-7	
196	CRESOL, ORTHO-	658.66	196	000095-48-7	
197	HEXACHLOROETHANE	653.10	199	000067-72-1	
198	VANADIUM	651.70	198	007440-62-2	

199	N-NITROSODIMETHYLAMINE	650.71	200	000062-75-9
200	1,2,4-TRICHLOROBENZENE	647.30	203	000120-82-1
201	BROMOFORM	643.53	202	000075-25-2
202	TETRACHLORODIBENZO-P-DIOXIN	635.74	204	041903-57-5
203	1,3-DICHLOROBENZENE	631.41	205	000541-73-1
204	PENTACHLORODIBENZO-P-DIOXIN	625.12	207	036088-22-9
205	N-NITROSODIPHENYLAMINE	624.79	208	000086-30-6
206	1,2-DICHLOROETHYLENE	622.49	206	000540-59-0
207	2,3,7,8-TETRACHLORODIBENZOFURAN	622.15	210	051207-31-9
208	2-BUTANONE	620.01	209	000078-93-3
209	2,4-DICHLOROPHENOL	616.45	212	000120-83-2
210	1,4-DIOXANE	616.29	215	000123-91-1
211	FLUORINE	613.28	214	007782-41-4
212	NITRITE	612.64	216	014797-65-0
213	CESIUM-137	612.50	217	010045-97-3
214	SILVER	612.19	213	007440-22-4
215	CHROMIUM TRIOXIDE	610.85	218	007738-94-5
216	NITRATE	610.66	219	014797-55-8
217	POTASSIUM-40	608.91	220	013966-00-2
218	DINITROTOLUENE	607.65	221	025321-14-6
219	ANTIMONY	605.37	222	007440-36-0
220	COAL TAR PITCH	605.33	224	065996-93-2
221	THORIUM-227	605.32	223	015623-47-9
222	2,4,5-TRICHLOROPHENOL	604.83	225	000095-95-4
223	ARSENIC ACID	604.45	226	007778-39-4
224	ARSENIC TRIOXIDE	604.36	227	001327-53-3
225	PHORATE	603.10	228	000298-02-2
226	BENZOPYRENE	603.00	230	073467-76-2
227	CRESOLS	602.74	229	001319-77-3
228	CHLORDANE, TECHNICAL	602.62	231	012789-03-6
229	DIMETHOATE	602.61	232	000060-51-5
230	ACTINIUM-227	602.57	233	014952-40-0
230	STROBANE	602.57	233	008001-50-1
232	4-AMINOBIPHENYL	602.51	235	000092-67-1
232	PYRETHRUM	602.51	235	008003-34-7
234	ARSINE	602.42	237	007784-42-1
235	NALED	602.32	238	000300-76-5
236	DIBENZOFURANS, CHLORINATED	602.13	239	042934-53-2
236	ETHOPROP	602.13	239	013194-48-4
238	ALPHA-CHLORDENE	601.94	241	056534-02-2
238	CARBOPHENOTHION	601.94	241	000786-19-6
240	DICHLORVOS	601.64	243	000062-73-7
241	CALCIUM ARSENATE	601.45	244	007778-44-1
241	MERCURIC CHLORIDE	601.45	244	007487-94-7
241	SODIUM ARSENITE	601.45	244	007784-46-5
244	FORMALDEHYDE	599.64	247	000050-00-0
245	2-CHLOROPHENOL	599.62	248	000095-57-8
246	PHENANTHRENE	597.68	249	000085-01-8
247	HYDROGEN FLUORIDE	588.03	250	007664-39-3
248	2,4-D ACID	584.47	251	000094-75-7
249	DIBROMOCHLOROMETHANE	580.59	252	000124-48-1
250	DIURON	579.16	253	000330-54-1
251	BUTYLATE	578.43	254	002008-41-5

252	DIMETHYL FORMAMIDE	578.23	255	000068-12-2
253	PYRENE	577.95	256	000129-00-0
254	DICHLOROBENZENE	577.70	211	025321-22-6
255	ETHYL ETHER	572.47	257	000060-29-7
256	DICHLOROETHANE	570.46	258	001300-21-6
257	4-NITROPHENOL	567.79	259	000100-02-7
258	1,3-DICHLOROPROPENE, CIS-	561.82	184	010061-01-5
259	PHOSPHINE	559.74	260	007803-51-2
260	TRICHLOROBENZENE	557.96	261	012002-48-1
261	2,6-DINITROTOLUENE	555.20	262	000606-20-2
262	FLUORIDE ION	549.64	263	016984-48-8
263	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	547.90	264	035822-46-9
264	METHYL PARATHION	545.83	265	000298-00-0
265	PENTAERYTHRITOL TETRANITRATE	545.59	266	000078-11-5
266	1,3-DICHLOROPROPENE, TRANS-	543.37	267	010061-02-6
267	BIS(2-ETHYLHEXYL)ADIPATE	540.20	268	000103-23-1
268	CARBAZOLE	534.52	269	000086-74-8
269	METHYL ISOBUTYL KETONE	533.24	271	000108-10-1
270	1,2-DICHLOROETHENE, CIS-	533.15	270	000156-59-2
271	STYRENE	532.70	272	000100-42-5
272	CARBARYL	530.98	273	000063-25-2
273	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	529.45	274	067562-39-4
274	ACRYLONITRILE	528.28	275	000107-13-1
275	1-METHYLNAPHTHALENE	526.51	NEW	

Substances were assigned the same rank when two (or more) substances received equivalent total point scores.

CAS #= Chemical Abstracts Service Registry Number

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