109-15 72nd Road

Forest Hills, NEW YORK

Remedial Action Work Plan

NYC VCP Project Number 15CVCP159QQ
OER Project Number 15EHAN519Q

Prepared For:
East Broadway Real Estate Holdings LLC

109-15 72nd Road

Forest Hills, NY 11375

Prepared By:
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SEPTEMBER 2015

REMEDIAL ACTION WORK PLAN
TABLE OF CONTENTS

FIGURES

APPENDICES

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, Andrew R. Levenbaum, 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 109-15 72nd Road, Forest Hills site, site number 15CVCP159Q. 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.

_____
Name

_____
PE License Number

_____
Signature

_____
Date

PE Stamp

I, Paul P. Stewart, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 109-15 72nd Road, Forest Hills site, site number 15CVCP159Q. 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.

_____
QEP Name

_____
QEP Signature

_____
Date

EXECUTIVE SUMMARY

East Broadway Real Estate Holdings LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 6,920-square foot site located at 109-15 72nd Road in Forest Hills, 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 109-15 72nd Road in the Forest Hills section in Queens, New York and is identified as Block 3258 and Lot 20 on the New York City Tax Map. Figure 1 shows the Site location. The Site is a 6,920-square feet and is bounded by a three-story commercial building to the north, a seven-story mixed use building with a dry cleaner to the south, 72nd Road followed by a three and four story church to the east, and a four story commercial to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is vacant and contains a three-story, 1,520 square foot building, and one-story garage. The most recent use of the property was as a mixed-use apartment building with three commercial units, formerly occupied by a doctor's office and ECG Business Services.

Summary of Redevelopment Plan

The proposed future use of the Site will consist of a seven story mixed-use commercial and residential building. The development will include a full build-out of the property with a cellar. Layout of the proposed site development is presented in Appendix 1. The current zoning designation is C4-4A commercial. The proposed use is consistent with existing zoning for the property.

The proposed redevelopment will consist of a full build-out of the property with a full cellar to a depth of approximately 11 feet below ground surface (bgs). The development will involve

excavation to 11 feet across the entire site and 15 feet for the elevator pit. The cellar will be utilized for a total of 12 parking spaces, meter rooms, trash compactor rooms and an elevator. The first floor will be utilized as a retail store and residential lobby. Floors 2 through 7 will be utilized as residential living space (24 units). The current buildings will have to be demolished and the entire site will need to be excavated. Approximately 2,000 tons of soil will be excavated to allow for cellar parking. Groundwater is estimated in excess of 60 feet bgs in the area of the site. Therefore, dewatering is unlikely to be necessary during construction activities.

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

Summary of Surrounding Property

The site is located at 109-15 72nd Road in the Forest Hills section of Queens. The surrounding area consists of commercial and residential buildings. The zoning for the area is C4-4A for commercial properties. There are no sensitive receptors such as schools, hospitals or day care facilities within a 500-foot radius of the site. Our Lady Queen of Martyrs Church is located adjacent to the site on the eastern side at the address 110-6 Queens Boulevard, Forest Hills, NY.

Figure 3 shows the surrounding land usage.

Summary of Past Site Uses and Areas of Concern

Advanced Cleanup Technologies (ACT) completed a Phase I Environment Site Assessment (ESA) on April 27th, 2015. Historical fire insurance maps indicate the subject property as undeveloped land until 1914 when a three-story residential building was constructed. The property remained the same through 2006. Building department records indicate the building was constructed in 1930 and is classified as an O8 office building. A Certificate of Occupancy from May 12th, 1978 lists the three-story building as a mixed-use apartment occupied by offices. ACT indicated the following Recognized Environmental Condition (REC):

- An e-designation for hazardous materials, air quality and noise at the subject property.

The AOCs identified for this site include:

1. Suspect floor drain located in the existing garage.

Summary of Work Performed under the Remedial Investigation

East Broadway Real Estate Holdings LLC performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed 6 soil borings across the entire project Site, and collected ten soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed four soil vapor probes around Site perimeter and collected four samples for chemical analysis.

Summary of Findings of Remedial Investigation

1. The site is approximately 73 feet above sea level.
2. Groundwater was not encountered during the scope of this investigation and is located in excess of 60' bgs. Due to limited site clearance, drill equipment capable of obtaining groundwater samples at a depth of 60' bgs is too large to fit on the site with the existing building
3. Groundwater flow is generally believed to occur from south to north beneath the Site.
4. Bedrock was not encountered during the investigation.
5. The stratigraphy of the site, from the surface down, consists of 1 foot of fill materials underlain by 15 feet of orange-brown fine to very coarse sand mixed with silt and pebbles.
6. Soil/fill samples collected during the RI were compared to NYSDEC Part 375-6.8 Unrestricted Use Soil Cleanup Objective (Track 1) and Restricted Residential Use (Track 2) Soil Cleanup Objectives (SCOs). Soil sampling showed that no VOCs, PCBs or metals were detected above Unrestricted Use SCOs. Trace levels of acetone was detected in in all samples and below Unrestricted Use SCOs. SVOCs consisting of Polycyclic Aromatic Hydrocardbons (PAHs) were detected with benzo(k)fluoranthene (max of 809 µg/kg) exceeding Track 1 Unrestricted Use SCOs in one shallow soil sample. All other SVOCs were below Unrestricted Use SCOs. Two pesticides including 4,4'-DDE (max of

23.3 µg/kg) and 4,4'-DDT (max of 7.95 µg/kg) were detected above their respective Unrestricted Use SCOs in one shallow sample. The majority of soil contamination is restricted to shallow soils and is indicative of historic fill materials. None of the VOCs, SVOCs, Pesticide, PCBs and metals exceeded Restricted Residential Use SCOs.

7. Soil vapor samples collected during the RI were compared to the compounds by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor samples collected during the subsurface investigation showed all four samples contained low levels of petroleum and chlorinated VOCs. All of the detected compounds were below their respective guidance values, with the exception of the chlorinated VOC Tetrachloroethylene (PCE). PCE was identified in all soil vapor samples, with one of the soil vapor samples at a maximum concentration of 46 µg/m^3, which exceeds the NYSDOH guidance value of 30 µg/m^3. Petroleum related compounds (BTEX) were detected at a maximum concentration of 2,820 µg/m^3. Highest concentrations of all compounds were detected in the SV-2 location. Most compounds were detected at less than 20 µg/m^3. Highest levels were detected for toluene (maximum of 1,500 µg/m^3) and m&p-xylenes (maximum of 720 µg/m^3). Trichloroethylene (TCE), 1,1,1-Trichloroethane (TCA) and carbon tetrachloride were not detected in any soil vapor samples.

Summary of the Remedial Action

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

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.

2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Selection of NYSDEC Part 375 Section 6.8 Unrestricted Use (Track 1) 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 Unrestricted Use (Track 1) SCOs.:
   The proposed development consists of a full build out of the property. About 80%of the property will be excavated to a depth of approximately 11 feet below grade for development purposes. The remaining 20% of the site already contains a basement and will be included in the future cellar level. A small portion of property will be excavated to the depth of approximately 15 feet below grade for an elevator pit. Approximately 2,000 tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, 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 Track 1 SCOs.
12. 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.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and lists any changes from this RAWP.

If Track 1 Unrestricted Use SCOs are not achieved, the following construction elements implemented as part of new development will constitute Engineering and Institutional Controls:

15. As part of development, construction of an engineered composite cover consisting of a six-inch thick concrete building slab and ramp, a five-inch thick concrete sidewalk with a seven-inch thick concrete driveway and sixteen-inch thick concrete foundation walls. The proposed construction consists of a full build out of the property and no landscaped areas.
16. As part of development, installation of a vapor barrier system beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. The vapor barrier system will consist of a 20-mil vapor barrier by Raven Industries' VaporBlock 20 Plus below the slab throughout the full building area and a 20-mil Raven Industries' VaporBlock 20 Plus outside all sub-grade foundation sidewalls. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration.
17. As part of new development, construction and operation of a cellar parking garage with high volume air exchange in conformance with NYC Building Code.
18. If Track 1 Unrestricted SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

19. If Track 1 Unrestricted SCOs are not achieved, the property will continue to be registered with an E-Designation by the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

The 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: 109-15 72nd Road, Forest Hills, NY 11375
- NYC Voluntary Cleanup Program Project Number: 15CVCP159QQ

Project Contacts:

- OER Project Manager: Katherine Glass, 212-788-8841
- Site Project Manager: Paul P. Stewart, 516-441-5800 x 103
- Site Safety Officer: Yisong Yang, 718-508-2970
- Online Document Repository: http://www.nyc.gov/html/oer/html/document-repository/document-repository.shtml

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

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

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

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

Site Safety Coordinator: This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of this Community Protection Statement.

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

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

Odor, Dust and Noise Control: This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with applicable NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

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

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

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

issued by that agency. For this cleanup project, the hours of operation will conform to requirements of the NYC Department of Buildings.

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

Complaint Management: The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager or the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

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

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

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

Stockpile Management: Soil stockpiles will be kept covered with tarps to prevent dust, odor and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be

promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed, to protect storm water catch basins and other discharge points.

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

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

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

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

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

Final Report: The results of all cleanup work will be fully documented in a final report (called the Remedial Action Report) that will be available for public review online. A link to the online document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document

Long-Term Site Management: If long-term protection is needed after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are 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

East Broadway Real Estate Holdings LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program and/or in the "E" Designation Program to investigate and remediate a property located at 109-15 72nd Road in the Forest Hills section of Queens, New York (the "Site"). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, 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 109-15 72nd Road in the Forest Hills section in Queens, New York and is identified as Block 3258 and Lot 20 on the New York City Tax Map. Figure 1 shows the Site location. The Site is a 6,920-square feet and is bounded by a three-story commercial building to the north, a seven-story mixed use building with a dry cleaner to the south, 72nd Road followed by a three and four story church to the east, and a four story commercial to the west. A map of the site boundary is shown in Figure 2. Currently, the Site is vacant and contains a three-story, 1,520 square foot building, and one-story garage. The most recent use of the property was as a mixed-use apartment building with three commercial units, formerly occupied by a doctor's office and ECG Business Services.

1.2 Redevelopment Plan

The proposed future use of the Site will consist of a seven story mixed-use commercial and residential building. The development will include a full build-out of the property with a cellar. Layout of the proposed site development is presented in Appendix 1. The current zoning

designation is C4-4A commercial. The proposed use is consistent with existing zoning for the property.

The proposed redevelopment will consist of a full build-out of the property with a full cellar to a depth of approximately 11 feet below ground surface (bgs). The development will involve excavation to 11 feet across the entire site and 15 feet for the elevator pit. The cellar will be utilized for a total of 12 parking spaces, meter rooms, trash compactor rooms and an elevator. The first floor will be utilized as a retail store and residential lobby. Floors 2 through 7 will be utilized as residential living space (24 units). The current buildings will have to be demolished and the entire site will need to be excavated. Approximately 2,000 tons of soil will be excavated to allow for cellar parking. Groundwater is estimated in excess of 60 feet bgs in the area of the site. Therefore, dewatering is unlikely to be necessary during construction activities.

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

1.3 Description of Surrounding Property

The site is located at 109-15 72nd Road in the Forest Hills section of Queens. The surrounding area consists of commercial and residential buildings. The zoning for the area is C4-4A for commercial properties. There are no sensitive receptors such as schools, hospitals or day care facilities within a 500-foot radius of the site. Our Lady Queen of Martyrs Church is located adjacent to the site on the eastern side at the address 110-6 Queens Boulevard, Forest Hills, NY.

Figure 3 shows the surrounding land usage.

1.4 Summary of Past Site Uses and Areas of Concern

Advanced Cleanup Technologies (ACT) completed a Phase I Environment Site Assessment (ESA) on April 27th, 2015. Historical fire insurance maps indicate the subject property as undeveloped land until 1914 when a three-story residential building was constructed. The property remained the same through 2006. Building department records indicate the building was constructed in 1930 and is classified as an O8 office building. A Certificate of Occupancy from

May 12th, 1978 lists the three-story building as a mixed-use apartment occupied by offices. ACT indicated the following Recognized Environmental Condition (REC):

- An e-designation for hazardous materials, air quality and noise at the subject property.

The AOCs identified for this site include:

1. Suspect floor drain located in the existing garage.

1.5 Summary of Work Performed under the Remedial Investigation

East Broadway Real Estate Holdings LLC performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed 6 soil borings across the entire project Site, and collected ten soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed four soil vapor probes around Site perimeter and collected four samples for chemical analysis.

1.6 Summary of Findings of Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called "Remedial Investigation Report, 109-15 72nd Road, Forest Hills, NY", dated May 2015 (RIR).

1. The site is approximately 73 feet above sea level.
2. Groundwater was not encountered during the scope of this investigation and is located in excess of 60' bgs. Due to limited site clearance, drill equipment capable of obtaining groundwater samples at a depth of 60' bgs is too large to fit on the site with the existing building
3. Groundwater flow is generally believed to occur from south to north beneath the Site.
4. Bedrock was not encountered during the investigation.

5. The stratigraphy of the site, from the surface down, consists of 1 foot of fill materials underlain by 15 feet of orange-brown fine to very coarse sand mixed with silt and pebbles.

6. Soil/fill samples collected during the RI were compared to NYSDEC Part 375-6.8 Unrestricted Use Soil Cleanup Objective (Track 1) and Restricted Commercial Use (Track 2) Soil Cleanup Objectives (SCOs). Soil sampling showed that no VOCs, PCBs or metals were detected above Unrestricted Use SCOs. Trace levels of acetone was detected in in all samples and below Unrestricted Use SCOs. SVOCs consisting of Polycyclic Aromatic Hydrocardbons (PAHs) were detected with benzo(k)fluoranthene (max of 809 µg/kg) exceeding Track 1 Unrestricted Use SCOs in one shallow soil sample. All other SVOCs were below Unrestricted Use SCOs. Two pesticides including 4,4'-DDE (max of 23.3 µg/kg) and 4,4'-DDT (max of 7.95 µg/kg) were detected above their respective Unrestricted Use SCOs in one shallow sample. The majority of soil contamination is restricted to shallow soils and is indicative of historic fill materials. None of the VOCs, SVOCs, Pesticide, PCBs and metals exceeded Restricted Commercial Use SCOs.

7. Soil vapor samples collected during the RI were compared to the compounds by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor samples collected during the subsurface investigation showed all four samples contained low levels of petroleum and chlorinated VOCs. All of the detected compounds were below their respective guidance values, with the exception of the chlorinated VOC Tetrachloroethylene (PCE). PCE was identified in all soil vapor samples, with one of the soil vapor samples at a maximum concentration of 46 µg/m^3, which exceeds the NYSDOH guidance value of 30 µg/m^3. Petroleum related compounds (BTEX) were detected at a maximum concentration of 2,820 µg/m^3. Highest concentrations of all compounds were detected in the SV-2 location. Most compounds were detected at less than 20 µg/m^3. Highest levels were detected for toluene (maximum of 1,500 µg/m^3) and m&p-xylenes (maximum of 720 µg/m^3). Trichloroethylene (TCE), 1,1,1-Trichloroethane (TCA) and carbon tetrachloride were not detected in any soil vapor samples.

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

2.0 Remedial Action Objectives

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

Soil

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

Groundwater

- Remove contaminant sources causing impact to groundwater.

Soil Vapor

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

3.0 Remedial Alternatives Analysis

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

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

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

Alternative 1:

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

excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 1 Unrestricted Use SCOs.

- No Engineering or Institutional Controls are required for a Track 1 cleanup., however a vapor barrier system would be installed beneath the building and up along sidewalls to grade to prevent potential exposures from soil vapor in the future; and
- A sub-grade ventilated parking garage would be installed and operated per requirements of Building department.

Alternative 2:

- Establishment of Track 4 Site-Specific SCOs;
- Removal of all soil/fill exceeding Track 4 Site-specific SCOs and confirmation that Track 4 Site-specific SCOs have been achieved with post-excavation end point sampling. Based on the results of the Remedial Investigation, it is expected that SCOs would be achieved by excavating for construction of the new building's cellar level to a depth of approximately 11 feet across the entire Site. If soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation, additional excavation would be performed to meet Track 4 Site-Specific SCOs.
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a vapor barrier system beneath the building slab and along foundation side walls to prevent potential exposures from soil vapor;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were intended. The SMP will note that the property owner and property owner’s successors and assigns must comply with the approved SMP; and

- The property will continue to be registered with an E-Designation at the NYC Buildings Department.

3.1 Threshold Criteria

Protection of Public Health and the Environment

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

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

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

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil/Materials Management Plan, and Community Air Monitoring Plan (CAMP).

Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier below the building slab and outside foundations walls below grade.

3.2 Balancing Criteria

Compliance with Standards, Criteria and Guidance (SCGs)

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

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCO's and Protection of Groundwater SCO's. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls, as part of development. In addition, the cellar of the building will contain a 12-car parking garage with high volume air exchange that conforms to the NYC Building Code.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCG's and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCO's. Compliance with SCG's for soil vapor would also be achieved by installing a vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls. A Site Management Plan would ensure that these controls remained protective for the long term. In addition, the cellar of the building will contain a 12-car parking garage with high volume air exchange that conforms to the NYC Building Code and will mediate any potential accumulation of soil vapors inside the building.

Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) will be implemented during Site redevelopment under this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action

would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-Term Effectiveness and Impacts

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

Both Alternative 1 and 2 have similar short-term effectiveness during their implementation, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short-term impacts could potentially be higher for Alternative 1 since excavation of greater amounts of historical fill material would take place. However, focused attention to means and methods during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.
An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flag persons will be used to protect pedestrians at Site entrances and exits.

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

protection from on-Site contaminants by using personal protective equipment would be worn consistent with the documented risks within the respective work zones.

Long-term effectiveness and permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of Engineering Controls/Institutional Controls (ECs/ICs) that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of ECs.

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

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

Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that

are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

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

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

Alternative 1 would remove a greater total mass of contaminants from the Site. The removal of soil to 11 feet for the new development in both scenarios would lessen the difference in contaminant mass removal between these two alternatives.

Implementability

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

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

Cost effectiveness

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

Since historic fill at the Site was found to extend to a depth of up to 4 feet below grade during the RI, and the new building requires excavation of the entire Site to a depth of 11 feet, the costs associated with both Alternative 1 and Alternative 2 will likely be comparable. Costs associated with Alternative 1 could potentially be 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 mixed use building to provide 24 dwelling units and retail establishments 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 are urban and consist of predominantly mixed residential and commercial buildings in zoning districts designated for commercial and residential uses. The development would remediate a vacant contaminated lot and provide a modern residential building. The proposed development would clean up the property and make it safer, create new employment opportunities, 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 PlanNYC: 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 1, the Track 1 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. Selection of NYSDEC Part 375 Section 6.8 Unrestricted Use (Track 1) 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 Unrestricted Use (Track 1) SCOs.:
   The proposed development consists of a full build out of the property. About 80%of the property will be excavated to a depth of approximately 11 feet below grade for development purposes. The remaining 20% of the site already contains a basement and will be included in the future cellar level. A small portion of property will be excavated to the depth of approximately 15 feet below grade for an elevator pit. Approximately 2,000 tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.

7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, 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 Track 1 SCOs.
12. 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.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Submission of a Remedial Action Report (RAR) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and lists any changes from this RAWP.

If Track 1 Unrestricted Use SCOs are not achieved, the following construction elements implemented as part of new development will constitute Engineering and Institutional Controls:

15. As part of development, construction of an engineered composite cover consisting of a six-inch thick concrete building slab and ramp, a five-inch thick concrete sidewalk with a seven-inch thick concrete driveway and sixteen-inch thick concrete foundation walls. The proposed construction consists of a full build out of the property and no landscaped areas.

16. As part of development, installation of a vapor barrier system beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. The vapor barrier system will consist of a 20-mil vapor barrier by Raven Industries' VaporBlock 20 Plus below the slab throughout the full building area and a 20-mil Raven Industries' VaporBlock 20 Plus outside all sub-grade foundation sidewalls. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration.
17. As part of new development, construction and operation of a cellar parking garage with high volume air exchange in conformance with NYC Building Code.
18. If Track 1 Unrestricted SCOs are not achieved, submission of an approved Site Management Plan (SMP) in the RAR for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
19. If Track 1 Unrestricted SCOs are not achieved, the property will continue to be registered with an E-Designation by the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 Soil Cleanup Objectives and Soil/ Fill Management

Track 1 SCOs are proposed for this project and SCO's are defined in 6 NYCRR Part 375, Table 6.8(a) Track 1 Unrestricted Use. If Track 1 SCO's are not achieved, the following will be Track 4 Site-Specific SCO's:

Contaminant	**Site-Specific SCO's**
Total SVOCs	250 ppm

Lead	800 ppm
Mercury	1.5 ppm
Barium	600 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

The entire footprint of the property is expected to be excavated to a depth of 11 feet bgs. The total quantity of soil/fill expected to be excavated and disposed off-Site is approximately 2,000 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 confirmation end-point soil sampling. A total of 5 confirmation samples will be collected from the base of the excavation at locations to be determined by OER. To evaluate attainment of Track 1 SCOs, soil samples will be analyzed for VOCs, SVOCs, pesticides, PCBs and metals according to analytical methods described above.

Quality Assurance/Quality Control

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

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

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

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

- Gently tap or scrape to remove adhered soil
- Rinse with tap water

- Wash with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

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

Import of Soils

Soil import is not planned on this project.

Reuse of Onsite Soils

Soil reuse is not planned on this project.

4.3 Engineering Controls

The remedial action will achieve Track 1 Unrestricted Use SCOs and no Engineering Controls are required. However, the following design elements will be incorporated into the project as part of the development:

(1) Composite Cover System
(2) Soil Vapor Barrier System

If Track 1 is not achieved, these elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

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 :

- Sixteen-inch thick concrete foundation walls;
- Five-inch thick concrete sidewalks and seven-inch thick concrete driveway;
- Six-inch thick concrete cellar slab and ramp;

Figure 5 shows the typical design for each remedial cover type used on this Site.

The composite cover system will be a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the Remedial Action Report.

Vapor Barrier System

Migration of soil vapor from onsite or offsite sources into the building will be mitigated with a combination of building slab and vapor barrier. The vapor barrier will consist of Raven Industries® VaporBlock Plus™ VBP20, which is a seven-layer co-extruded barrier made from polyethylene and EVOH resins. The vapor barrier will extend throughout the area occupied by the footprint of the new building and up the foundation sidewalls and will be installed in accordance with manufacturer specifications.

A plan view showing the location of the proposed vapor barrier system is provided in Figure 6. Typical design sections for the vapor barrier on slab and sidewalls are provided in Appendix 1. Product specification sheets are provided in Appendix 5. The Remedial Action Report will include as-built drawings and diagrams; manufacturer documentation; and photographs.

The Remedial Action Report will include a PE-certified letter (on company letterhead) from the primary contractor responsible for installation oversight and field inspections and a copy of the manufacturer's certificate of warranty.

4.4 Institutional Controls

A Track 1 remedial action is proposed and Institutional Controls are not required. If a Track 1 remedial action is not achieved, Institutional Controls (IC's) will be incorporated in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. 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 mixed-use, residential and commercial building, and will not be used for a higher level of use without prior approval by OER.

4.5 Site Management Plan

A Track 1 remedial action is proposed and Site Management is not required. If a Track 1 remedial action is not achieved, Site Management will be required and will be the last phase of remediation. Site Management will begin 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: Fill material was detected in shallow soils to de[pths of one foot below grade. Several SVOCs and pesticides were detected, but no compounds were detected above Track 2 Restricted Residential SCOs. Petroleum related BTEX were detected in soil vapor at elevated levels. PCE was the only VOC detected above its NYS DOH guideline of 30 $\mu g/m^3$ with a concentration of 46 $\mu g/m^3$ in one sample.

Nature, Extent, Fate and Transport of Contaminants

Soil: The majority of contaminates detected were found in the shallow soils located beneath the asphalt parking lot and driveway. Groundwater is located in excess of 60 feet bgs at the property and migration of contaminants is not a concern.

Soil Vapor: Soil vapor contained low levels of petroleum and chlorinated VOCs. No VOCs were detected at concentrations indicating the site as a source of vapors and are therefore likely due to the urban area that the site is located in. The contaminants are unlikely to be volatilizing from groundwater due to the depth below ground surface.

Receptor Populations

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

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

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

Potential Routes of Exposure

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

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

Potential Exposure Points

Current Conditions: The site is currently capped with asphalt there are no potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill. Groundwater is not exposed at the site. The site is served by the public water supply and groundwater is not used at the site for potable supply and there is no potential for exposure. The site is currently improved with a 2.5 story building and 1-story garage. Vapors may be accumulating in the cellar, however the building is vacant and locked.

Construction/ Remediation Conditions: During the remedial action, onsite workers will come into direct contact with surface and subsurface soils as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with exposed impacted soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. Due to the depth of groundwater, direct contact with groundwater is not expected. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan,

dust controls, and through the implementation of the Community Air-Monitoring Program and a Construction Health and Safety Plan.

Proposed Future Conditions: Under future remediated conditions, all soils in excess of Track 1 SCOs will be removed. The site will be fully capped, preventing potential direct exposure to soil and groundwater remaining in place, and protective systems (vapor barrier) 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, and a subsurface vapor barrier system 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 Yisong Yang (ACT) as the designated Site Safety Officer, Timothy Young (ACT) as the alternate Site Safety Officer and Theresa Burkard (ACT) as the Project Manager. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Andrew R. Levenbaum and Paul P. Stewart, respectively.

5.2 Site Security

Site access will be controlled through gated entrances and construction fencing.

5.3 Work Hours

The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. The hours of operation will be conveyed to OER during the pre-construction meeting.

5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in Appendix 6. The Site Safety Coordinator will be Yisong Yang. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, such as 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and will comply with all requirements of 29 CFR 1910.120. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the CHASP. That document will define the specific project contacts for use in case of emergency.

5.5 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

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

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring

particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

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

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

5.6 Agency Approvals

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

5.7 Site Preparation

Pre-Construction Meeting

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

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling

equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed 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; stormwater management systems will be inspected and

fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

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

5.8 Traffic Control

Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the Site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is shown on Figure 7.

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, [name], am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the [site name (address)] site, site number [VCP site number]. I certify to the following:

- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated [date] and Stipulations in a letter dated [date] were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

PE License Number

Signature

Date

PE Stamp

I, [name], am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the [site name (address)] site, site number [VCP site number]. I certify to the following:

- The OER-approved Remedial Action Work Plan dated August 15, 2012 and Stipulations in a letter dated September 10, 2014 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

Date

7.0 Schedule

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 24 month remediation period is anticipated.

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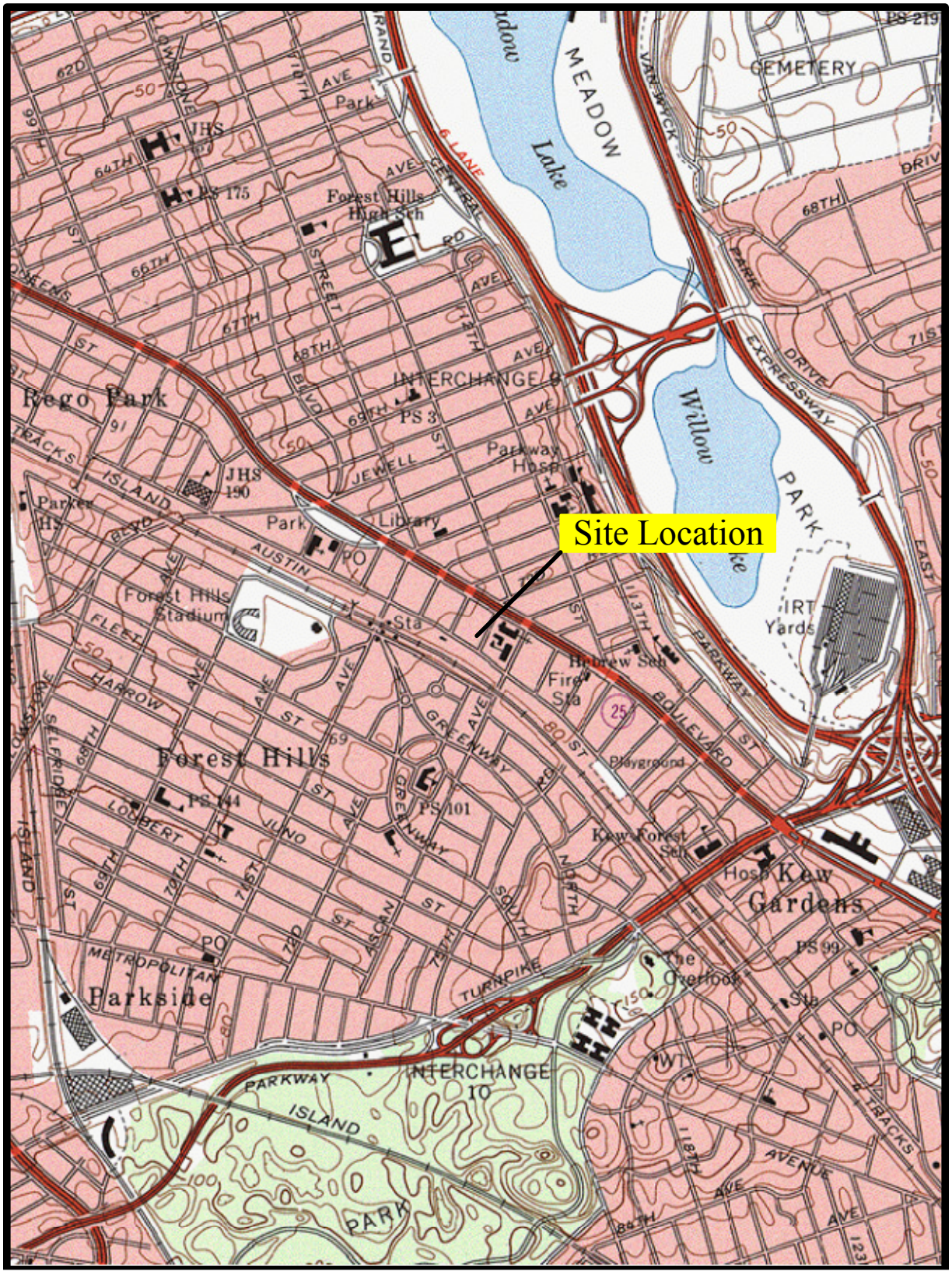
Schedule Milestone	**Weeks from Remedial Action Start**	**Duration (weeks)**
Mobilization	0	1
Remedial Excavation	1	6
Demobilization	8	2
Submit Remedial Action Report	10	3

Figure 1

Site Location



From USGS 7.5 Minute Topographic Map Of
Jamaica, NY Quadrangle

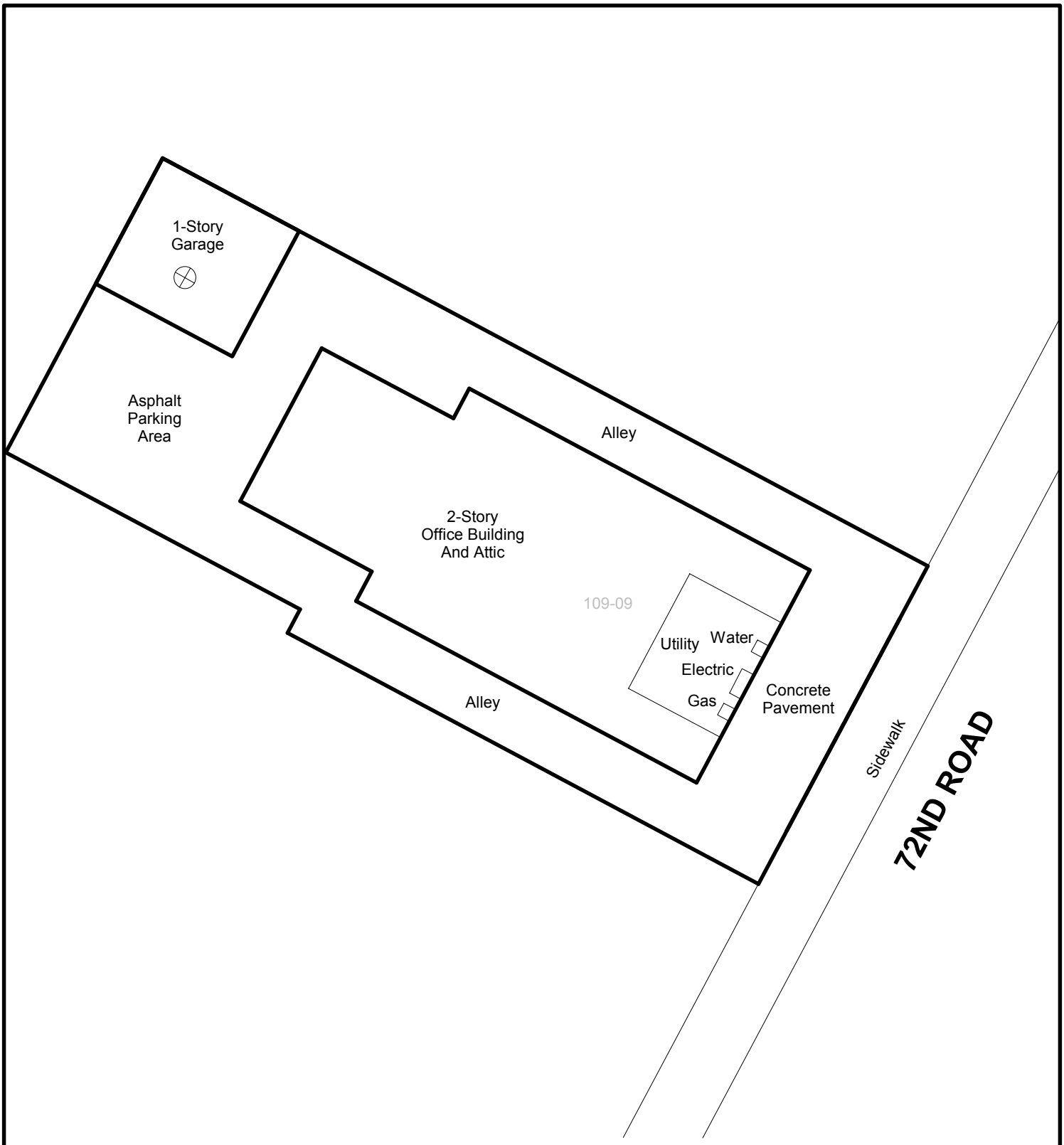
Locational Diagram

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS
110 Main Street, Suite 103, Port Washington, NY 11050
Tel: 516-441-5800 Fax: 516-441-5511

Project No.: 8212-FHNY	Figure No.: 1
Date: 04/06/2015	Scale: 1 inch = 2000 feet

Figure 2

Site Diagram



Legend

⊕ Floor Drain

N

Site Diagram

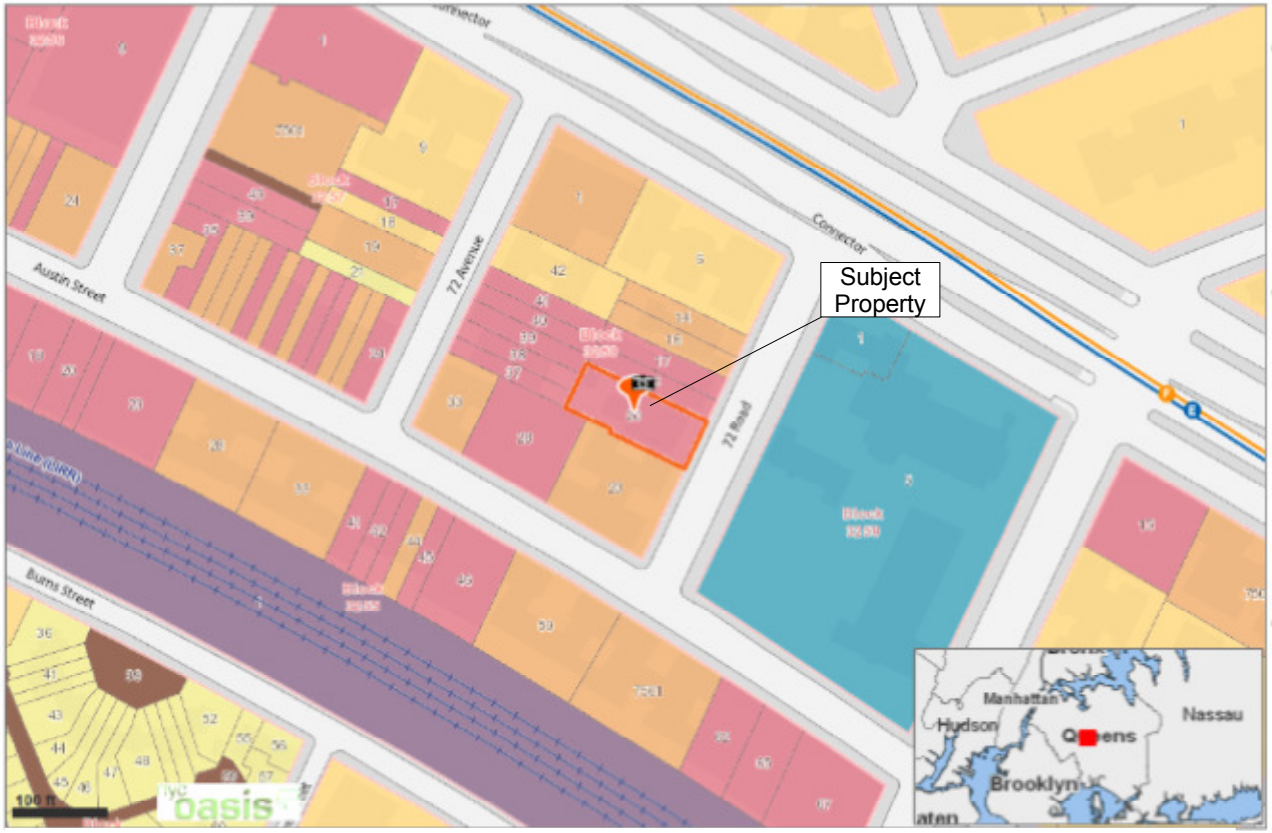
Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS
110 Main Street, Suite 103, Port Washington, New York 11050
Tel: 516-441-5800 Fax: 516-441-5511

Project No.:8212-FHNY	Figure No.: 2
Date: 04/06/2015	Scale: Not To Scale

Figure 3

Surrounding Land Use

Surrounding Land Use



Source: oasis.net

nyc oasis

Legend

Transit, Roads, Reference Features

Roads, ferries, commuter rail, neighborhood names

- Roads
- Major Roads
- Interstate Highways
- Tunnels
- Neighborhood/Town Labels
- County Boundaries
- Ferry
- Commuter Rail
- NYC subway routes and stations

Parks, Playgrounds, & Open Space

- Parks & Public Lands
- Forested Areas (NJ)
- Community Gardens
- School property with garden
- Playgrounds
- Green Spaces Along Streets
- Golf Courses
- Baseball/Soccer/Football Fields
- Tennis/Basketball/Handball Courts & Tracks
- Cemeteries

Land Use

Block/Lot Boundaries

(Building footprints in gray)

- 1 & 2 Family Residential
- Multi-family Residential
- Mixed Use
- Open space & outdoor recreation
- Commercial
- Institutions
- Industrial
- Parking
- Transportation / Utilities
- Vacant Lots

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

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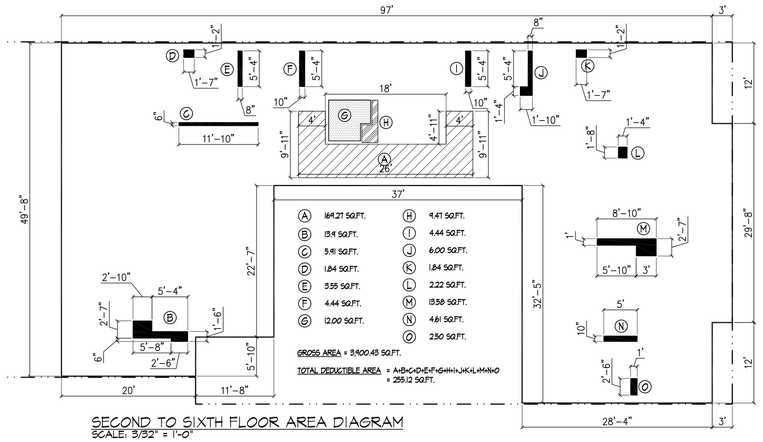
Surrounding Land Use Diagram

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS
110 Main Street, Suite 103, Port Washington, New York 11050
Tel: 516-441-5800 Fax: 516-441-5511

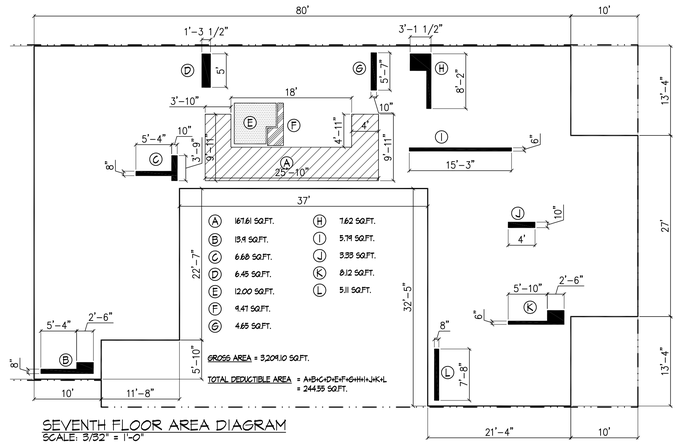
Project No.: 8212-FHNY	Figure No.: 4
Date: 04/27/2015	Scale: Not To Scale

Figure 4

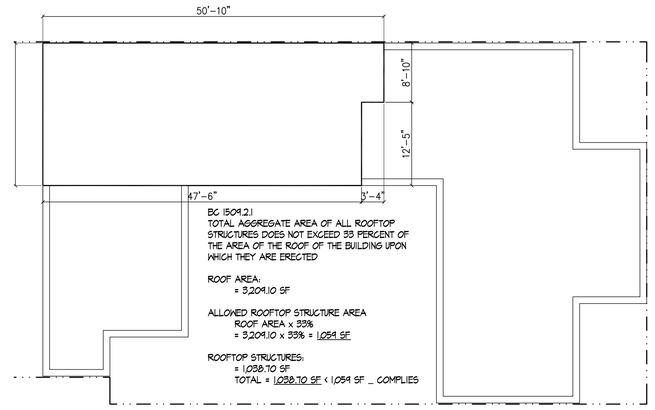
Soil Excavation Diagram



SECOND TO SIXTH FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



SEVENTH FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



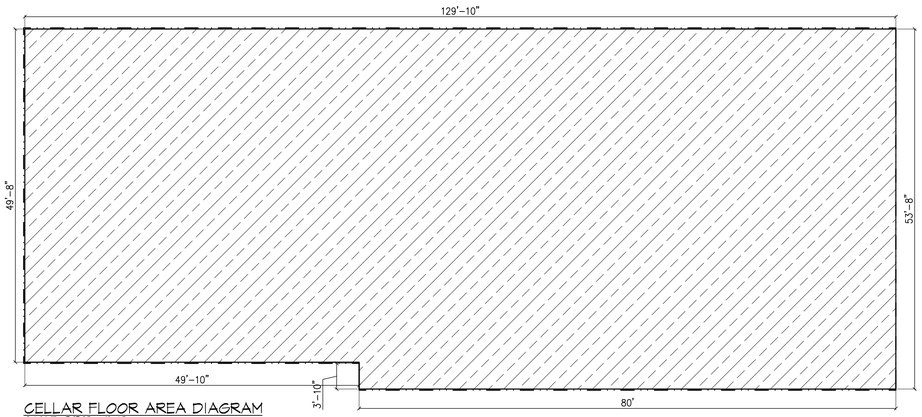
BC 1509.2.1
TOTAL AGGREGATE AREA OF ALL ROOFTOP STRUCTURES DOES NOT EXCEED 33 PERCENT OF THE AREA OF THE ROOF OF THE BUILDING UPON WHICH THEY ARE ERECTED

ROOF AREA:
= 3,209.10 SF

ALLOWED ROOFTOP STRUCTURE AREA
ROOF AREA x 33%
= 3,209.10 x 33% = 1,059 SF

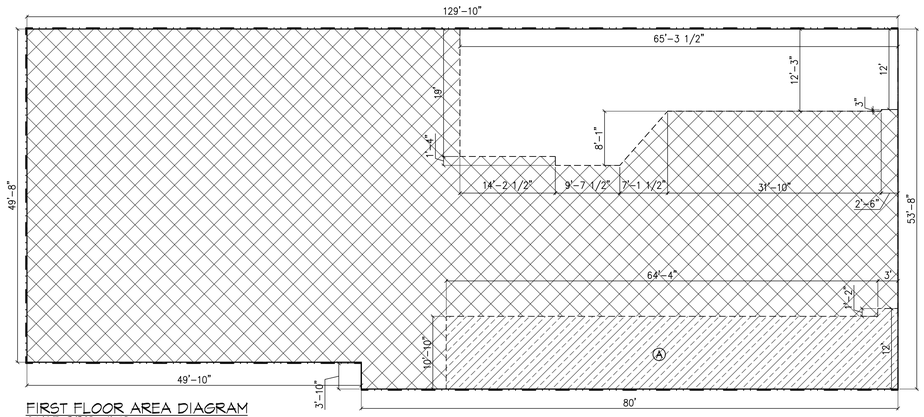
ROOFTOP STRUCTURES:
= 1,038.70 SF
TOTAL = 1,038.70 SF < 1,059 SF _ COMPLIES

ROOF FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



GROSS AREA = 6,768.38 SQ.FT.

CELLAR FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"

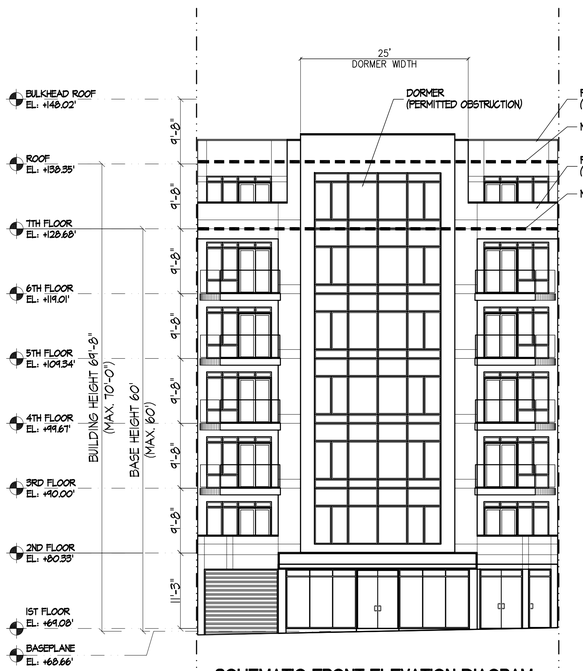


Ⓐ 732.44 SQ.FT.

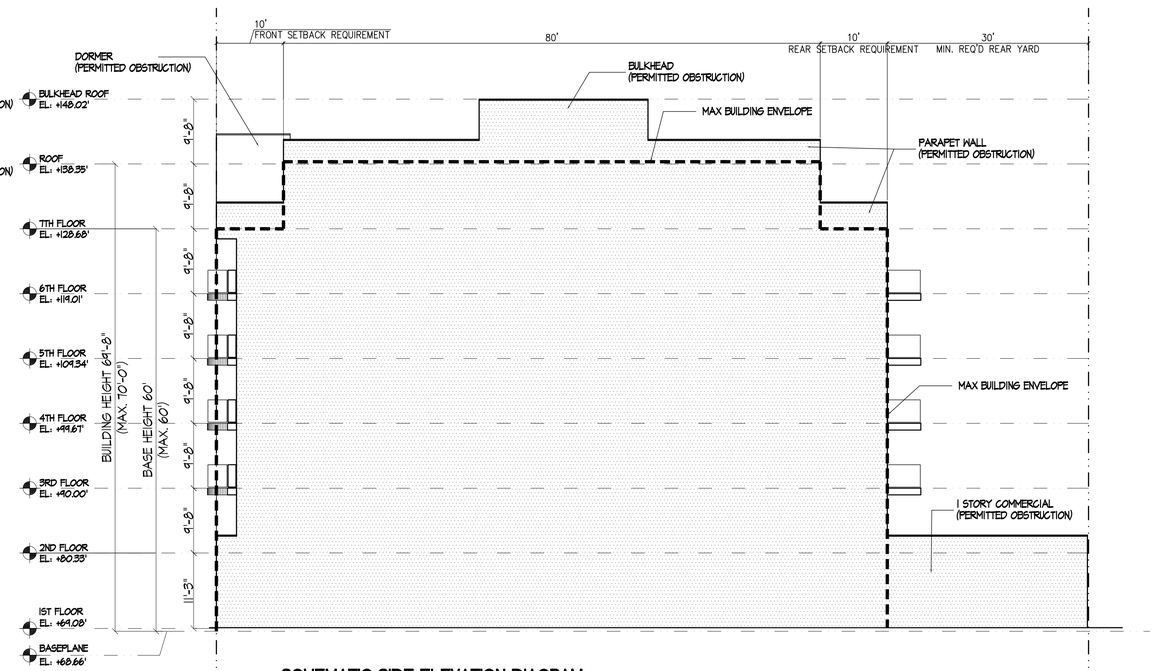
1ST FLOOR GROSS AREA = 6,768.38 SQ.FT.
COMMERCIAL GROSS AREA = 5,035.80 SQ.FT.
RESIDENTIAL GROSS AREA = 1,734.58 SQ.FT.

RESIDENTIAL TOTAL DEDUCTIBLE AREA = A
=732.44 SQ.FT.

FIRST FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



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



SCHEMATIC SIDE ELEVATION DIAGRAM
SCALE: 3/32"=1'-0"

LEGEND

- RESIDENTIAL AREA
- RESIDENTIAL HALLWAY 100% DEDUCTIBLE
- COMMERCIAL AREA
- MECHANICAL DEDUCTIBLE AREA
- PLUMBING CHASE DEDUCTIBLE AREA
- PARKING GARAGE , DRIVEWAY, + UTILITY AREA
- REFUGE STORAGE (MAX. 12 S.F. DEDUCTIBLE)

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

ZONING FLOOR AREA DIAGRAM, ZONING FLOOR AREA BREAK DOWN LEGEND

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

REGISTERED ARCHITECT
CHANG HWA TAN
026376
STATE OF NEW YORK

DRAWN BY: KT

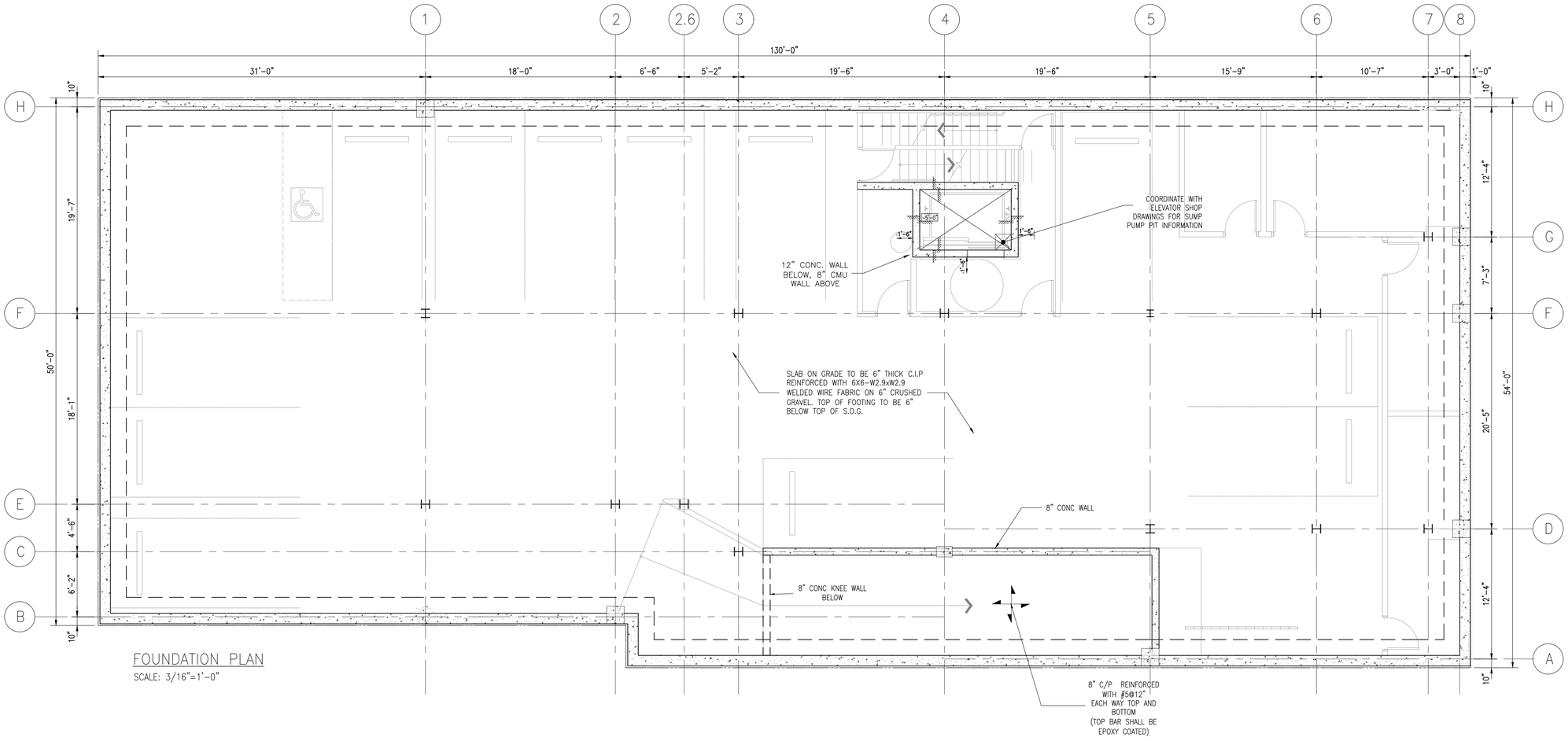
CHKD. BY: CT

DRAWING #:

Z-104.00

Figure 5

Composite Cover Diagram

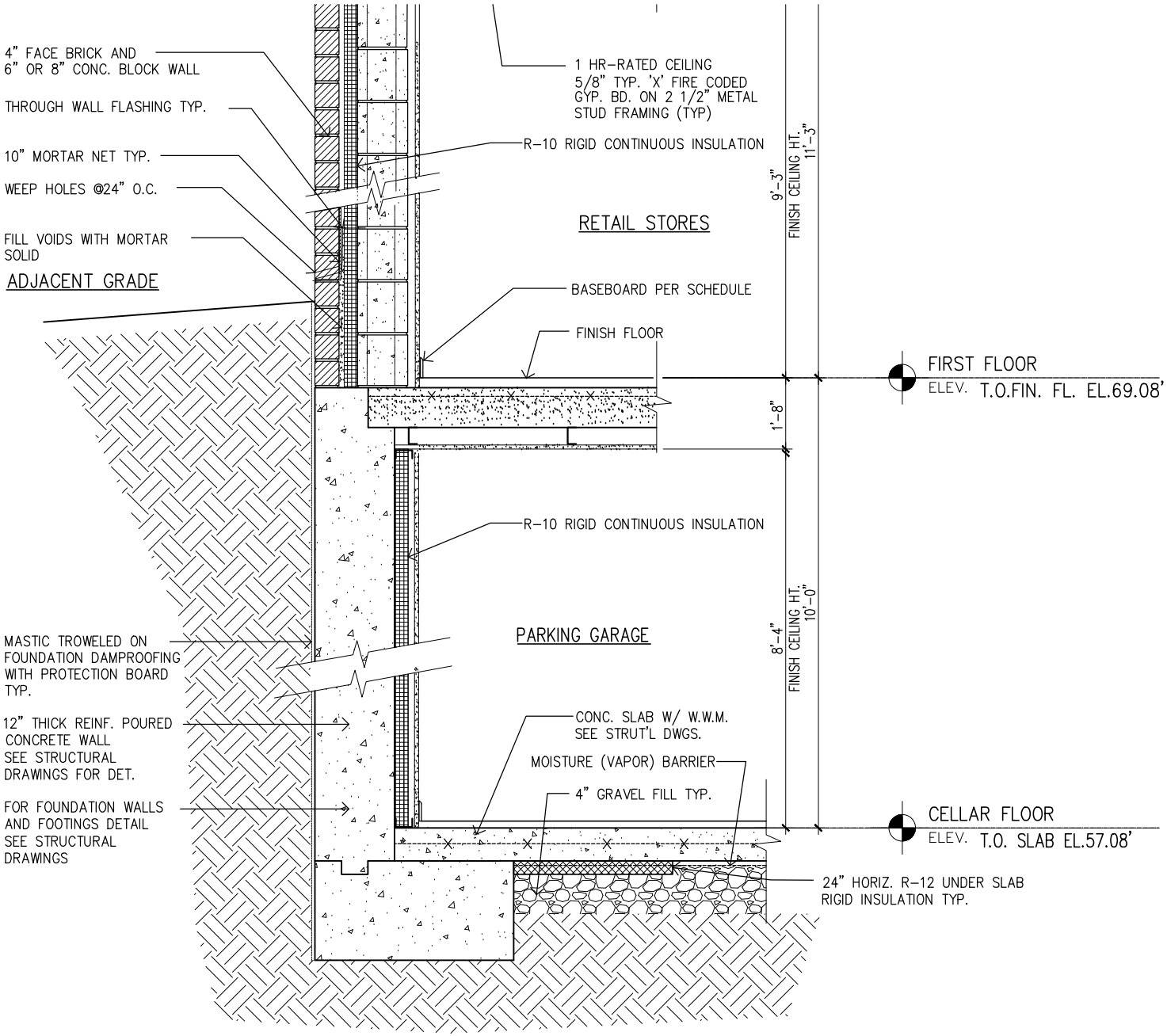


FOUNDATION PLAN

SCALE: 3/16"=1'-0"

Figure 6

Vapor Barrier Diagram



A
A-405

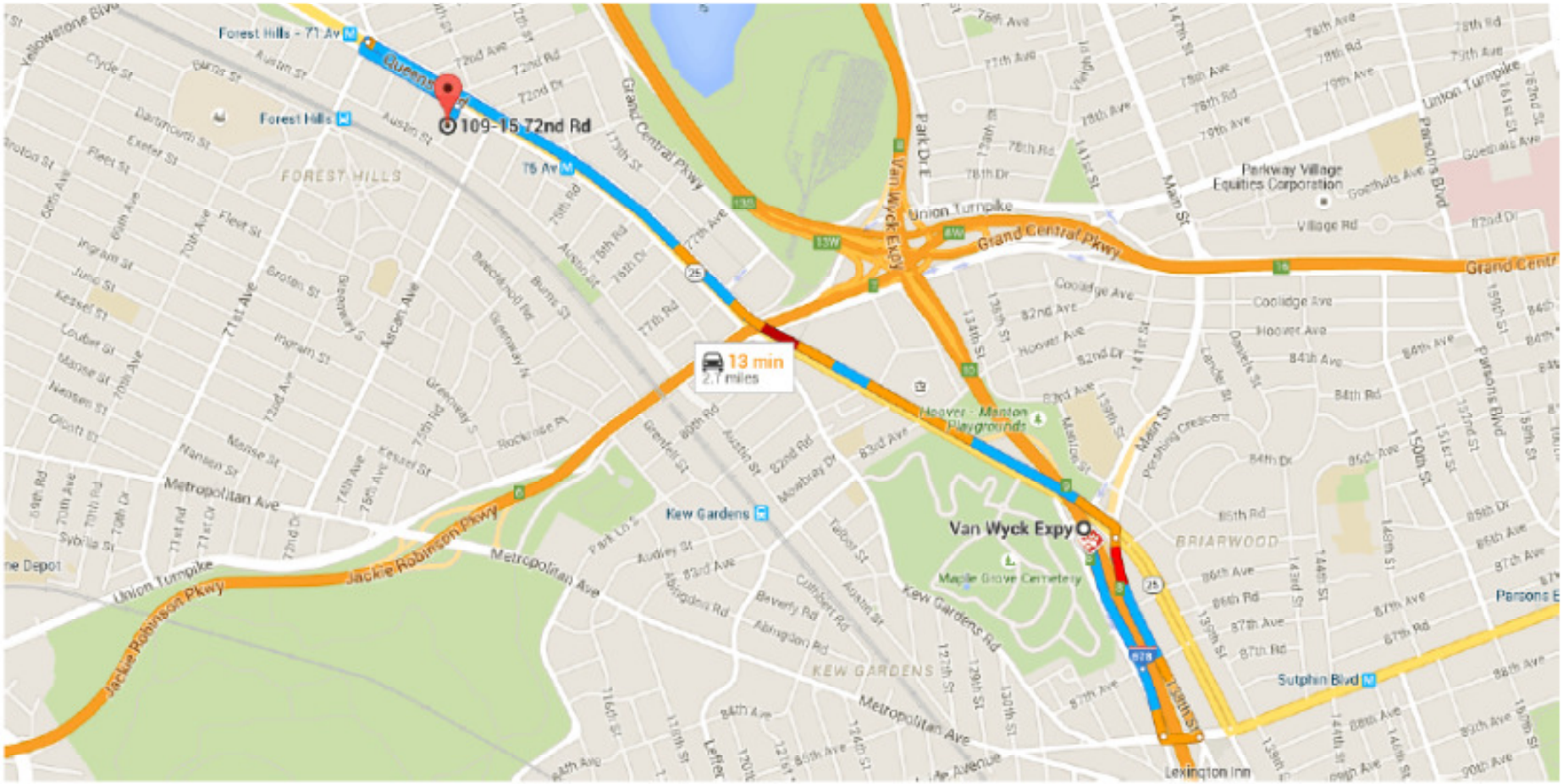
TYPICAL WALL SECTION AT SIDE WALLS

SCALE: 3/4"=1'-0"

Figure 7

Truck Route

Directions from **Van Wyck Expy** to **109-15 72nd Rd**



Source: Google Maps

N

Truck Route

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS
110 Main Street, Suite 103, Port Washington, New York 11050
Tel: 516-441-5800 Fax: 516-441-5511

Project No.: 8212-HFNY	Figure No.: 6
Date: 05/28/2015	Scale: Not To Scale

APPENDIX 1

PROPOSED DEVELOPMENT PLANS

GENERAL NOTES

- ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE NEW YORK CITY ADMINISTRATIVE BUILDING CODE, REFERENCE MEMORANDUMS, DIRECTIVES AND APPLICABLE SECTIONS OF THE NEW YORK STATE MULTIPLE DWELLING LAW AND THE HOUSING MAINTENANCE CODE OF THE CITY OF NEW YORK AND ALL OTHER STATE AND CITY AGENCIES, DEPARTMENTS OR AUTHORITIES HAVING JURISDICTION THEREOVER.
- DRAWINGS ARE NOT TO BE SCALED. USE DIMENSIONS ONLY. EACH CONTRACTOR SHALL BE HELD. RESPONSIBLE FOR HIS OWN WORK. ANY DISCREPANCIES IN THE CONTRACT DRAWINGS SHALL BE CALLED TO THE ATTENTION OF THE ARCHITECT BEFORE PROCEEDING WITH THE WORK ALL DIMENSIONS SHALL BE VERIFIED BEFORE STRATING WORK BY RESPECTIVE CONTRACTORS.
- ALL DIMENSIONS ARE NOMINAL. DIMENSIONS ARE GIVEN TO THE FACE OF CONCRETE OR MASONRY WALLS, ROUGH PARTITIONS, TO THE CENTER LINES OF STEEL COLUMNS AND TO THE FACE OF FINISH AT GYPSUM BOARD PARTITIONS. ELEVATIONS ARE GIVEN TO THE TOP OF FINISH FLOOR CUMULATIVE COORDINATES (FEET AND INCHES) ARE SHOWN ON PLANS THUSLY: (64'-2 1/2").
- SOIL CONDITIONS SHALL BE VERIFIED BY INSPECTION AFTER EXCAVATION AND REPORT OF INSPECTOR SHALL BE SUBMITTED.
- NO BACKFILLING SHALL BE DONE UNTIL THE EXCAVATION AND THE FOUNDATION WORK HAVE BEEN INSPECTED AND APPROVED BY THE BUILDING DEPARTMENT INSPECTOR, AND UNTIL THE SECOND TIER FLOOR STRUCTURE IS PLACED.
- SIZE AND LOCATION OF CONCRETE PADS FOR TANKS, PUMPS AND OTHER EQUIPMENT SHALL BE VERIFED WITH HEATING AND PLUMBING CONTRACTOR BEFORE PLACEMENT OF CONCRETE.
- HOUSE TRAPS BELOW FIRST FLOOR SHALL BE PROVIDED WITH CONCRETE TRAP PITS HAVING STEEL COVERS AND FRAMES.
- STRUCTURAL ENGINEER'S DRAWINGS, NOTES AND SPECIFICATIONS SHALL BE USED FOR ALL STRUCTURAL WORK.
- SOLID BEARING WALLS WILL BE CONSTRUCTED OF BLOCK OR AN ASSEMBLY OF BRICK AND BLOCK. BRICK AND BLOCK ASSEMBLY WILL CONSIST OF A FACING OF FOUR INCH BRICK DURAWALL BONDED TO THE EIGHT INCHES OF LOAD BEARING CONCRETE BLOCK. CONCRETE BLOCK, USED ALONE OR PART OF AN ASSEMBLY WILL BE IN ACCORDANCE WITH A.S.T.M C145, CURRENT EDITION, WITH MINIMUM COMPRESSIVE STRENGTH AS SPECIFIED, BONDING OF WALLS WILL BE AS PER RA 10-1 SECTION 7.
- BRICK SHELVES AT EXTERIOR FOUNDATION WALLS, UNLESS SPECIFICALLY SHOWN OTHERWISE SHALL BE MINIMUM 0'-8" BELOW GRADE. STEP SHELVES AS REQUIRED OR AS INDICATED ON THE DRAWINGS.
- ALL TOILET AND BATHROOM PARTITIONS TO BE OF APPROVED MOISTURE RESISTANT GYPSUM WALLBOARD B.S.A. CAL. NO. 486-34 SM. ON METAL STUDS.
- MINIMUM CLEAR STORY HEIGHT, FINISHED FLOOR TO FINISHED CEILING IN APARTMENTS WILL BE 8'-0" MINIMUM.
- STAIR ENCLOSURES SHALL BE CONSTRUCTED OF MATERIALS HAVING A FIRE RESTRICTIVE RATING OF 2 HOURS.
- SHAFT ENCLOSURES SHALL BE CONSTRUCTED OF MATERIALS HAVING A FIRE RESISTANCE RATING OF 1 OR 2 HOURS AS REQUIRED.
- ALL FURRED-OUT SPACES WILL BE CLOSED AT FLOORS AND ROOF WITH CONCRETE.
- FURRING AT PIPES AND SIMILAR PLACES, UNLESS OTHERWISE SHOWN, WILL BE DONE WITH 1 5/8" STEEL STUD SPACED 16" O.C. FACED WITH 5/8" DRYWALL.
- ALL FURRED-OUT SPACES AT PIPES WILL BE FIRE-STOPPED AT FLOOR AND ROOF SLAB WITH CONCRETE AT LEAST 4" THICK.
- WHERE FURRED-OUT SPACES ARE PROVIDED AT RATED PARTITONS, THEY WILL BE FIRE-STOPPED AT EACH TIER AND ENCLOSED WITH 5/8" GYPSUM WALLBOARD ON METAL STUDS IN LIEU OF DIRECT APPLICATION OF FINISH MATERIAL.
- ALL PLUMBING STACKS WILL BE CARRIED UP 6'-6" ABOVE FINISHED ROOF.
- CONDUIT IN FIRE-RATED PARTITIONS WILL NOT EXCEED 3/4" I.P.S. OUTLET BOXES IN SUCH PARTITIONS WILL BE BACKED UP WITH APPROVED MATERIALS.
- WHERE HEATING AND PLUMBING PIPES ARE CONCEALED IN HUNG OR FURRED CEILINGS, THESE CEILINGS SHALL NOT BE BUILT UNTIL THE HEATING AND PLUMBING LINES HAVE BEEN TESTED.
- CONTRACTOR SHALL NOTIFY ARCHITECT OF ALL CHASES WHERE PIPING, DUCTWORK, STRUCTURE, ETC. BREAKS BELOW FINISHED EXPOSED CEILING LINES INDICATED, PRIOR TO INSTALLATION, SOFFIT AROUND SUCH OBSTRUCTIONS WITH STEEL STUD FRAMING AND GYPSUM WALLBOARD.
- WHEREVER FLOOR DRAINS ARE LOCATED IN ROOMS, A HOSE BIBB OR THREADED FAUCET WILL BE PROVIDED WITHIN SUCH ROOM. SLOPE FLOOR TO DRAINS.
- ALL TOILETS AND APARTMENT BATHROOMS WILL HAVE CERAMIC TILE FLOORS WITH AT LEAST A 6" TILE BASE. THEY WILL BE PROVIDED WITH ELECTRIC LIGHT.
- ALL ALUMINUM SHALL BE NONCOMBUSTIBLE ALLOY NO. 6063-T5.
- ALL PAVED WALKS, SURFACES WILL BE DRAINED ADEQUATELY WITHIN THE SITE.
- WALKS OR OTHER SURFACES WILL NOT EXCEED PITCH OF 1" PER 5'-0" FOOT. WALKS AT BUILDING ENTRANCES TO HAVE GRADE OF 4%. SLOPE OF STREET SIDEWALKS WILL BE 1" PER 5'-0" SIDEWALKS TO BE PROVIDED WITH NON-SKID SURFACE.
- SIDEWALK CONSTRUCTION TO COMPLY WITH SPECIFICATIONS OF THE DEPARTMENT OF HIGHWAYS.
- FINAL SURVEY TO BE PROVIDED BY CONTRACTOR.
- HOPPER DOORS TO REFUSE CHUTES TO BE SELF-CLOSING AND SO CONSTUCTED SO AS NOT TO PROJECT INTO CHUTE. AREA OF SERVICE OPENING SHALL NOT BE MORE THAN 1/3 AREA OF CHUTE-RULE 2.
  REFUSE CHUTE TO EXTEND TO BOTTOM OF CEILING OF REFUSE ROOM OR LOWER, AND TO BE SUPPORTED ON 2-HR. FIRE-RESISTIVE CONSTRUCTION.
  PROVIDE FLOOR DRAINS AND HOSE BIBB FOR REFUSE ROOM AND AT LEAST TWO SPRINKLER HEADS ARRANGED AS PER RULE 5 AND OPERATED AS PER RULE 8 AND 10. FLOOR DRAINS TO COMPLY WITH RULE 6.
  HOPPERS, CUT-OFF, AND STARTING EQUIPMENT SHALL COMPLY WITH RULE 9.
  LIGHTING TO COMPLY AS PER RULE 11, AND PEST CONTROL TO COMPLY WITH RULE 3.
- SEPARATE APPLICATIONS SHALL BE FILED WITH DEPARTMENT OF BUILDINGS, CITY OF NEW YORK FOR THE FOLLOWING:
  A. FENCE
  B. DEMOLITION
  C. ELEVATOR
  D. OPEN
- CONTRACTOR SHALL PROVIDE AND INSTALL STAIR AND ELEVATOR IDENTIFICATION SIGNS AT ALL BUILDING LEVELS IN ACCORDANCE WITH LOCAL LAW 16 OF 1985.
- CONTRACTOR SHALL PROVIDE ALL SIGNS AS SPECIFIED.
- THE CONTRACTOR SHALL PROVIDE, ERECT AND MAINTAIN ALL TEMPORARY BARRIERS AND GUARDS, AND ALL TEMPORARY SHORING AND BRACING AS REQUIRED BY DEPARTMENT OF BUILDING RULES AN REGULATIONS.
- 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 AGENCIES.
- CONTRACTOR IS TO COORDINATE AND SUBMIT FOR APPROVAL, ALL MATERIALS REQUIRED BY DOCUMENTS (DRAWINGS AND SPECIFICATIONS) PRIOR TO THEIR INCLUSION INTO PROJECT.

MULTIPLE DWELLING LAW NOTES

- MULTIPLE DWELLING LAW WILL BE COMPLIED WITH, AS PER LOCAL LAW NO. 23-66.
- BUILDING WILL BE ENTIRELY FIREPROOF IN ACCORDANCE WITH SUBDIVISION 25 OF SECTION 4, AND SECTIONS 101, 107 AND 108 OF THE MULTIPLE DWELLING LAW AND ARTICLE 3 OF BUILDING CODE.
- ALL ROOMS WILL COMPLY WITH SECTION 31-6 OF THE MULTIPLE DWELLING LAW.
- SECTION 33, SUBDIVISION 3, OF THE MULTIPLE DWELLING LAW AND THE DEPARTMENT RULES WILL BE COMPLIED WITH. RANGES WILL BE USED OF A TYPE APPROVED BY A RECOGNIZED TESTING LABORATORY. ALL COOKING RANGES WILL BE INSTALLED IN ACCORDANCE WITH C26-1302A.7C BUILDING CODE AND WITH SECTION 64 M.D.L. RANGES WILL COMPLY WITH THE REQUIREMENTS OF THE AMERICAN GAS ASSOCIATION.
- SECTION 34, SUBDIVISION 2, OF THE MULTIPLE DWELLING LAW WILL BE COMPLIED WITH IN THAT ALL WALLS OR FLOORS BELOW THE GROUND LEVEL SHALL BE DAMPPROOFED OR WATERPROOFED.
- WALLS AND CEILINGS IN SERVICE AREAS WHERE NOTED IN SCHEDULE OF INTERIOR FINISHES WILL BE PAINTED A LIGHT COLOR AS PER SEC. 34(4) M.D.L. APARTMENT STAIRWAYS AND HALLS TO BE PAINTED PER SEC. 80(4) M.D.L.
- EVERY DOOR GIVING ACCESS TO THE ENTRANCE FROM THE OUTSIDE OF BUILDING WILL CONTAIN NOT LESS THAN 5 SQUARE FEET OF GLAZED SURFACE IN ACCORDANCE WITH SEC. 35 OF THE M.D.L.
- ARTIFICIAL LIGHTING OF PUBLIC HALLS AND STAIRWAYS WILL COMPLY WITH SECTION 37 OF THE MULTIPLE DWELLING LAW.
- INTERCOMMUNICATION SYSTEM AND ENTRANCE DOOR LOCKS SHALL BE PROVIDED AS PER SEC. 50(A) OF THE MULTIPLE DWELLING LAW.
- ALL OPENINGS TO THE ELEVATOR SHAFTS WILL BE PROVIDED WITH DOORS AND BUCKS HAVING A MIN. 1-HOUR RATING. ALL DOORS TO ELEVATOR SHAFTS AND DOORS IN ELEVATOR CABS TO BE PROVIDED WITH AUTOMATIC DEVICES AS REQUIRED BY SECTION 51, MULTIPLE DWELLING LAW.
- ALL OUTSIDE STEPS AND THEIR RAILS WILL COMPLY WITH SECTIONS 52 AND 62, MULTIPLE DWELLING LAW. GUARD RAILS ON RETAINING WALLS MORE THAN 18" ABOVE GRADE WILL BE AT LEAST 3 FEET 3 INCHES HIGH.
- PARKING ON PROJECT WILL BE PRIMARILY FOR THE USE OF TENANTS PER SEC. 60 M.D.L. AND WILL COMPLY WITH DEPARTMENT RULES AND REGULATIONS.
- MAINTENANCE, MANAGEMENT, AND LAUNDRY, ETC, ARE OF ACCESSORY USE TO THE PROJECT AND WILL COMPLT WITH SEC. 61 M.D.L.
- GAS METERS WILL BE PLACED IN SPACES PROVIDED ON FIRST FLOOR.
- SECTION 77 OF THE MULTIPLE DWELLING LAW WILL BE COMPLIED WITH. NO LEADER, DRAIN, OR HOUSE TRAP WILL BE LOCATED IN ANY BATHROOM OR WATER CLOSET COMPARTMENTS.
- MECHANICAL VENTILATION FOR INTERIOR BATHROOMS, KITCHENETTES AND PUBLIC HALLS WILL BE OPERATED AS REQUIRED BY SECTIONS 76, 33 AND 107 OF THE MULTIPLE DWELLING LAW.
- SOUND CONTROL SHALL BE PROVIDED AS PER SEC. 84 M.D.L. AND IN ACCORDANCE WITH THE BUILDING CODE AND ITS REFERENCE STANDARDS.
- COMPLY WITH SECTION 80, SUBDIVISION 6, M.D.L. AND ARTICLE 13, H.M.C. AS TO PEST AND RODENT ERADICTION.
- PROVIDE HEAT AND HOT WATER PER SECTION 77.3 AND 79 M.D.L.
- FOR LIGHTING THROUGHOUT, COMPLY WITH SECTION 64, M.D.L.

HOUSING MAINTENANCE CODE NOTES

- BUILDING SHALL COMPLY WITH SECTION 27-2027 H.M.C. DRAINAGE OF ROOFS AND COURTYARDS.
- BUILDING SHALL COMPLY WITH SECTION 27-2028 H.M.C. CENTRAL HEATING.
  BUILDING SHALL COMPLY WITH SECTION 27-2031 H.M.C. SUPPLY HOT WATER.
- BUILDING SHALL COMPLY WITH SECTION 27-2032 H.M.C. GAS FUELED OR ELECTRIC HEATERS WHERE PERMITTED.
- BUILDING SHALL COMPLY WITH SECTION 27-2040 HMC LIGHTS NEAR ENTRANCE WAYS AND YARDS AND COURTS.
- BUILDING SHALL COMPLY WITH SECTION 27-2038 HMC LIGHTING PUBLIC HALLS AND STAIRS.
- BUILDING SHALL COMPLY WITH SECTION 27-2041 HMC PEEPHOLES IN ENTRANCE DOORS TO APARTMENTS.
- BUILDING SHALL COMPLY WITH SECTION 27-2042 HMC MIRRORS IN SELF-SERVICE ELEVATORS.
- BUILDING SHALL COMPLY WITH SECTION 27-2047 HMC MAIL SERVICE.
- BUILDING SHALL COMPLY WITH SECTION 27-2048 HMC FLOOR SIGNS TO INDICATE FLOORS IN MD.
- BUILDING SHALL COMPLY WITH SECTION 27-2044 HMC STREET NUMBERS ON THE DWELLING.
- BUILDING SHALL COMPLY WITH SECTION 27-2052 THRU 27-2056 HMC JANITORIAL SERVICES.
- BUILDING SHALL COMPLY WITH SECTION 27-2051 THRU 27-2058 HMC LIGHTING AND VENTILATION OF LIVING ROOMS IN MULTIPLE DWELLINGS.
- BUILDING SHALL COMPLY WITH SECTION 27-2097 HMC REGISTRATION: TIME TO FILE.
- BUILDING SHALL COMPLY WITH SECTION 27-2105 HMC IDENTIFICATION OF MANAGING AGENT OR OWNER.
- BUILDING SHALL COMPLY WITH SECTION 27-2104 HMC POSTING OF SERIAL NUMBER.
- BUILDING SHALL COMPLY WITH SECTION 27-2021 HMC RECEPTACLES FOR GARBAGE.
- BULDING SHALL COMPLY WITH SECTION 27-2022 HMC COLLECTION OF SAME.
- BUILDING SHALL COMPLY WITH SECTION 27-2045 HMC INSTALLATION AND MAINTENANCE OF SMOKE DETECTING DEVICES IN CLASS A MULTIPLE DWELLING.

CONTROLLED INSPECTIONS

- MATERIALS, OPERATIONS AND EQUIPMENT SUBJECT TO CONTROLLED INSPECTION BY BUILDING 2008 CODE. (SEE BC 1701)

CONCRETE

- THE INSPECTION OF MATERIALS FOR ALL STRUCTURAL ELEMENTS PROPORTIONED ON THE BASIS OF CALCULATED STRESSES TO PERCENT OR GREATER OF BASIC ALLOWABLE VALUES
- THE MAKING OF PRELIMINARY TESTS OF CONCRETE.
- QUALITY CONTROL AND INSPECTION AT THE BATCH PLANT.
- ACTUAL PREPARATION OF CYLINDERS FOR STRENGTH TESTS, 1905.1.
- THE CHECKING OF ALL SAMPLES RECOVERED FOR THE PURPOSE OF STRENGTH TESTS FOR SLUMP, AIR CONTENT, UNIT WEIGHT AND TEMPERATURE IN ACCORDANCE WITH TABLE 1904
- THE MEASUREMENT OF FORMS FOR SIZE AND DIMENSIONS OF MEMBERS.
- THE INSPECTION OF PLACEMENT OF CONCRETE AND THE RECORDING OF IN COMPLIANCE WITH BUILDING CODE PROVISIONS ATTESTED TO OF:
  - TEMPERATURES
  - PROTECTIONS AGAINST EXCESSIVE TEMPERATURES
  - CURING
  - ERECTION AND CONNECTION OF PRECAST MEMBERS
  - AMOUNT OF WATER ADDED IN THE FIELD
- INSPECTION FOR THE PROPER USE OF ADMIXTURES. BATCH PLANT INSPECTION REQUIRED FOR ALL ADMIXTURES OTHER THAN AIR-ENTRAINING AND WATER-REDUCING AGENTS, 1905.3

STEEL

- OF BASIC, ALLOWABLE VALUES, TABLE 1704.3.
- CHECK OF WELDER'S LICENSES OR QUALIFICATIONS IN ACCORDANCE WITH TABLE 1704.3.
- INSPECTION OF THE TENSIONING OF HIGH STRENGTH BOLTS WHERE STRESSES IN BOLTS ARE 50% OR MORE OF BASIC ALLOWABLE VALUES. TABLE 1704.3.
  INSPECTION OF WELDING OPERATIONS WHERE STRESSES IN WELDS ARE 50% OR MORE.

FOUNDATIONS

- INSPECTION OF BORING OPERATIONS, 1704.7.4.
- INSPECTION OF SUBGRADE FOR FOOTINGS, FOUNDATION PIERS, AND FOUNDATION WALLS (NOTIFICATION TO DEPARTMENT AT LEAST TWO DAYS PRIOR TO INSTALLATION REQUIRED UNLESS DEPARTMENT INSPECTION IS WAIVED UNDER 1704.1.1.

FOOTING

- SUPERVISION OF THE PLACING OF CONTROLLED FILLS, 1704.7.2 NOTE WHERE FOUNDATION IS TO REST ON, OR BE UNDERLAIN BY NOMINALLY UNSATISFACTORY BEARING MATERIALS, REPORT BASES ON SOIL TEST, FOUNDATION ANALYSIS (INCLUDING ANALYSIS OF UNDISTURBED SAMPLES), BY ARCHITECT OR ENGINEER IS REQUIRED, 1704.7.1.

FIRE PROTECTION

- INSPECTION OF THE INSTALLATION OF ALL REQUIRED FIRE STOPPING, 1704.25.

MECHANICAL VENTILATION, AIR CONDITIONING AND REFRIGERATION

- INSPECTION AND TESTS OF REQUIRED VENTILATING SYSTEM 1704.15.

HEATING AND COMBUSTION EQUIPMENT

- FINAL INSPECTIONS AND TESTS OF BOILERS (SUCH INSPECTIONS AND TESTS, HOWEVER, MAY BE MADE BY DEPARTMENT INSPECTORS OR BY INSURANCE COMPANY INSPECTORS), 1704.15.1.
- APPLICATION FOR EQUIPMENT USE PERMIT (FOR EQUIPMENT SYSTEM) TO BE ACCOMPANIED BY A STATEMENT BY ARCHITECT OR ENGINEER INDICATING THE SYSTEM HAS BEEN OPERATED AND FUNCTIONS SATISFACTORILY AND THAT TO THE REQUIREMENTS 1704.15.2.
  BEST OF HIS KNOWLEDGE AND BELIEF, THE SYSTEM WILL MEET CODE TEMPERATURE

MATERIALS, ASSEMBLIES, FORMS AND METHODS OF CONSTRUCTION

- CODE TEST METHOD: WHENEVER THE BUILDING CODE PRESCRIBES A METHOD OF TESTING, SUCH TESTS SHALL BE MADE UNDER THE SUPERVISION OF AN ARCHITECT OR AN ENGINEER: OR BY A TESTING SERVICE OR LABORATORY ACCEPTABLE TO THE COMMISSIONER.

INSPECTION DURING PROGRESS OF WORK

- THE COMMISSIONER MAY ACCEPT SIGNED STATEMENTS BY ARCHITECTS AND ENGINEERS AND SUPPORTING INSPECTIONS AND TEST REPORTS WITHOUT VERIFYING INSPECTION OR TEST BY DEPARTMENT INSPECTORS. PROVIDED NAMES AND ADDRESSES APPEAR IN WORK PERMIT APPLICATION FILED TEN DAYS PRIOR TO WORK COMMENCEMENT.

FINAL INSPECTION

- THE ARCHITECT, ENGINEER, OR OTHER PERSON WHO SUPERVISED OR SUPERINTENDED THE WORK IS REQUIRED TO BE PRESENT AT FINAL INSPECTION BY DEPARTMENT, BC104.5.

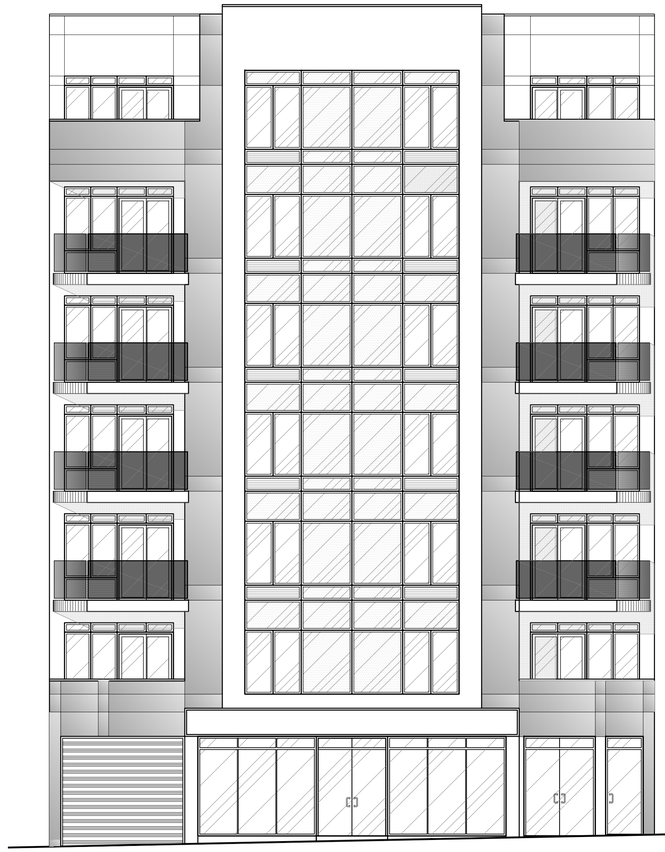
NOTE: ARCHITECT OR ENGINEER WILL BE DESIGNATED FOR EACH TYPE OF CONTROLLED INSPECTION BY THE OWNER.

MANUAL NOTES

- OPERATING AND MAINTENANCE MANUAL SHALL BE PROVIDED TO THE BUILDING OWNER BY THE MECHANICAL CONTRACTOR. THE MANUAL SHALL INCLUDE, AT LEAST, THE FOLLOWING:
  - SUBMITTAL DATA STATING EQUIPMENT SIZE AND SELECTED OPTIONS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE.
  - MANUFACTURER'S OPERATION MANUALS AND MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE, EXCEPT EQUIPMENT NOT FURNISHED AS PART OF THE PROJECT. REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED.
  - NAME AND ADDRESS OF AT LEAST ONE SERVICE AGENCY.
  - HVAC CONTROLS SYSTEM MAINTENANCE AND CALIBRATION INFORMATION, INCLUDING WIRING DIAGRAMS, SCHEMATICS, AND CONTROL SEQUENCE DESCRIPTIONS. DESIRED OR FIELD-DETERMINED SETPOINTS SHALL BE PERMANENTLY RECORDED ON CONTROL DRAWINGS AT CONTROL DEVICES OR, FOR DIGITAL CONTROL SYSTEMS, IN SYSTEM PROGRAMMING INSTRUCTIONS.
  - A NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE, INCLUDING RECOMMENDED SETPOINTS.

LIST OF DRAWINGS

ARCHITECTURAL



CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

GENERAL NOTES

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-101.00

REGISTERED ARCHITECT DIMING HING TAN 025376 STATE OF NEW YORK

BUILDING INFORMATION AND CODE REQUIREMENTS

OCCUPANCY GROUP	R-2, B
USE GROUP	2A - APARTMENT RESIDENTIAL 6A - RETAIL STORE
CONSTRUCTION CLASSIFICATION	IB, SPRINKLERED BUILDING
MAXIMUM FIRE AREA	UNLIMITED IN FLOOR AREA AS PER TABLE 503 OF THE NEW YORK CITY BUILDING CODE

SPECIAL CONTROLLED INSPECTION ITEMS

STRUCTURAL	
STRUCTURAL STEEL-WELDING	BC 1704.3.1
STRUCTURAL STEEL-ERECTION & BOLTING	BC 1704.3.2, BC 1704.3.3
CONCRETE - CAST-IN-PLACE	BC 1704.4
MASONRY	BC 1704.5
SOILS - SITE PREPARATION	BC 1704.7.1
SOILS - INVESTIGATIONS (BORINGS/TEST PITS)	BC 1704.7.4
EXCAVATION - SHEETING, SHORING AND BRACING	BC 1704.1.9, BC 3304.4.1
CONCRETE TEST CYLINDERS	BC 1905.6
CONCRETE DESIGN MIX	BC 1905.3
MECHANICAL	
MECHANICAL SYSTEMS	BC 1704.15
SPRINKLER SYSTEMS	BC 1704.21
CHIMNEYS	BC 1704.24
ARCHITECTURAL	
FIRE STOPS, DRAFTSTOP, AND FIREBLOCK SYSTEMS	BC 1704.25

PROGRESS INSPECTION ITEMS

STRUCTURAL	
FOOTING AND FOUNDATION	BC 109.3.1
ARCHITECTURAL	
FRAME INSPECTION	BC 109.3.3
ENERGY CODE COMPLIANCE INSPECTIONS TR-8	BC 109.3.5
FIRE RESISTANCE RATED CONSTRUCTION	BC 109.3.4
TR-8 PROGRESS INSPECTIONS	
	TABLE REFERENCE IN IRCNY 5000-01(H) (1) AND (2)
PROTECTION OF FOUNDATION INSULATION	(1A1), (1A1)
INSULATION PLACEMENT AND R VALUES	(1A2), (1A2)
FENESTRATION THERMAL VALUES AND RATINGS	(1A3), (1A3)
FENESTRATION RATINGS FOR AIR LEAKAGE	(1A4), (1A4)
FENESTRATION AREAS	(1A5), (1A5)
AIR SEALING AND INSULATION – VISUAL	(1A6), (1A6)
AIR SEALING AND INSULATION – TESTING	(1A7)
ELECTRICAL METERING	(1C1), (1C1)
LIGHTING IN DWELLING UNITS	(1C2), (1C2)
INTERIOR LIGHTING POWER	(1C3)
MAINTENANCE INFORMATION	(1D1), (1D1)

THE FOLLOWING WORKS ARE FILED UNDER SEPARATE APPLICATIONS:

1. BUILDERS PAVEMENT PLAN UNDER APPLICATION# --------
2. SITE CONNECTION (SD 1 & 2) PLAN UNDER APPLICATIONS# --------
3. ELEVATOR IS FILED UNDER SEPARATE APPLICATION
4. SPRINKLER IS FILED UNDER THIS APPLICATION #---------
5. STRUCTURE IS FILED UNDER THIS APPLICATION #---------

NOTE:

CHAPTER 1 OF THE 2008 BUILDING CODE --- ASBESTOS INVESTIGATION
THERE IS NO ASBESTOS INVOLVED IN THIS APPLICATION, IT IS A NEW BUILDING APPLICATION.

CHAPTER 9
903.2.7 GROUP R AN AUTOMATIC SPRINKLER SYSTEM SHALL BE INSTALLED IN GROUP R FIRE AREAS. AN AUTOMATIC SPRINKLER SYSTEM SHALL BE INSTALLED THROUGHOUT BUILDINGS WITH A MAIN USE OR DOMINANT OCCUPANCY OF GROUP R.

NYCECC COMPLIANCE STATEMENT

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE COMPLIANCE WITH THE ENERGY CONSERVATION CODE 2014 OF NEW YORK CITY, USING CHAPTER C4.

SEISMIC DESIGN COMPLIANCE STATEMENT

PROPOSE STRUCTURE WILL BE DESIGNED AND CONSTRUCTED TO RESIST THE EFFECTS OF EARTHQUAKE MOTIONS AND COMPLY WITH 2008 BUILDING CODE BC1614 AND LL17/95.

BUILDING CODE ANALYSIS

TABLE 1015.1
EXIT ACCESS TRAVEL DISTANCE[a]

A	WITHOUT SPRINKLER SYSTEM (FEET)	WITH SPRINKLER SYSTEM (FEET)
E, F-1, I-1, M, R, S-1	150	200[b]
B	200	300[c]
F-2, S-2, U	200	250[a]
H-1	NOT PERMITTED	75[c]
H-2	NOT PERMITTED	100[c]
H-3	NOT PERMITTED	150[c]
H-4	NOT PERMITTED	175[c]
H-5	NOT PERMITTED	200[c]
I-2, I-3, I-4	150	200[c]

For SI: 1 foot = 304.8 mm.
a. See the following sections for modifications to exit access travel distance requirements:
Section 402: For the distance limitation in malls.
Section 404: For the distance limitation through an atrium space.
Section 1018.2: For buildings with one exit.
Chapter 31: For the limitation in temporary structures.
b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where sprinkler systems according to Section 903.3.1.2 are permitted.
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

TABLE 1016.1.2
PUBLIC CORRIDOR FIRE-RESISTANCE RATING

OCCUPANCY	REQUIRED FIRE-RESISTANCE RATING (hour)
H-1, H-2, H-3	2
H-4, H-5	1
A, E, F, M, S, U	1
B	1[a]
R (Noncombustible)	1
R (Combustible)	2[b]
I-1, I-2, I-3, I-4	1

a. Public corridors need not be fire rated in high-rise buildings in Occupancy Group B equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, where such building is provided with smokeproof enclosures in stairways in accordance with Section 403.13.
b. Public corridors in buildings not exceeding two stories in height, or that are three stories in height and occupied by not more than one family on each story, may be constructed with 1-hour fire-resistance rating.

TABLE 1005.1
EGRESS WIDTH PER OCCUPANT SERVED

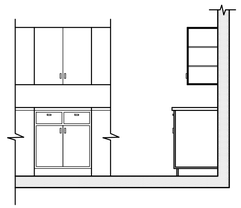
OCCUPANCY	STAIRWAYS (inches per occupant)	OTHER COMPONENTS (inches per occupant)
Occupancies other than those listed below	0.3	0.2
Hazardous: H-1, H-2, H-3 and H-4	0.7	0.4
For SI: 1 inch = 25.4 mm.‡		

TABLE 1016.1.1
INTERIOR CORRIDOR FIRE-RESISTANCE RATING

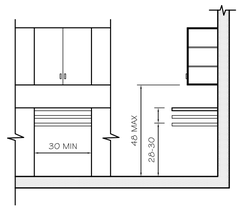
OCCUPANCY	OCCUPANT LOAD SERVED BY INTERIOR CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system
H-1, H-2, H-3	All	Not Permitted	1
H-4, H-5	Greater than 30	Not Permitted	1
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 10	1[d]	0
I-2a, I-4	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1[b]

a. For requirements for occupancies in Group I-2, see Section 407.3.
b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.7.
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.
d. Interior corridors within dwelling or sleeping units in Group R occupancies pursuant to Section 1016.1.1, Exception 2 shall not require fire-resistance rating.

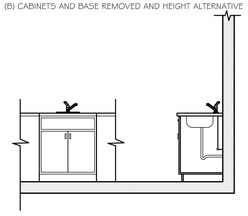
HANDICAP ACCESSIBLE KITCHEN



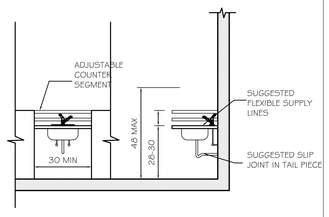
(a) BEFORE REMOVVAL OF CABINETS AND BASE



(B) CABINETS AND BASE REMOVED AND HEIGHT ALTERNATIVE



(A) BEFORE REMOVERAL OF CABINETS AND BASE



(B) CABINETS AND BASE REMOVED AND HEIGHT ALTERNATIVES

HANDICAPPED ADAPTABLE DETAILS

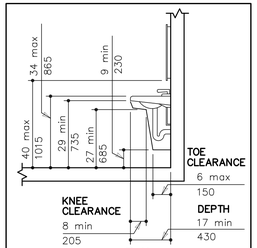


Fig 31
Lavatory Clearances

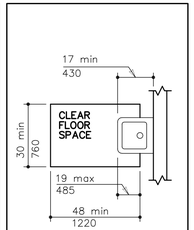


Fig 32
Clear Floor Space at Lavatories

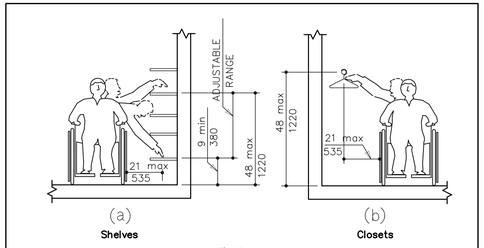


Fig 38
Storage Shelves and Closets

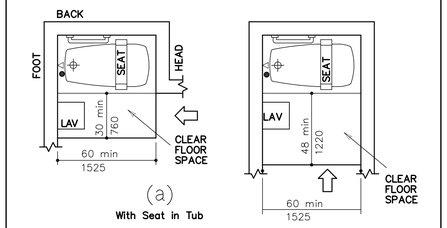


Fig 33
Clear Floor Space at Bathtubs

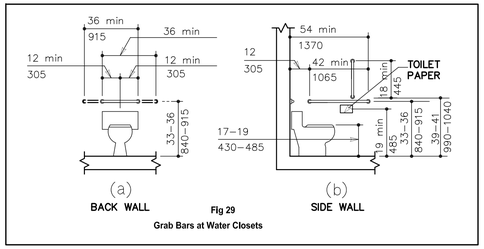


Fig 29
Grab Bars at Water Closets

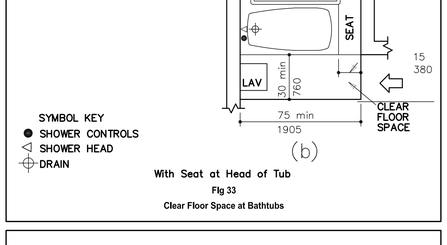


Fig 28
Clear Floor Space at Water Closets

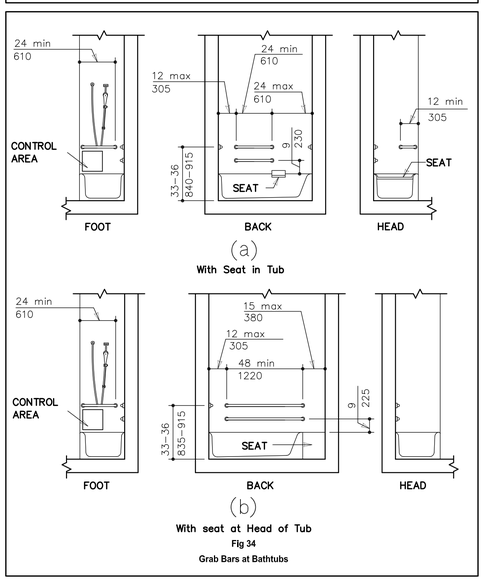
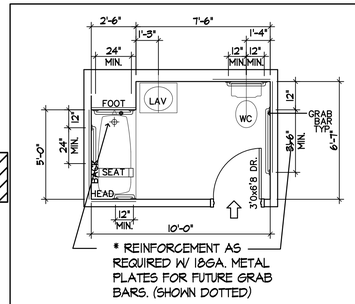
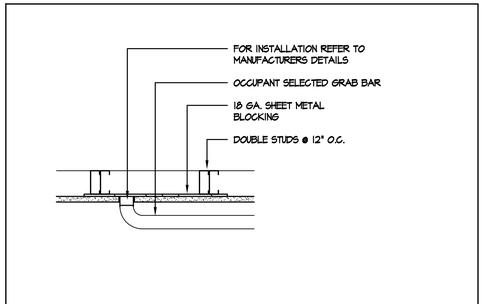


Fig 34
Grab Bars at Bathtubs



ADAPTABLE BATHROOM



GRAB BARS MOUNTING DETAIL

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

BUILDING CODE ANALYSIS

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-102.00
	2 OF 22

REGISTERED ARCHITECT CHANG HWA TAN 026376 STATE OF NEW YORK

ZONING ANALYSIS

PROPOSED ONE ZONING LOT, ONE TAX LOT.

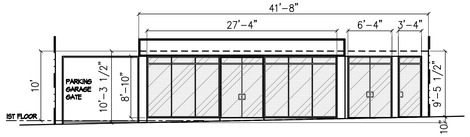
ZONING DISTRICT :	C4-4A (SPECIAL FOREST HILLS DISTRICT
BLOCK # :	3258
LOT # :	20
HOUSE # :	109-15
LOT AREA :	6,820 SQ-FT PER SURVEY BY ROGUSKI SURVEYING
OCCUPANCY GROUP :	R2, B
CONSTRUCTION CLASSIFICATION :	1B

ZR 86-02 THE UNDERLYING ZONING DISTRICTS SHALL REMAIN IN EFFECT UNLESS MODIFIED BY THE OTHE PARTICULAR PROVISIONS OF THE SPECIAL DISTRICT. IN THE EVENT OF A CONFLICT BETWEEN THE PROVISIONS OF THIS CHAPTER AND OTHER REGULATIONS OF THIS RESOLUTION, THE PROVISIONS OF THIS CHAPTER SHALL CONTROL.

USE GROUPS

CELLAR :	VALET PARKING SPACE & RESIDENTIAL UTILITY ROOM____ USE GROUP 2B
1ST FLOOR :	APT. LOBBY, RESIDENTIAL APARTMENT & RETAIL STORE___USE GROUP 2, 6A
2ND FLOOR:	RESIDENTIAL APARTMENT& RECREATION AREA_____USE GROUP 2, 2B
3RD FLOOR:	RESIDENTIAL APARTMENT_____USE GROUP 2
4TH FLOOR:	RESIDENTIAL APARTMENT_____USE GROUP 2
5TH FLOOR:	RESIDENTIAL APARTMENT_____USE GROUP 2
6TH FLOOR:	RESIDENTIAL APARTMENT_____USE GROUP 2
7TH FLOOR:	RESIDENTIAL APARTMENT_____USE GROUP 2
ROOF:	ELEVATOR MACHINE ROOM_____USE GROUP 2B

ZR 86-14 TRANSPARENCY REQUIREMENTS
FOR COMMERCIAL USE, 70 PERCENT OF THE AREA GROUND FLOOR STREET WALL MEASURED TO A HEIGHT OF 10 FEET SHALL BE GLAZED. NOT LESS THAN 50 PERCENT OF SUCH AREA SHALL BE GLAZED WITH TRANSPARENT MATERIALS AND UP TO 20 PERCENT OF SUCH AREA MAY BE GLAZED WITH TRANSLUCENT MATERIALS.



COMMERCIAL STREET WALL AREA = (41'-8" X 10'-3 ½") - (41'-8" X 10')/2
= 411.67 SQ. FT.

PROPOSED GLAZED AREA = (27'-4" X 8'-10") + (6'-4" X 8'-10") + (3'-4" X 8'-10")
= 326.34 SQ.FT.

PROPOSED PERCENTAGE OF GLAZED AREA = 329.34/ 411.67 X 100%
= 79.28% > 70%_____OK

ZR 86-20 SPECIAL BULK REGULATIONS
THE APPLICABLE BULK REGULATIONS OF THE UNDERLYING DISTRICTS SHALL APPLY WITHIN THE SPECIAL FOREST HILLS DISTRICT, EXCEPT AS MODIFIED BY THIS SECTION, INCLUSIVE.

BULK REGULATION

ZR 35-31 GENERAL PROVISIONS
THE PORTIONS OF A BUILDING USED FOR RESIDENTIAL USE ARE SUBJECT TO FLOOR AREA RATIO SET FORTH IN ARTICLE II, CHAPTER3, AND THE PORTIONS OF A BUILDING USED FOR COMMERCIAL USE ARE SUBJECT TO THE FLOOR AREA RATIO IN ARTICLE III, CHAPTER 3.

MAXIMUM FLOOR AREA RATIO

RESIDENTIAL BULK REGULATIONS IN C4 DISTRICTS.

ZR 35-23(b) APPLICABLE RESIDENTIAL DISTRICT FOR C4-4A = R7A
ZR 23-145 R7A RESIDENTIAL MAXIMUM PERMITTED F.A.R. = 4.0
MAX. FLOOR AREA PERMITTED IS 6,820 X 4.0 X = 27,280 SQ-FT

ZR 33-122 MAXIMUM COMMERCIAL C4-4A F.A.R. = 4.0
MAX. FLOOR AREA PERMITTED IS 6,820 X 4.0 = 27,280 SQ-FT

ZR 33-122 MAXIMUM ALLOWABLE TOTAL BUILDING FLOOR AREA = 27,280 SQ-FT

PROPOSED FLOOR AREA

	GROSS FLOOR AREA (SQ. FT.) A		DEDUCTIBLE FLOOR AREA (SQ. FT.) B		TOTAL ZONING FLOOR AREA (SQ. FT.) (A) - (B)		TOTAL GROSS BUILDING AREA (SQ. FT.)
FLOORS	COMMERCIAL	RESIDENTIAL	COMMERCIAL	RESIDENTIAL	COMMERCIAL	RESIDENTIAL	
CELLAR	0	6,168.39					6,168.39
1ST FL.	5,033.80	1,134.58	0	132.44	5,033.80	1,001.64	6,168.39
2ND FL.	0	3,400.43	0	255.12	0	3,145.31	3,400.43
3RD FL.	0	3,400.43	0	255.12	0	3,145.31	3,400.43
4TH FL.	0	3,400.43	0	255.12	0	3,145.31	3,400.43
5TH FL.	0	3,400.43	0	255.12	0	3,145.31	3,400.43
6TH FL.	0	3,400.43	0	255.12	0	3,145.31	3,400.43
7TH FL.	0	3,204.10	0	244.35	0	2,959.75	3,204.10
SUB TOTAL	5,033.80	31,214.21	618.11	2,255.04	5,033.80	22,192.14	
TOTAL AREA	36,248.01				27,226.34		36,248.01

FLOOR AREA CALCULATION OF BUILDING (SEE Z-105 FOR DETAILED CALCULATIONS)

PROPOSED COMMERCIAL FLOOR AREA = 5,033.80 SQ.FT
5,033.80/ 6,820 = 0.74 F.A.R
0.74 F.A.R. < 4.0 F.A.R. COMPLIES

PROPOSED RESIDENTIAL FLOOR AREA = 22,192.14 SQ.FT
22,192.14/ 6,820 = 3.25 F.A.R
3.25 F.A.R. < 4.0 F.A.R. COMPLIES

PROPOSED TOTAL BUILDING FLOOR AREA = 5,033.80 + 22,192.14 = 27,226.34 SQ-FT
27,226.34/ 6,820 = 3.99 F.A.R
3.99 F.A.R. < 4.0 F.A.R. COMPLIES

ZR 24-145 MAXIMUM LOT COVERAGE
R7A RESIDENTIAL MAXIMUM ALLOWABLE LOT COVERAGE = 65%
MAX. ALLOWABLE LOT COVERAGE = 6,820 X 65% = 4,433 SQ-FT
PROPOSED LOT COVERAGE = 3,900.43 SQ.FT. < 4,433 SQ.FT. COMPLIES
PROPOSED LOT COVERAGE = 57.19% < 65% COMPLIES

ZR 23-22 MAXIMUM NUMBER OF DWELLING UNITS
UNIT FACTOR OF 680
NUMBER OF DWELLING UNITS ALLOWABLE = (MAX. ALLOWABLE RESID. AREA) / 680
MAX ALLOWABLE RESIDENTIAL AREA = 27,280 SQ.FT.
MAX ALLOWABLE 27,280 / 680 = 40 UNITS MAX ALLOWABLE
ACTUAL PROPOSED NUMBER OF DWELLING UNITS = 23 UNITS, OK

ZR 23-30 LOT AREA AND LOT WIDTH REGULATIONS
REQ'D MIN. LOT SIZE = 1,700 SF
PROPOSED LOT SIZE = 6,820 S.F.

REQ'D MIN. LOT WIDTH = 18'
PROPOSED LOT WIDTH = 54'

ZR 23-40 YARD REGULATIONS

ZR 23-45 FRONT YARD REQUIREMENT
NONE -REQUIRED
NONE PROVIDED

ZR 23-462(c) SIDE YARD REQUIREMENT
NONE REQUIRED
NON PROVIDED

ZR 24-36 REAR YARD REQUIREMENT
REQUIRED 30' REAR YARD
PROVIDED 30' REAR YARD

HEIGHT AND SETBACK REGULATIONS

ZR 86-23 BUILDING OR OTHER STRUCTURE WITHIN THE SPECIAL DISTRICT SHALL COMPLY WITH THE HEIGHT AND SETBACK REGULATIONS OF SECTION 35-24 (SPECIAL STREET WALL LOCATION AND HEIGHT AND SETBACK REGULATIONS IN CERTAIN DISTRAICTS), EXCEPT AS MODIFIED BY THIS SECTIONS.

ZR 86-23 (a) IN C4-4A DISTRICT
MAXIMUM BASE HEIGHT OF STREET WALL = 60'
MAX. BUILDING HEIGHT = 70'

PROPOSED BASE HEIGHT = 60'
PROPOSED BUILDING HEIGHT = 69'-8"

ZR 23-621 (c) PERMITTED OBSTRUCTIONS
DORMERS SHALL BE ALLOWED AS PERMITTED OBSTRUCTION, PROVIDED THAT ON ANY "STREET" FRONTAGE, THE AGGREGATE WIDTH OF ALL DORMERS AT THE MAXIMUM BASE HEIGHT DOES NOT EXCEED 60% OF THE WIDTH OF THE STREET WALL OF THE HIGHEST STORY ENTIRELY BELOW THE MAXIMUM BASE HEIGHT. FOR EACH FOOT ABOVE THE MAXIMM BASE HEIGHT, THE AGGREGATE WIDTH OF ALL DORMERS SHALL BE DECREASED BY ONE PERCENT OF THE STREET WALL WIDTH OF THE HIGHEST STORY ENTIRELY BELOW THE MAXIMUM BASE HEIGHT.

WIDTH OF STREET WALL = 53'-8"
PROPOSED HIGHEST POINT OF DORMER IS 9'-8" ABOVE MAX. BASE HEIGHT.
MAX. AGGREGATE WIDTH = 60% - 9.67% = 50.33%
MAX. DORMER WIDTH AT THE HIGHEST POINT = 50.33% X 53'-8" = 27'-0"
PROPOSED DORMER WIDTH AT THE HIGHEST POINT = 27'-0". COMPLIES

ZR-25-00 ACCESSORY OFF-STREET PARKING AND LOADING
ZR 25-23 FOR RESIDENTIAL USE
FOR R7A, REQ'D PARKING SPACES = 50% OF NO. OF D.U. = 23 X 50% = 12 SPACES

PROPOSED 12 PARKING SPACES IN THE CELLAR.

ZR 86-41 FOR COMMERCIAL GENERAL RETAIL STORE USES (PRG B), REQUIRED 1 PER 400 S.F.
TOTAL GROSS AREA OF COMMERCIAL RETAIL = 5,185.75
PARKING SPACES REQUIRED = 5,185.75 / 400 = 14 SPACES

ZR 86-43 MODIFICATION OF PARKING REQUIREMENT WAIVERS
PARKING SPACE CAN BE WAIVED IF THE REQUIREMENT NUMBER IS BELOW 40 SPACES.

PARKING REQUIRED FOR COMMERCIAL USE WAIVED.

ZR 25-80 BICYCLE PARKING
REQUIRED 1 SPACE PER 2 DWELLING UNITS FOR USE GROUP 2
PROPOSED BUILDING HAVE 24 DWELLING UNIT, BICYCLE PARKING
REQUIRED = 24/2 = 12 SPACES

ZR 36-711 BICYCLE PARKING FOR COMMERCIAL USES
REQUIRED 1 PER 10,000 SQ.FT. FOR GENERAL RETAILS USES
REQUIRED BICYCLE PARKING SPACES = 5,185.75/10,000
= 0.51 SPACES
= 1 SPACES

PROPOSED 13 BICYCLE PARKING SPACES ON CELLAR FLOOR.

ZR 28-00 QUALITY HOUSING PROGRAM

ZR 28-21 SIZE OF DWELLING UNITS
REQ'D MIN. SIZE D.U. = 400 SF
PROVIDE MIN. SIZE D.U. = 613 SF > 400 SF ------ OK

ZR 28-22 WINDOWS
REQ'D ALL WINDOWS DOUBLE GLAZED
PROVIDE DOUBLE GLAZED WINDOWS (SEE WINDOW SCHEDULE)

ZR 28-23 REFUSE STORAGE AND DISPOSAL
PROVIDED REFUSE STORAGE IN EVERY RESIDENTIAL FLOOR

ZR 28-24 LAUNDRY FACILITIES
REQ'D AT LEAST 1 WASHING MACHINE PER 20 DWELLING UNITS
PROPOSED BUILDING HAVE TOTAL 23 DWELLING UNIT,
1 WASHING MACHINE REQUIRED.

1 WASHING MACHINE AND 1 DRYER PROVIDED IN EVERY DWELLING UNITS.

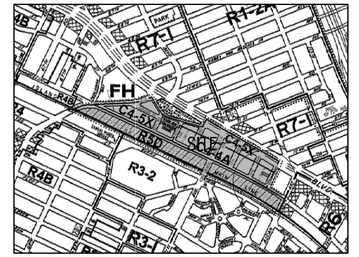
ZR 28-25 DAYLIGHT IN CORRIDORS
NATURAL LIGHT PROVIDED AT 2ND FLOOR THRU 7TH FLOOR HALLWAY.

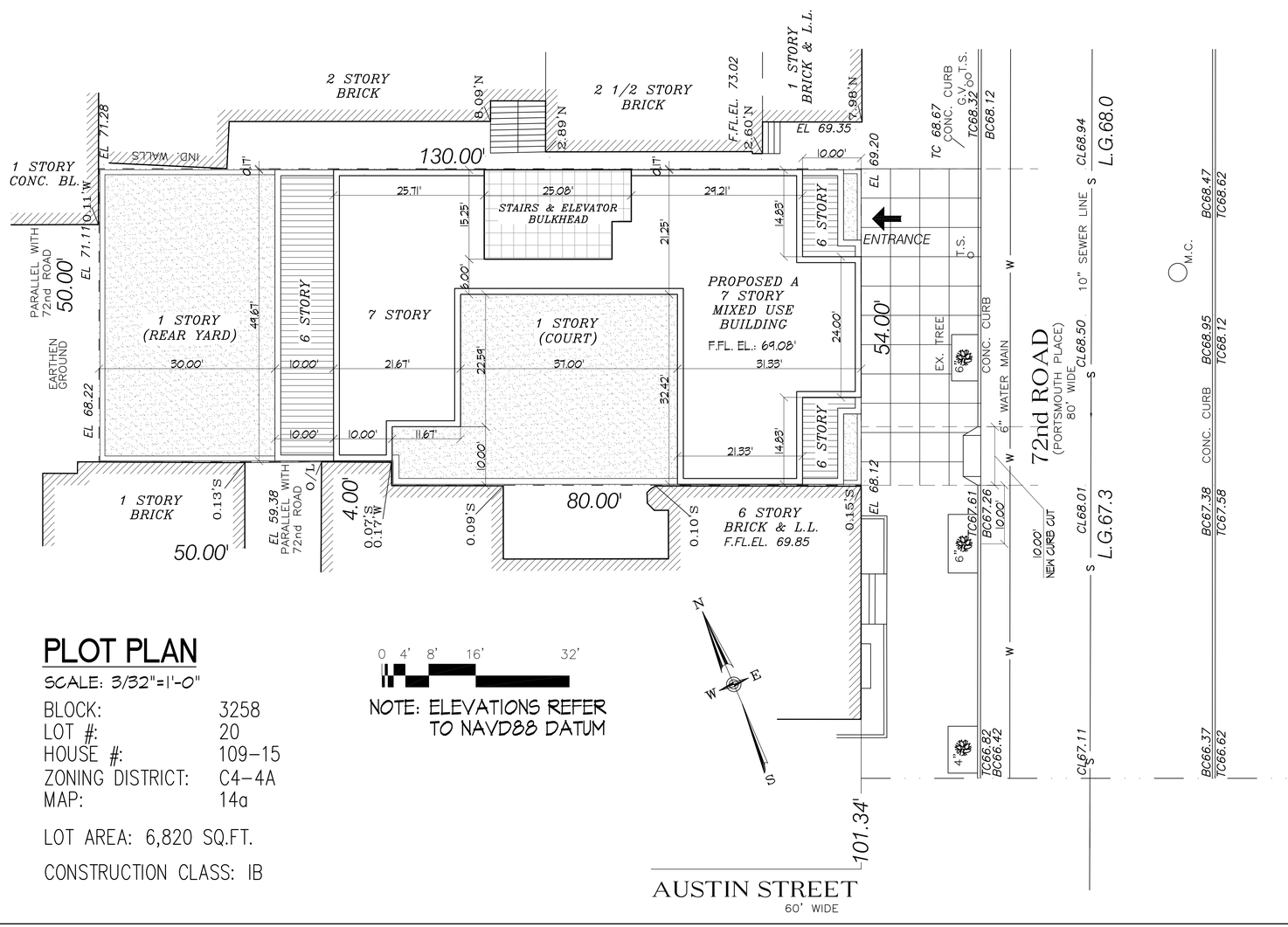
ZR 28-30 RECREATION SPACES AND PLANTING AREA
REQ'D 9.3% OF RESIDENTIAL FL. AREA FOR RECREATION SPACE
REQ'D RECREATION SPACE = 9.3% X 22,191.29 = 1,930.53 S.F.
PROVIDED 852.91 S.F. OF RECREATION SPACE ON 2ND FLOOR

ZR 28-41 DENSITY PER CORRIDOR
FOR R7A DISTRICT, IF CORRIDOR SERVE NOT MORE THAN 11 UNITS 50% OF CORRIDOR AREA MAY BE DEDUCT FROM FL. AREA.
PROPOSED NEW BUILDINGS EACH FL. HAS ONLY 4 UNITS MAX., 50% OF CORRIDOR AREA MAY BE EXCLUDED FROM FL. AREA

TAX MAP

ZONING MAP 14a





PLOT PLAN

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

BLOCK:	3258
LOT #:	20
HOUSE #:	109-15
ZONING DISTRICT:	C4-4A
MAP:	14a

LOT AREA: 6,820 SQ.FT.

CONSTRUCTION CLASS: 1B

0 4' 8' 16' 32'

NOTE: ELEVATIONS REFER TO NAVD88 DATUM

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

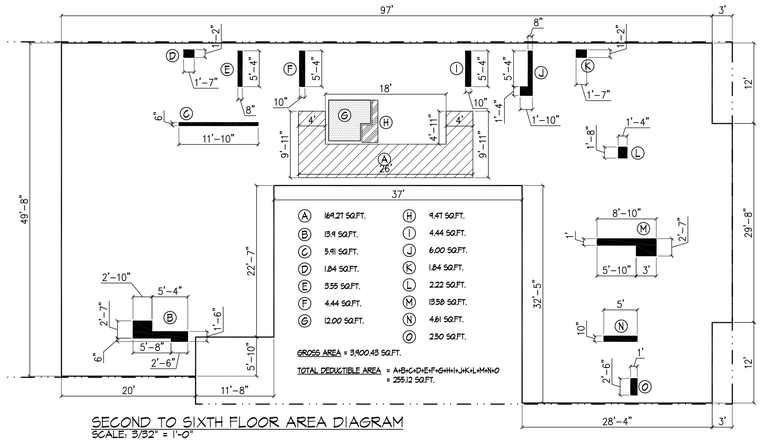
PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

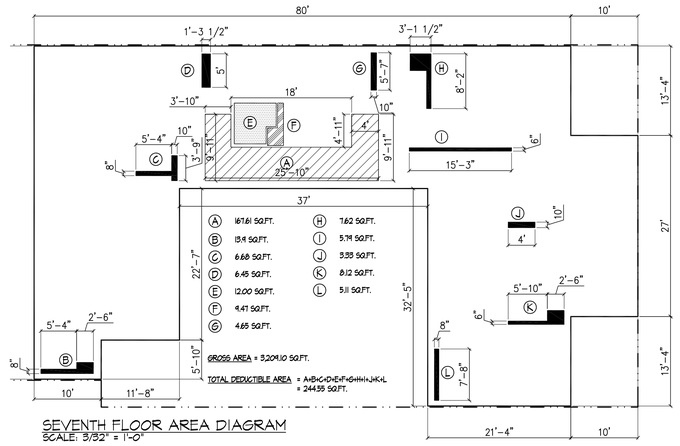
DRAWING TITLE :

ZONING COMPUTATION, PLOT PLAN, ZONING MAP AND TAX MAP.

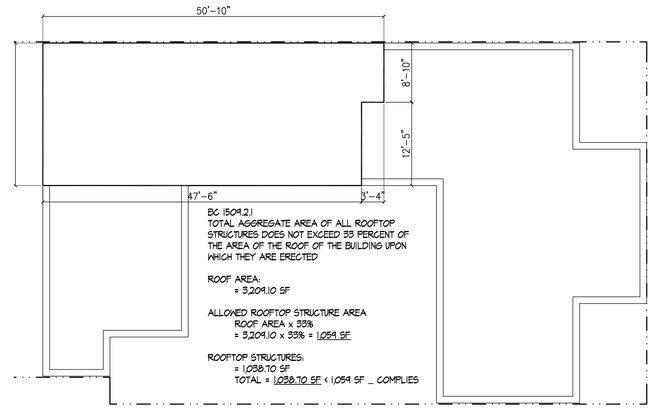
DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
REGISTERED ARCHITECT CHING HWA TAN 025376 STATE OF NEW YORK	CHKD. BY: CT
	DRAWING #: Z-103.00
	3 OF 22



SECOND TO SIXTH FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



SEVENTH FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



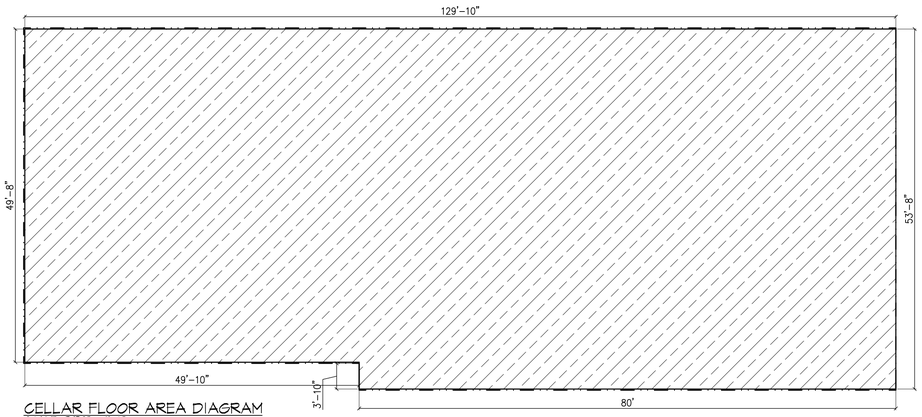
BC 1509.2.1
TOTAL AGGREGATE AREA OF ALL ROOFTOP STRUCTURES DOES NOT EXCEED 33 PERCENT OF THE AREA OF THE ROOF OF THE BUILDING UPON WHICH THEY ARE ERECTED

ROOF AREA:
= 3,209.10 SF

ALLOWED ROOFTOP STRUCTURE AREA
ROOF AREA x 33%
= 3,209.10 x 33% = 1,059 SF

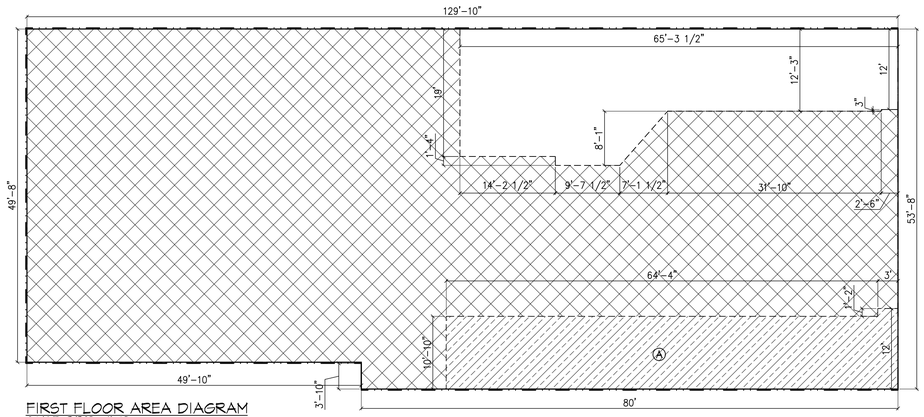
ROOFTOP STRUCTURES:
= 1,038.70 SF
TOTAL = 1,038.70 SF < 1,059 SF _ COMPLIES

ROOF FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



GROSS AREA = 6,768.38 SQ.FT.

CELLAR FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"

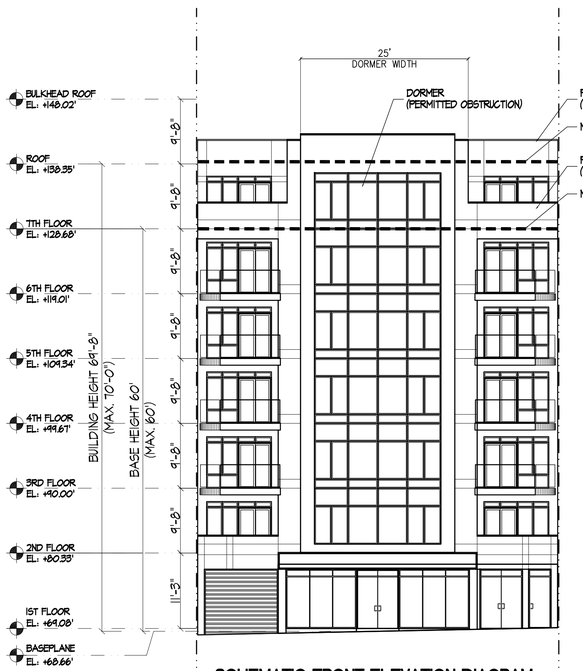


Ⓐ 732.44 SQ.FT.

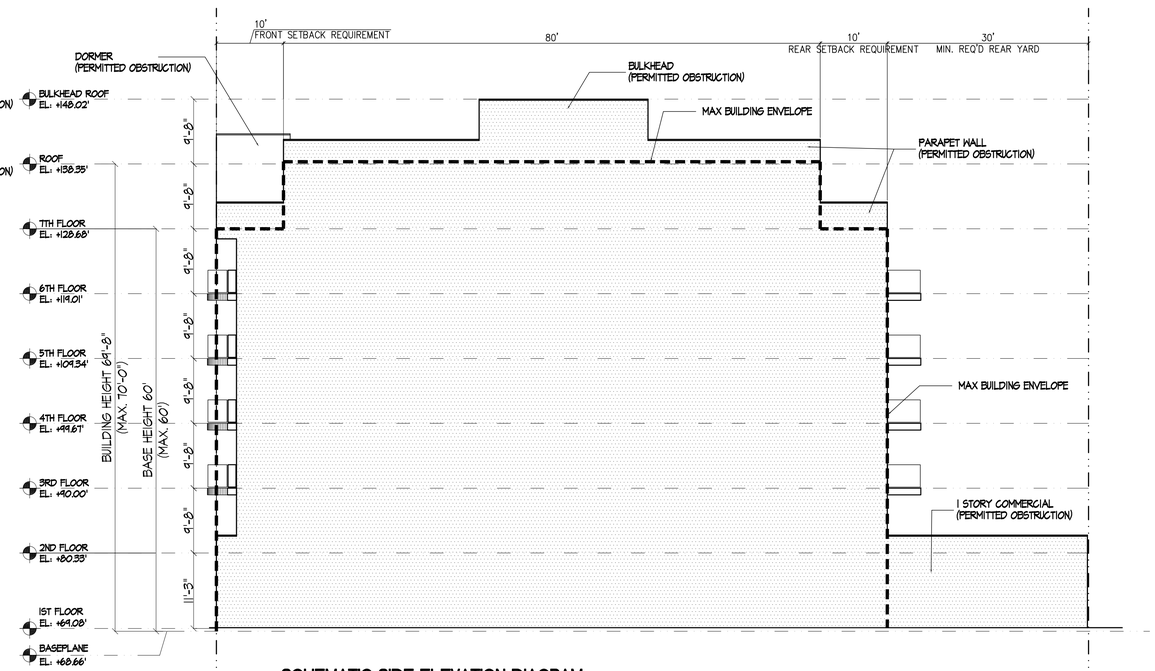
1ST FLOOR GROSS AREA = 6,768.38 SQ.FT.
COMMERCIAL GROSS AREA = 5,035.80 SQ.FT.
RESIDENTIAL GROSS AREA = 1,734.58 SQ.FT.

RESIDENTIAL TOTAL DEDUCTIBLE AREA = A
=732.44 SQ.FT.

FIRST FLOOR AREA DIAGRAM
SCALE: 3/32" = 1'-0"



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



SCHEMATIC SIDE ELEVATION DIAGRAM
SCALE: 3/32"=1'-0"

LEGEND

- RESIDENTIAL AREA
- RESIDENTIAL HALLWAY 100% DEDUCTIBLE
- COMMERCIAL AREA
- MECHANICAL DEDUCTIBLE AREA
- PLUMBING CHASE DEDUCTIBLE AREA
- PARKING GARAGE , DRIVEWAY, + UTILITY AREA
- REFUGE STORAGE (MAX. 12 S.F. DEDUCTIBLE)

CLIENT:

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(718) 224-1130/Tel
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STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

ZONING FLOOR AREA DIAGRAM, ZONING FLOOR AREA BREAK DOWN LEGEND

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

REGISTERED ARCHITECT
CHANG HWA TAN
026376
STATE OF NEW YORK

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

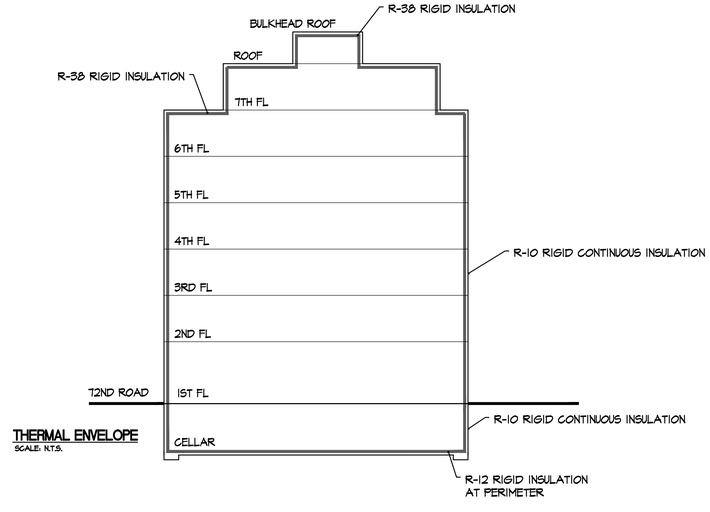
Z-104.00

NYC TABULAR ENERGY ANALYSIS

CHAPTER C4: COMMERCIAL ENERGY EFFICIENCY

CLIMATE ZONE 4A

NYCECC CITATION	PROVISION	ITEM DESCRIPTION	PROPOSED DESIGN VALUE	CODE-PRESCRIPTIVE VALUE AND CITATION	SUPPORTING DOCUMENTATION
COMMERCIAL BUILDING THERMAL ENVELOPE					
C302	**DESIGN CONDITIONS**				
C302.1	INTERIOR DESIGN CONDITIONS	INTERIOR DESIGN CONDITIONS	MAXIMUM OF 72°F (22°C) FOR HEATING AND MINIMUM OF 75°F (24°C) FOR COOLING.	THE INTERIOR DESIGN TEMPERATURES USED FOR HEATING AND COOLING LOAD CALCULATIONS SHALL BE A MAXIMUM OF 72°F (22°C) FOR HEATING AND MINIMUM OF 75°F (24°C) FOR COOLING.	A-202 (DESIGN CONDITIONS NOTES)
C402.2	**OPAQUE ASSEMBLIES**				
C402.1.2 OR C402.2	ROOF ASSEMBLY - ATTIC AND OTHER	THERMAL INSULATION IN ROOF	R-38 RIGID INSULATION	R-38	A-405 (WALL SECTIONS)
C402.1.2 OR C402.2	WALLS, ABOVE-GRADE: MASS.	CMU WALL WITH BATT INSTALLATION IN CAVITY OR RIGID INSULATION BETWEEN BRICK AND BLOCK	R-13 BATT INSULATION, CAVITY OR R-10 RIGID INSULATION, CONTINUOUS	R-9.5 CONTINUOUS INSULATION R-11.4 CONTINUOUS INSULATION	A-405 (WALL SECTIONS)
C402.1.2 OR C402.2	BELOW-GRADE WALLS	THERMAL INSULATION AT NEW CELLAR WALL	R-10 RIGID INSULATION, CONTINUOUS	R-7.5 CONTINUOUS INSULATION	A-405 (WALL SECTIONS)
C402.1.2 OR C402.2	SLAB-ON-GRADE FLOORS: UNHEATED SLABS	SLAB ON GRADE - 24" HORIZONTAL RIGID INSULATION AT PERIMETER	R-12 RIGID INSULATION	R-10 FOR 24" BELOW	A-405 (WALL SECTIONS)
C402.3	**FENESTRATION**				
C402.3	ENTRANCE DOOR	ENTRANCE DOORS	U = 0.35, SHGC = 0.40	U = 0.77, SHGC = 0.40	A-502 (SCHEDULES)
C402.3	WINDOW AND OTHER DOORS	WINDOWS AND OTHER DOORS	U = 0.35, SHGC = 0.40	FIXED FENESTRATION U = 0.38 OPERABLE FENESTRATION U = 0.45 SHGC = 0.40	A-502 (SCHEDULES)
C402.3	SKYLIGHTS	SKYLIGHT AT STAIR BULKHEAD	U = 0.35, SHGC = 0.40	U = 0.50, SHGC = 0.40	
C402.4	**AIR LEAKAGE**				
C402.4.1	AIR BARRIER	CONTINUOUS AIR BARRIER	CONTINUOUS AIR BARRIER SHALL BE PROVIDED THROUGHOUT THE BUILDING THERMAL ENVELOPE	A CONTINUOUS AIR BARRIER SHALL BE PROVIDED THROUGHOUT THE BUILDING THERMAL ENVELOPE.THE AIR BARRIERS SHALL BE PERMITTED TO BE LOCATED ON THE INSIDE OR OUTSIDE OF THE BUILDING ENVELOPE, LOCATED WITHIN THE ASSEMBLIES COMPOSING THE ENVELOPE, OR ANY COMBINATION THEREOF. THE AIR BARRIER SHALL COMPLY WITH SECTIONS C402.4.1.1 AND C402.4.1.2.	A-502 (NOTES)
C402.4.2	AIR BARRIER PENETRATIONS	AIR BARRIER PENETRATIONS	PENETRATIONS OF THE AIR BARRIER AND PATHS OF AIR LEAKAGE SHALL BE SEALED IN A MANNER COMPATIBLE WITH THE CONSTRUCTION MATERIALS AND LOCATION.	PENETRATIONS OF THE AIR BARRIER AND PATHS OF AIR LEAKAGE SHALL BE CAULKED, GASKETED OR OTHERWISE SEALED IN A MANNER COMPATIBLE WITH THE CONSTRUCTION MATERIALS AND LOCATION. JOINTS AND SEALS SHALL BE SEALED IN THE SAME MANNER OR TAPED OR COVERED WITH A MOISTURE VAPOR-PERMEABLE WRAPPING MATERIAL.	A-502 (NOTES)
C402.4.3	AIR LEAKAGE OF FENESTRATION	AIR LEAKAGE OF FENESTRATION	WINDOWS = 0.20 CFM/FT² SKYLIGHTS (ALL OTHERS) = 0.20 CFM/FT² STOREFRONT GLAZING = 0.06 CFM/FT² GARAGE DOORS = 0.4 CFM/FT²	WINDOWS, SLIDING AND SWINGING DOORS AND SKYLIGHTS (ALL OTHERS) = 0.20 CFM/FT² STOREFRONT GLAZING = 0.06 CFM/FT² COMMERCIAL GLAZED SWINGING ENTRANCE, REVOLVING AND ROLLING DOORS = 1.0 CFM/FT² GARAGE DOORS = 0.4 CFM/FT²	A-502 (NOTES)
C402.4.4	DOOR AND ACCESS OPENINGS TO SHAFTS, CHUTES, STAIRWAYS, AND ELEVATOR LOBBIES	DOOR AND ACCESS OPENINGS TO SHAFTS, CHUTES, STAIRWAYS, AND ELEVATOR LOBBIES	DOORS AND ACCESS OPENINGS FROM CONDITIONED SPACE TO SHAFTS, CHUTES, STAIRWAYS AND ELEVATOR LOBBIES SHALL EITHER MEET THE REQUIREMENTS OF SECTION C402.4.3 OR SHALL BE GASKETED, WEATHERSTRIPPED OR SEALED EXCEPTION: DOOR OPENINGS REQUIRED TO COMPLY WITH SECTION 715 OR 715.3 OF THE NEW YORK CITY BUILDING CODE	DOORS AND ACCESS OPENINGS FROM CONDITIONED SPACE TO SHAFTS, CHUTES, STAIRWAYS AND ELEVATOR LOBBIES SHALL EITHER MEET THE REQUIREMENTS OF SECTION C402.4.3 OR SHALL BE GASKETED, WEATHERSTRIPPED OR SEALED. EXCEPTION: DOOR OPENINGS REQUIRED TO COMPLY WITH SECTION 715 OR 715.3 OF THE NEW YORK CITY BUILDING CODE; OR DOORS AND DOOR OPENINGS REQUIRED BY THE NEW YORK CITY BUILDING CODE TO COMPLY WITH UL 1784	A-202 (NOTES)
C402.4.5	DAMPERS INTEGRAL TO BUILDING ENVELOPE AIR INTAKES, EXHAUST OPENINGS, STAIRWAYS AND SHAFTS	NEW VENTS AND AIR INTAKES	ALL NEW VENTS AND AIR INTAKES TO BE PROVIDED WITH CLASS I MOTORIZED WHERE REQUIRED, LEAKAGE-RATED DAMPER WITH A MAX LEAKAGE RATE OF 4 CFM/SF AT 1.0 IN. WG.	STAIRWAY ENCLOSURES AND ELEVATOR SHAFT VENTS AND OTHER OUTDOOR AIR INTAKES AND EXHAUST OPENINGS INTEGRAL TO THE BUILDING ENVELOPE SHALL BE PROVIDED WITH DAMPERS IN ACCORDANCE WITH SECTION C403.2.4.4	A-202 (NOTES)
C402.4.6	LOADING DOCK WEATHERSEALS	LOADING DOCK WEATHERSEALS	CARGO DOORS AND LOADING DOCK DOORS SHALL BE EQUIPPED WITH WEATHERSEALS TO RESTRICT INFILTRATION WHEN VEHICLES ARE PARKED IN THE DOORWAY.	CARGO DOORS AND LOADING DOCK DOORS SHALL BE EQUIPPED WITH WEATHERSEALS TO RESTRICT INFILTRATION WHEN VEHICLES ARE PARKED IN THE DOORWAY.	
C402.4.7	VESTIBULES	7' DEEP VESTIBULE AT BUILDING ENTRANCE. TWO SETS OF SWINGING DOORS WITH SELF-CLOSERS	7' DEEP VESTIBULE AT BUILDING ENTRANCE. TWO SETS OF SWINGING DOORS WITH SELF-CLOSERS	ALL BUILDING ENTRANCES SHALL BE PROTECTED WITH AN ENCLOSED VESTIBULE, WITH ALL DOORS OPENING INTO AND OUT OF THE VESTIBULE EQUIPPED WITH SELF-CLOSING DEVICES. VESTIBULES SHALL BE DESIGNED SO THAT IN PASSING THROUGH THE VESTIBULE IT IS NOT NECESSARY FOR THE INTERIOR AND EXTERIOR DOORS TO OPEN AT THE SAME TIME. EXCEPTIONS: DOORS NOT INTENDED TO BE USED BY THE PUBLIC OR INTENDED SOLELY FOR EMPLOYEE USE OR OPENING DIRECTLY FROM A SLEEPING UNIT OR DWELLING UNIT OR OPEN DIRECTLY FROM A SPACE LESS THAN 3,000 SQUARE FEET IN AREA OR REVOLVING DOORS IN THE BUILDING ENTRANCE WHICH SHALL NOT ELIMINATE THE REQUIREMENT THAT A VESTIBULE BE PROVIDED ON ANY DOORS ADJACENT TO REVOLVING DOORS OR USED PRIMARILY TO FACILITATE VEHICULAR MOVEMENT OR MATERIAL HANDLING AND ADJACENT PERSONNEL DOORS.	A-201 (ARCHITECTURAL PLAN)
C402.4.8	RECESSED LIGHTING	RECESSED LUMINAIRES IN THE THERMAL ENVELOPE TO BE WEATHER SEALED	RECESSED LUMINAIRES IN THE ROOF CEILING ASSEMBLY SEALED TO ALLOW NO MORE THAN 2CFM AIR LEAKAGE AND SEALED WITH A GASKET OR CAULK	RECESSED LUMINAIRES INSTALLED IN THE BUILDING THERMAL ENVELOPE SHALL BE IC-RATED AND LABELED AS HAVING AN AIR LEAKAGE RATE OF NOT MORE 2.0 CFM. ALL RECESSED LUMINAIRES SHALL BE SEALED WITH A GASKET OR CAULK BETWEEN THE HOUSING AND INTERIOR WALL OR CEILING COVERING.	EN-107 (LIGHTING NOTES)
COMMERCIAL BUILDING MECHANICAL SYSTEMS					
C403.1	**BUILDING MECHANICAL SYSTEMS**				
C403.2	MANDATORY PROVISIONS				
C403.2.1	CALCULATION OF HEATING AND COOLING LOADS	MINIMUM AND MAXIMUM TEMPERATURES FOR INTERIOR DESIGN LOAD CALCULATIONS	DESIGN LOADS SHALL BE DETERMINED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN THEASHRAE/ACCA 183.	ASHRAE/ACCA 183 ASHRAE HVAC SYSTEMS AND EQUIPMENT HANDBOOK, CHAPTER 3 ENERGY CODE	A-202 (MECHANICAL SYSTEM NOTES)
C403.2.2	EQUIPMENT AND SYSTEM SIZING	HEATING AND COOLING EQUIPMENT SHALL NOT EXCEED CALCULATED LOADS	SPECIFIED EQUIPMENT SIZED WITHIN LOAD CALCULATION LIMITS	HEATING AND COOLING EQUIPMENT SHALL NOT EXCEED CALCULATED LOADS	A-202 (MECHANICAL SYSTEM NOTES)
C403.2.3	**HVAC EQUIPMENT PERFORMANCE REQUIREMENTS**				
C403.2.3(5)	BOILERS, HOT WATER GAS FIRED	WILLIAMSON MODEL # GWA 070 MEA# 411-00-E	70,000 BTU/H / HOT WATER / 83% AFUE	< 300,000 BTU/H / HOT WATER / 82% AFUE	A-202 (EQUIPMENT LIST)
C403.2.4	**HVAC SYSTEM CONTROLS**				
C403.2.4.1	THERMOSTATIC CONTROLS	THERMOSTATS	ONE THERMOSTAT IS PROVIDED FOR EACH ZONE	MINIMUM ONE THERMOSTAT REQUIRED PER ZONE	EN-106, EN-107 (REFLECTIVE CEILING PLANS)
C403.2.4.2	SET POINT OVERLAP RESTRICTION	BOILER	EACH THERMOSTAT WILL BE PROGRAMMED AS REQUIRED	ZONE THERMOSTAT OPERATION SHALL HAVE MINIMUM 5 DEGREE DEAD BAND BETWEEN HEATING AND COOLING	EN-107 (NOTES)
C403.2.4.3	OFF-HOUR CONTROLS, SETBACKS	ALL ZONES	EACH THERMOSTAT WILL BE PROGRAMMABLE TO MEET REQUIREMENTS	ALL ZONE THERMOSTAT SHALL BE OPERATED VIA THERMOSTATIC SET BACK CONTROLS OPERATED VIA AN AUTOMATIC TIME CLOCK OR A PROGRAMMABLE CONTROL SYSTEM	EN-107 (NOTES)
C403.2.4.3.1	THERMOSTATIC SETBACK CAPABILITIES	ALL ZONES	EACH THERMOSTAT WILL BE PROGRAMMABLE TO MEET REQUIREMENTS	CONTROLS SHALL HAVE ABILITY TO SETBACK TEMPERATURES DOWN TO 55 DEGREES F. OR UP TO 85 DEGREES F.	EN-107 (NOTES)
C403.2.4.3.2	AUTOMATIC SETBACK AND SHUTDOWN CAPABILITIES	ALL ZONES	EACH THERMOSTAT WILL BE PROGRAMMABLE TO MEET REQUIREMENTS	CONTROLS SHALL BE CAPABLE OF AUTOMATICALLY STARTING AND STOPPING THE SYSTEMS FOR SEVEN DIFFERENT DAILY SCHEDULES PER WEEK, CAPABLE OF HAVING SETTINGS SAVED IN MEMORY FOR 10 HOURS DURING A LOSS OF POWER, AND A MANUAL SYSTEM "ON" OVERRIDE FOR UP TO TWO HOURS, OR AN OCCUPANCY SENSOR	EN-107 (NOTES)
C403.2.4.4; C403.2.4.4.1; C403.2.4.4.2	SHUTOFF DAMPER CONTROLS STAIRWAY AND SHAFT VENT DAMPERS. OUTDOOR AIR INTAKES AND EXHAUSTS.	OUTSIDE AIR INTAKES AND EXHAUST	EACH OUTDOOR SUPPLY AIR AND EXHAUST AIR DUCTS ARE PROVIDED WITH CLASS I MOTORIZED DAMPERS TO SHUTOFF WHEN NOT IN USE OR AUTOMATICALLY OPEN DURING FIRE ALARM OR POWER INTERRUPTION OR GRAVITY DAMPERS FOR OUTSIDE AIR INTAKE OR EXHAUST AIR FLOWS OF 300 CFM OR LESS	STAIRWAY AND SHAFT VENTS SHALL BE PROVIDED WITH CLASS I MOTORIZED DAMPERS WITH A MAXIMUM LEAKAGE RATE OF 4 CFM/FT². OUTDOOR AIR SUPPLY AND EXHAUST OPENINGS IN THE BUILDING ENVELOPE, DUCTS, OR EQUIPMENT SHALL BE PROVIDED WITH CLASS I MOTORIZED DAMPERS WITH A MAXIMUM LEAKAGE RATE OF 4 CFM/FT². EXCEPTIONS: GRAVITY (NONMOTORIZED) DAMPERS HAVING A MAXIMUM LEAKAGE RATE OF 20 CFM/FT² AT 1.0 INCH WATER GAUGE IN BUILDINGS LESS THAN THREE STORIES IN HEIGHT ABOVE GRADE FOR EXHAUST AND RELIEF DAMPERS OR WHERE THE DESIGN OUTDOOR AIR INTAKE OR EXHAUST CAPACITY DOES NOT EXCEED 300 CFM. GRAVITY (NONMOTORIZED) DAMPERS SMALLER THAN 24 INCHES (610MM) IN EITHER DIMENSION SHALL BE PERMITTED TO HAVE A LEAKAGE OF 40 CFM/FT² AT 1.0 INCH WATER GAUGE.	A-202 (NOTES)
C403.2.7	**DUCT AND PLENUM INSULATION AND SEALING**				
C403.2.7	MINIMUM DUCT INSULATION	MINIMUM DUCT INSULATION	R-5 IN UNCONDITIONED SPACES R-8 FOR OUTDOOR SPACES	ALL SUPPLY AND RETURN AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-6 INSULATION WHERE LOCATED IN UNCONDITIONED SPACES AND A MINIMUM OF R-8 INSULATION WHERE LOCATED OUTSIDE THE BUILDING.	A-202 (NOTES)
C403.2.8	**PIPING INSULATION**				
C403.2.8 TABLE C403.2.8	HOT WATER PIPING INSULATION	INSULATION FOR HOT WATER PIPING	ALL PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE C403.2.8.	ALL PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE C403.2.8.	A-202 (NOTES) (TABLE C403.2.8)
COMMERCIAL BUILDING SERVICE WATER HEATING					
C404	**SERVICE WATER HEATING**				
C404.2	EQUIPMENT PERFORMANCE EFFICIENCY - STORAGE WATER HEATERS, GAS	STORAGE WATER HEATERS, GAS	A.O. SMITH MODEL# GCV-40 40,000 BTU INPUT/ 40 gal 0.59 EF/ MEA# 376-04-E	≤ 75,000 BTU/H AND ≥ 20 gal. 0.67 - 0.0019V, EF	A-202 (NOTES)
C404.3	TEMPERATURE CONTROLS	TEMPERATURE CONTROLS	HOLBY VALVE, MIXED WATER TEMPERATURE SET FOR 110 DEGREES F.	CONTROLS SHALL ALLOW 110 DEGREE F SET POINT FOR DWELLINGS, AND 90 DEGREES F FOR OTHER OCCUPANCIES. LAVATORIES IN PUBLIC RESTROOMS SHALL BE LIMITED TO 110 DEGREES F	A-202 (NOTES)
C404.4	HEAT TRAPS	HEAT TRAPS	WATER HEATING EQUIPMENT SHALL BE SUPPLIED WITH HEAT TRAPS IF APPLICABLE	WATER HEATING EQUIPMENT SHALL BE PROVIDED WITH HEAT TRAPS ON THE SUPPLY AND DISCHARGE PIPING IF NOT INTEGRATED WITH EQUIPMENT	A-202 (NOTES)
C404.5	PIPE INSULATION	PIPE INSULATION	1" MINIMUM INSULATION SHALL BE USED ON ALL HOT WATER SERVICE PIPING	FOR AUTOMATIC CIRCULATING HOT WATER SYSTEMS AND HEAT-TRACED SYSTEMS, PIPING SHALL BE INSULATED NOT LESS THAN 1 INCH OF INSULATION. THE FIRST 8 FEET OF PIPING IN NON-HOT-WATER-SUPPLY TEMPERATURE MAINTENANCE SYSTEMS SERVED BY EQUIPMENT WITHOUT INTEGRAL HEAT TRAPS SHALL BE INSULATED WITH 0.5 INCH OF MATERIAL.	A-202 (NOTES)
C404.6	HOT WATER SYSTEM CONTROLS	CIRCULATING PUMPS	IF PROVIDED, CONTROLS SHALL SHUT OF HEAT TRACE WHEN HEATING SYSTEM IS NOT IN OPERATION	CIRCULATING HOT WATER SYSTEM PUMPS OR HEAT TRACE SHALL BE ARRANGED TO BE TURNED OFF EITHER AUTOMATICALLY OR MANUALLY WHEN THERE IS LIMITED HOT WATER DEMAND.	A-202 (NOTES)
COMMERCIAL BUILDING ELECTRICAL AND POWER LIGHTING SYSTEMS					
C405.1	DWELLING UNITS WITHIN COMMERCIAL BUILDINGS	DWELLING UNITS WITHIN COMMERCIAL BUILDINGS	MINIMUM 75 PERCENT PERMANENTLY INSTALLED HIGH-EFFIENCY LAMPS PROVIDED IN DWELLING UNITS	DWELLING UNITS WITHIN COMMERCIAL BUILDINGS SHALL NOT BE REQUIRED TO COMPLY WITH SECTIONS C405.2 THROUGH C405.5 PROVIDED THAT A MINIMUM OF 75 PERCENT OF THE LAMPS IN PERMANENTLY INSTALLED LIGHTING FIXTURES, OTHER THAN LOW VOLTAGE LIGHTING, SHALL BE HIGH-EFFICACY LAMPS.	EN-107 (NOTES)
C405.2	**LIGHTING CONTROLS (MANDATORY)**				
C405.2.1.1	INTERIOR LIGHTING CONTROLS	INTERIOR LIGHTING CONTROLS	INTERIOR LIGHTING CONTROLS HAVE BEEN PROVIDED.	EACH AREA ENCLOSED BY WALLS OR FLOOR-TO-CEILING PARTITIONS SHALL HAVE AT LEAST ONE MANUAL CONTROL FOR THE LIGHTING SERVING THAT AREA. THE REQUIRED CONTROLS SHALL BE LOCATED WITHIN THE AREA SERVED BY THE CONTROLS OR BE A REMOTE SWITCH THAT IDENTIFIES THE LIGHTS SERVED AND INDICATES THEIR STATUS.	EN-106, AND EN-107
C405.2.1.2	LIGHTING REDUCTION CONTROLS	MANUAL CONTROLS FOR LIGHTING REDUCTION ARE NOT PROVIDED	LIGHTING REDUCTION ARE NOT REQUIRED FOR AREAS THAT HAVE ONLY ONE LUMINAIRE, SLEEPING UNIT, SPACES THAT USE LESS THAN 0.6 WATTS PER SQUARE FOOT (6.5 W/M2), ETC	EACH AREA THAT IS REQUIRED TO HAVE A MANUAL CONTROL SHALL ALSO ALLOW THE OCCUPANT TO REDUCE THE CONNECTED LIGHTING LOAD IN A REASONABLY UNIFORM ILLUMINATION PATTERN BY AT LEAST 50%. *SEE CODE FOR APPROVED METHODS OF REDUCTION.	EN-107 (LIGHTING NOTES)
C405.2.2, SEE SECTIONS C405.2.2.1, C405.2.2.2 AND C405.2.2.3	ADDITIONAL LIGHTING CONTROLS	ADDITIONAL LIGHTING CONTROLS	ADDITIONAL LIGHTING CONTROLS PROVIDED WHERE APPLICABLE	EACH AREA THAT IS REQUIRED TO HAVE A MANUAL CONTROL SHALL ALSO HAVE CONTROLS THAT MEET THE REQUIREMENTS OF SECTIONS C405.2.2.1, C405.2.2.2 AND C405.2.2.3.	E-106(REFLECTED CEILING PLAN) E-107(NOTES)
C405.2.2.2	OCCUPANCY SENSORS	OCCUPANCY SENSORS	OCCUPANCY SENSORS PROVIDED WHERE APPLICABLE	AUTOMATIC CONTROL DEVICES SHALL BE INSTALLED IN SPACES TO AUTOMATICALLY TURN OFF LIGHTS WITHIN 30 MINUTES OF ALL OCCUPANTS LEAVING	EN-107 (NOTES)
C405.2.2.3	DAYLIGHT ZONE CONTROL	DAYLIGHT ZONE CONTROL THROUGH MANUAL LIGHT SWITCH	DAYLIGHT ZONE CONTROL THROUGH MANUAL LIGHT SWITCH PROVIDED AS REQUIRED	DAYLIGHT ZONES SHALL BE DESIGNED SUCH THAT LIGHTS IN THE DAYLIGHT ZONE ARE CONTROLLED INDEPENDENTLY OF GENERAL AREA LIGHTING AND ARE CONTROLLED EITHER BY MANUAL DAYLIGHTING CONTROLS. EACH DAYLIGHT CONTROL ZONE SHALL NOT EXCEED 2,500 SQUARE FEET (232 M2). CONTIGUOUS DAYLIGHT ZONES ADJACENT TO VERTICAL FENESTRATION ARE ALLOWED TO BE CONTROLLED BY A SINGLE CONTROLLING DEVICE PROVIDED THAT THEY DO NOT INCLUDE ZONES FACING MORE THAN TWO ADJACENT CARDINAL ORIENTATIONS (I.E., NORTH, EAST, SOUTH, WEST).DAYLIGHTZONES UNDER SKYLIGHTS MORE THAN 15 FEET (4572 MM) FROM THE PERIMETER SHALL BE CONTROLLED SEPARATELY FROM DAYLIGHT ZONES ADJACENT TO VERTICAL FENESTRATION.	EN-106, EN-107 (REFLECTED CEILING PLAN)
C405.2.3	SPECIFIC APPLICATION CONTROLS	SPECIFIC APPLICATION CONTROLS	SPECIFIC APPLICATION CONTROLS PROVIDED WHERE APPLICABLE	SPECIFIC APPLICATION CONTROLS SHALL BE PROVIDED. *SEE CODE FOR SPECIFIC APPLICATION CONTROLS.	EN-107 (NOTES)
C405.2.4	EXTERIOR LIGHTING CONTROLS	DAYLIGHT SENSOR CONTROLS PROVIDED ENTRY LIGHTING. MANUAL OVERRIDES TO BE PROVIDED.	PHOTOSENSORS PROVIDED WHERE APPLICABLE AND PROGRAMMED AS PER REQUIREMENTS	ALL EXTERIOR LIGHTING SHALL BE PROVIDED WITH A CONTROL THAT AUTOMATICALLY TURNS OFF THE LIGHTING WHEN DAYLIGHT IS AVAILABLE. ALL CONTROLS THAT OPERATE AS A FUNCTION OF TIME SHALL BE CAPABLE OF RETAINING PROGRAMMING AND THE TIME SETTING DURING A LOSS OF POWER OF AT LEAST 10 HOURS	EN-106 (REFLECTING CEILING PLAN)
C405.4	EXIT SIGNS	EXIT SIGNS TO BE PROVIDED	MINIMUM 5W PER SIDE EXIT SIGNS PROVIDED	INTERNALLY ILLUMINATED EXIT SIGNS SHALL NOT EXCEED 5 WATTS PER SIDE.	EN-107 (NOTES)
C405.5	**INTERIOR LIGHTING POWER REQUIREMENTS (PRESCRIPTIVE)**				
C405.5.2 AND TABLE C405.5.2 (1)	INTERIOR LIGHTING POWER	INTERIOR LIGHTING POWER FOR: RETAIL	RETAIL: .27	RETAIL: 1.4	EN-107
C405.6, C405.6.2(1) AND C405.6.2(2)	EXTERIOR BUILDING LIGHTING POWER	THE TOTAL EXTERIOR LIGHTING POWER ALLOWANCE FOR LIGHTING ZONE 2	ZONE: 2 - 600W MAX EXTERIOR LIGHTING POWER ALLOWANCE: 81W < 600W	THE TOTAL EXTERIOR LIGHTING POWER ALLOWANCE FOR ALL EXTERIOR BUILDING APPLICATIONS IS THE SUM OF THE BASE SITE ALLOWANCE PLUS THE INDIVIDUAL ALLOWANCES FOR AREAS THAT ARE TO BE ILLUMINATED AND ARE PERMITTED IN TABLE C405.6.2(2) FOR THE APPLICABLE LIGHTING ZONE	EN-107 (EXTERIOR POWER ALLOWANCE)
C405.7	ELECTRICAL ENERGY CONSUMPTION (MANDATORY)	SEPARATE ELECTRICAL METERS HAVE BEEN PROVIDED FOR EACH UNIT.	METER FOR EACH UNIT PROVIDED	IN BUILDINGS HAVING INDIVIDUAL DWELLING UNITS, PROVISIONS SHALL BE MADE TO DETERMINE THE ELECTRICAL ENERGY CONSUMED BY EACH TENANT BY SEPARATELY METERING INDIVIDUAL DWELLING UNITS.	A-201 (ARCHITECTURAL PLAN)
C408.2.5	MANUALS	OPERATING AND MAINTENANCE MANUAL REQUIREMENTS	CONTRACTOR SHALL PROVIDE MANUALS FOR, BUT NOT LIMITED TO, MECHANICAL EQUIPMENTS.	OPERATING AND MAINTENANCE MANUAL SHALL BE PROVIDED BY MECHANICAL CONTRACTOR AND SPECIFIED IN THE CONSTRUCTION DOCUMENTS	A-101 (NOTES)



THERMAL ENVELOPE
SCALE: N.T.S.

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
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FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

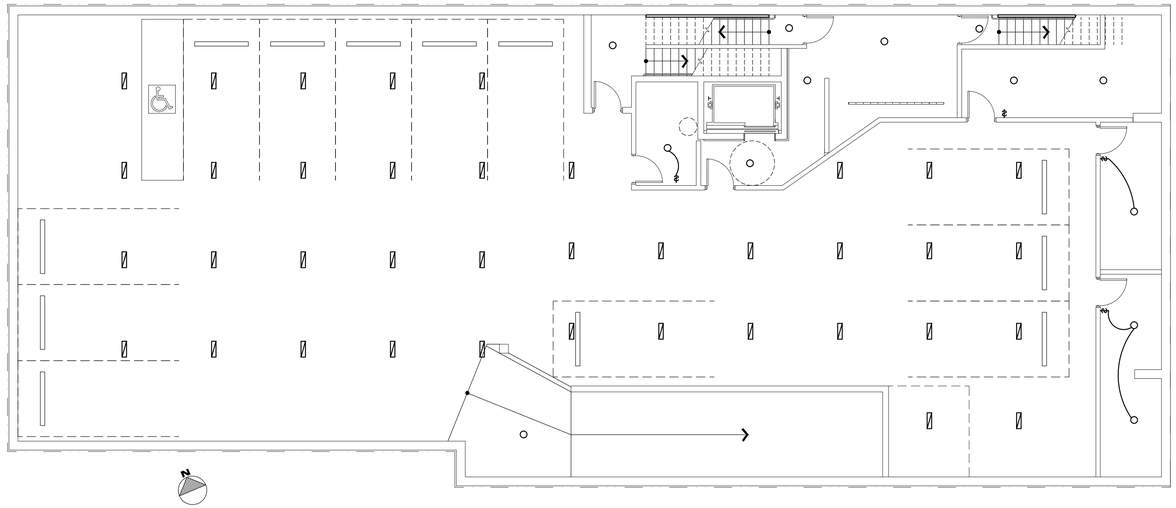
PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

ENERGY TABULAR ANALYSIS ENERGY INSPECTION ITEMS THERMAL ENVELOPE

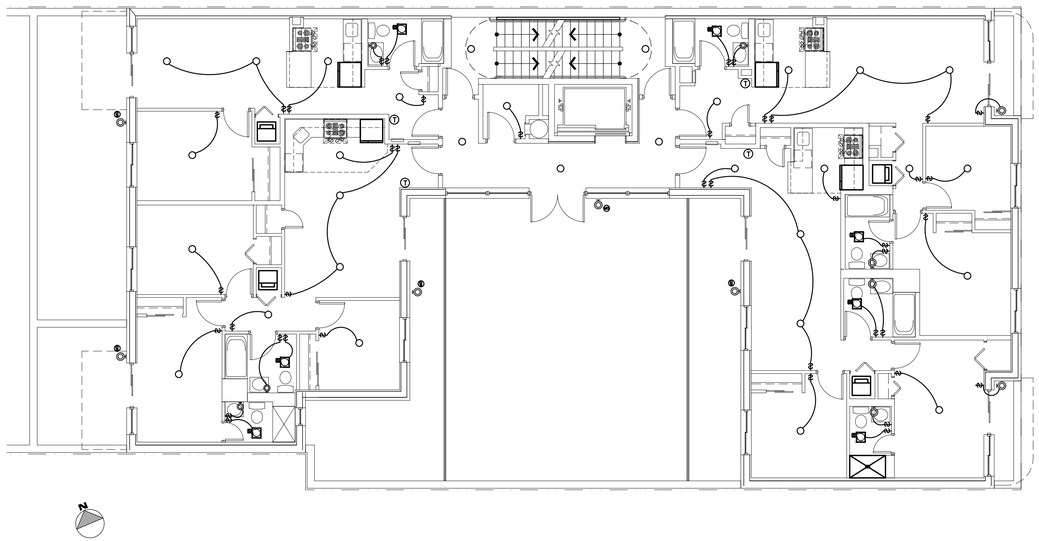
DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE: REGISTERED ARCHITECT CHANG HWA TAN 025376 STATE OF NEW YORK	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: EN-105.00
	5 OF 22



CELLAR FLOOR REFLECTED CEILING PLAN

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

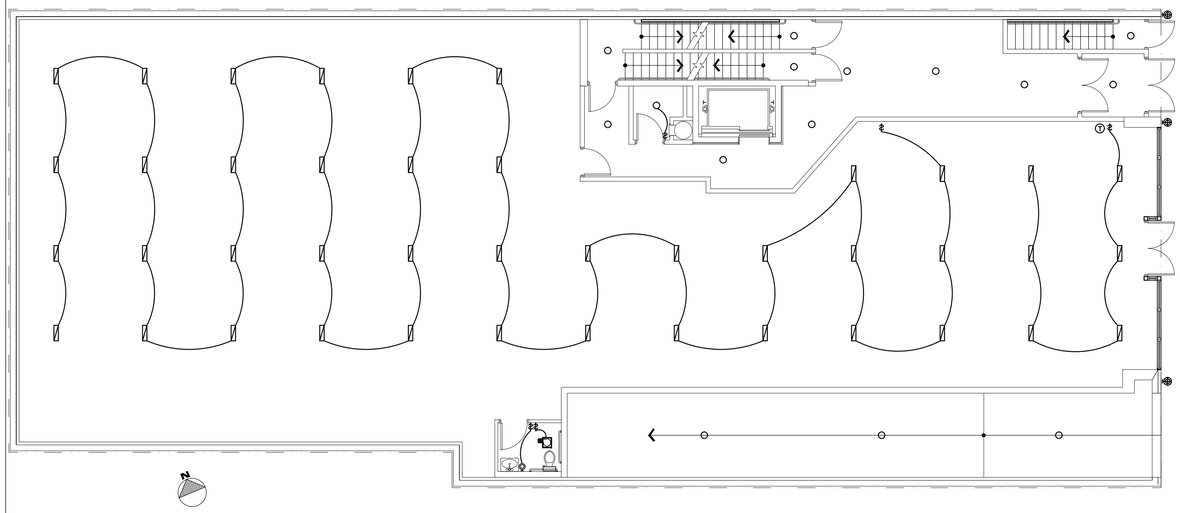
CELLAR FLOOR LIGHT FIXTURE SCHEDULE			
SYMBOLS	DESCRIPTION	NO. OF FIXTURE	TOTAL WATTS
	1'-0" X 4'-0" SURFACE MOUNTED FLUORESCENT LIGHT FIXTURE WITH 1 LAMP @ 32W EACH T8 LAMPS AND ELECTRONIC BALLAST	28	896
	25W INCANDESCENT LAMP, SURFACE-MOUNT DOWNLIGHTING	13	325
	20W WALL MOUNT INCANDESCENT SCONCE	0	0
	20W WALL MOUNT INCANDESCENT SCONCE W/ MOTION SENSOR	0	0
	EXHAUST FAN W/ 25W INCANDESCENT LAMP DOWNLIGHTING	0	0
T	PROGRAMMABLE THERMOSTAT CONTROL OF HEATING AND COOLING	0 CONTROLS	
TOTAL LIGHTING WATT AT THIS FLOOR			1221



2nd FLOOR REFLECTED CEILING PLAN

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

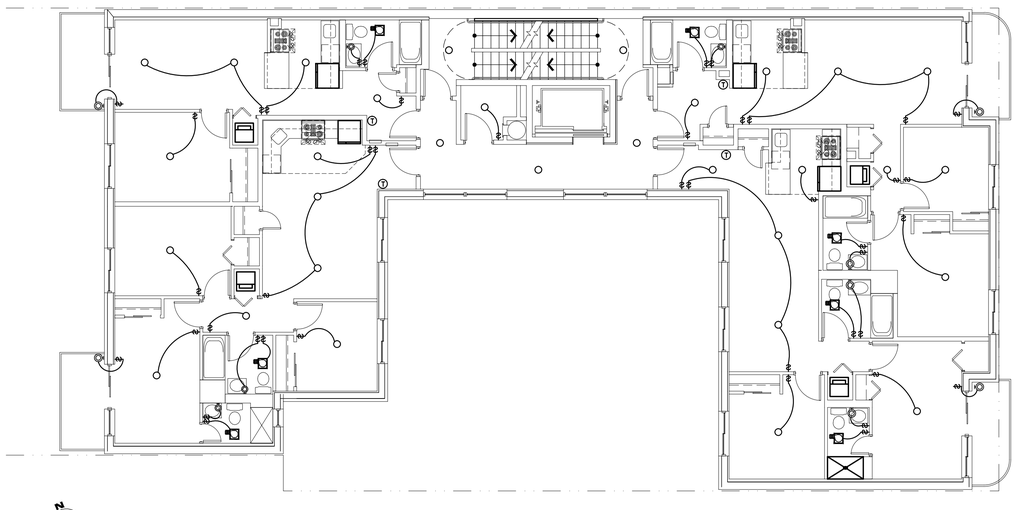
SECOND FLOOR LIGHT FIXTURE SCHEDULE			
SYMBOLS	DESCRIPTION	NO. OF FIXTURE	TOTAL WATTS
	1'-0" X 4'-0" SURFACE MOUNTED FLUORESCENT LIGHT FIXTURE WITH 1 LAMP @ 32W EACH T8 LAMPS AND ELECTRONIC BALLAST	0	0
	25W INCANDESCENT LAMP, SURFACE-MOUNT DOWNLIGHTING	31	775
	20W WALL MOUNT INCANDESCENT SCONCE	2	40
	20W WALL MOUNT INCANDESCENT SCONCE W/ MOTION SENSOR	5	100
	EXHAUST FAN W/ 25W INCANDESCENT LAMP DOWNLIGHTING	7	175
T	PROGRAMMABLE THERMOSTAT CONTROL OF HEATING AND COOLING	4 CONTROLS	
TOTAL LIGHTING WATT AT THIS FLOOR			1090



1st FLOOR REFLECTED CEILING PLAN

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

FIRST FLOOR LIGHT FIXTURE SCHEDULE			
SYMBOLS	DESCRIPTION	NO. OF FIXTURE	TOTAL WATTS
	1'-0" X 4'-0" SURFACE MOUNTED FLUORESCENT LIGHT FIXTURE WITH 1 LAMP @ 32W EACH T8 LAMPS AND ELECTRONIC BALLAST	42	1344
	25W INCANDESCENT LAMP, SURFACE-MOUNT DOWNLIGHTING	12	300
	20W WALL MOUNT INCANDESCENT SCONCE	1	20
	27W WALL MOUNT FLUORESCENT LIGHT	3	81
	20W WALL MOUNT INCANDESCENT SCONCE W/ MOTION SENSOR	0	0
	EXHAUST FAN W/ 25W INCANDESCENT LAMP DOWNLIGHTING	1	25
T	PROGRAMMABLE THERMOSTAT CONTROL OF HEATING AND COOLING	1 CONTROLS	
TOTAL LIGHTING WATT AT THIS FLOOR			1689



3rd to 6th FLOOR REFLECTED CEILING PLAN

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

3RD TO 6TH FLOOR LIGHT FIXTURE SCHEDULE			
SYMBOLS	DESCRIPTION	NO. OF FIXTURE	TOTAL WATTS
	1'-0" X 4'-0" SURFACE MOUNTED FLUORESCENT LIGHT FIXTURE WITH 1 LAMP @ 32W EACH T8 LAMPS AND ELECTRONIC BALLAST	0	0
	25W INCANDESCENT LAMP, SURFACE-MOUNT DOWNLIGHTING	31	775
	20W WALL MOUNT INCANDESCENT SCONCE	0	0
	20W WALL MOUNT INCANDESCENT SCONCE W/ MOTION SENSOR	4	80
	EXHAUST FAN W/ 25W INCANDESCENT LAMP DOWNLIGHTING	7	175
T	PROGRAMMABLE THERMOSTAT CONTROL OF HEATING AND COOLING	3 CONTROLS	
TOTAL LIGHTING WATT AT EACH FLOOR			1030

CLIENT:

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(718) 224-1130/Tel
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STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

ENERGY ANALYSIS REFLECTED CEILING PLANS

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

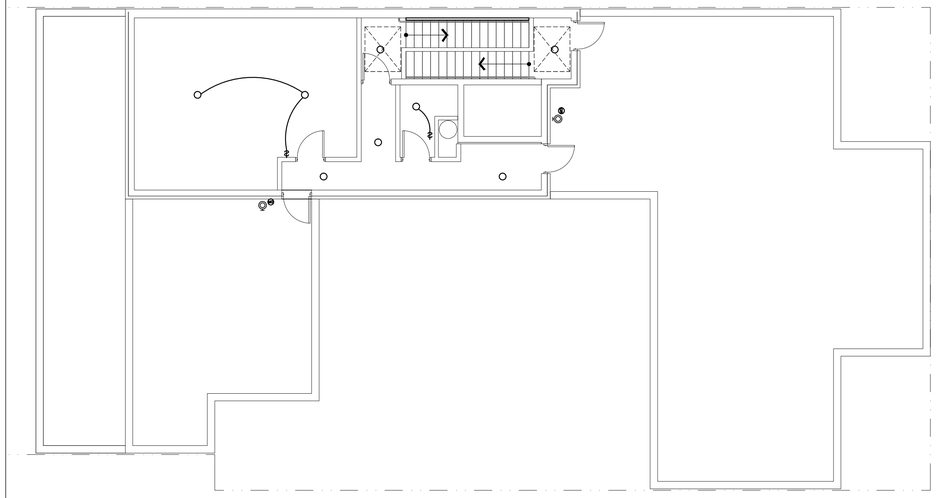
REGISTERED ARCHITECT GUANG HWA TAN 025376 STATE OF NEW YORK

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

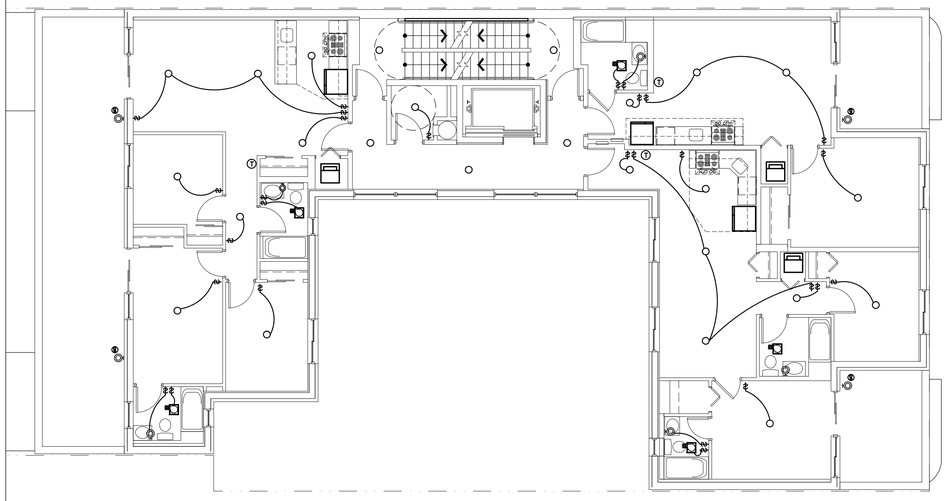
EN-106.00



ROOF FLOOR REFLECTED CEILING PLAN

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

ROOF BULKHEAD LIGHT FIXTURE SCHEDULE			
SYMBOLS	DESCRIPTION	NO. OF FIXTURE	TOTAL WATTS
	1'-0" X 4'-0" SURFACE MOUNTED FLUORESCENT LIGHT FIXTURE WITH 1 LAMP @ 32W EACH T8 LAMPS AND ELECTRONIC BALLAST	0	0
	25W INCANDESCENT LAMP, SURFACE-MOUNT DOWNLIGHTING	8	200
	20W WALL MOUNT INCANDESCENT SCONCE	0	0
	20W WALL MOUNT INCANDESCENT SCONCE W/ MOTION SENSOR	2	40
	EXHAUST FAN W/ 25W INCANDESCENT LAMP DOWNLIGHTING	0	0
T	PROGRAMMABLE THERMOSTAT CONTROL OF HEATING AND COOLING	0 CONTROLS	
TOTAL LIGHTING WATT AT THIS FLOOR			240



7th FLOOR REFLECTED CEILING PLAN

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

5TH FLOOR LIGHT FIXTURE SCHEDULE			
SYMBOLS	DESCRIPTION	NO. OF FIXTURE	TOTAL WATTS
	1'-0" X 4'-0" SURFACE MOUNTED FLUORESCENT LIGHT FIXTURE WITH 1 LAMP @ 32W EACH T8 LAMPS AND ELECTRONIC BALLAST	0	0
	25W INCANDESCENT LAMP, SURFACE-MOUNT DOWNLIGHTING	25	625
	20W WALL MOUNT INCANDESCENT SCONCE	0	0
	20W WALL MOUNT INCANDESCENT SCONCE W/ MOTION SENSOR	4	80
	EXHAUST FAN W/ 25W INCANDESCENT LAMP DOWNLIGHTING	5	125
T	PROGRAMMABLE THERMOSTAT CONTROL OF HEATING AND COOLING	3 CONTROLS	
TOTAL LIGHTING WATT AT EACH FLOOR			830

EXTERIOR LIGHTING ZONES

LIGHTING ZONE 2 - AREAS PREDOMINANTLY CONSISTING OF RESIDENTIAL ZONING, NEIGHBORHOOD BUSINESS DISTRICTS, LIGHT INDUSTRIAL WITH LIMITED NIGHT-TIME USE AND RESIDENTIAL MIXED-USE AREAS

INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

BASE SITE ALLOWANCE (BASE ALLOWANCE MAY BE USED IN TRADABLE OR NONTRADABLE SURFACES.)

(3) EXTERIOR WALL MOUNTED 27W COMPACT FLUORESCENT LIGHT = 81 W — ZONE 2 - 600W

81W < 600W

	B	C	D	E
LIGHTING SCHEDULE	LAMPS/ FIXTURE	# OF FIXTURES	FIXTURE WATT.	C X D
RETAIL STORE (5,033.80 SQ. FT.)				
1. 1'-0" X 4'-0" SURFACE MOUNTED FLUORESCENT LIGHT FIXTURE WITH 1 LAMP @ 32W EACH T8 LAMPS AND ELECTRONIC BALLAST	2	42	32	1344
2. 20W WALL MOUNT INCANDESCENT SCONCE / ELECTRONIC BALLAST	1	1	20	20
			TOTAL PROPOSED WATTAGE =	1364

LIGHTING POWER DENSITY				
SPACE TYPE	AREA (S.F.)	DESIGN WATTAGE	DESIGN LPD [W/SF]	INTERIOR LIGHTING POWER ALLOWANCES NYCECC TABLE C405.5.2
RETAIL STORE	5,033.80 S.F.	1364	.27	1.4

LIGHTING NOTES

- LIGHT REDUCTION CONTROLS – EACH AREA THAT IS REQUIRED TO HAVE A MANUAL CONTROL SHALL ALSO ALLOW THE OCCUPANT TO REDUCE THE CONNECTED LIGHTING LOAD IN A REASONABLY UNIFORM ILLUMINATION PATTERN BY AT LEAST 50 PERCENT. LIGHTING REDUCTION SHALL BE ACHIEVED BY ONE OF THE FOLLOWING OR OTHER APPROVED METHOD:

1 CONTROLLING ALL LAMPS OR LUMINAIRES
2 DUAL SWITCHING OF ALTERNATE ROWS OF LUMINAIRES, ALTERNATE LUMINAIRES OR ALTERNATE LAMPS
3 SWITCHING THE MIDDLE LUMINAIRE LAMPS INDEPENDENTLY OF THE OUTER LAMPS
4 SWITCHING EACH LUMINAIRE OR EACH LAMP

EXCEPTIONS: LIGHT REDUCTION CONTROLS NEED NOT BE PROVIDED IN THE FOLLOWING AREAS AND SPACES:

1 AREAS THAT HAVE ONLY ONE LUMINAIRE, WITH RATED POWER LESS THAN 100 WATTS.
2 AREAS THAT ARE CONTROLLED BY AN OCCUPANT-SENSING DEVICE
3 CORRIDORS, EQUIPMENT ROOMS, STORERROMS, RESTROOMS, PUBLIC LOBBIES, ELECTRICAL OR MECHANICAL ROOMS.
4 SLEEPING UNIT (SEE SECTION C405.2.3).
5 SPACES THAT USE LESS THAN 0.6 WATTS PER SQUARE FOOT (6.5 W/M²)
6 DAYLIGHT SPACES COMPLYING WITH SECTION C405.2.2.3.2.

- ADDITIONAL LIGHTING CONTROLS – EACH AREA THAT IS REQUIRED TO HAVE A MANUAL CONTROL SHALL ALSO HAVE CONTROLS THAT MEET THE REQUIREMENTS OF SECTIONS C405.2.2.1, C405.2.2.2 AND C405.2.2.3.
- EXCEPTION: ADDITIONAL LIGHTING CONTROLS NEED NOT BE PROVIDED IN THE FOLLOWING SPACES:

1 SLEEPING UNITS.
2 SPACES WHERE PATIENT CARE IS DIRECTLY PROVIDED.
3 SPACES WHERE AN AUTOMATIC SHUTOFF WOULD ENDANGER OCCUPANT SAFETY OR SECURITY.
4 LIGHTING INTENDED FOR CONTINUOUS OPERATION.

- AUTOMATIC TIME SWITCH CONTROL DEVICES – AUTOMATIC TIME SWITCH CONTROLS SHALL BE INSTALLED TO CONTROL LIGHTING IN ALL AREAS OF THE BUILDING.

EXCEPTIONS:

1. EMERGENCY EGRESS LIGHTING DOES NOT NEED TO BE CONTROLLED BY AN AUTOMATIC TIME SWITCH.
2. LIGHTING IN SPACES CONTROLLED BY OCCUPANCY SENSORS DOES NOT NEED TO BE CONTROLLED BY AUTOMATIC TIME SWITCH CONTROLS.

- THE AUTOMATIC TIME SWITCH CONTROL DEVICE SHALL INCLUDE AN OVERRIDE SWITCHING DEVICE THAT COMPLIES WITH THE FOLLOWING:

1. THE OVERRIDE SWITCH SHALL BE IN A READILY ACCESSIBLE LOCATION;
2. THE OVERRIDE SWITCH SHALL BE LOCATED WHERE THE LIGHTS CONTROLLED BY THE SWITCH ARE VISIBLE; OR THE SWITCH SHALL PROVIDE A MECHANISM WHICH ANNOUNCES THE AREA CONTROLLED BY THE SWITCH;
3. THE OVERRIDE SWITCH SHALL PERMIT MANUAL OPERATION;
4. THE OVERRIDE SWITCH, WHEN INITIATED, SHALL PERMIT THE CONTROLLED LIGHTING TO REMAIN ON FOR A MAXIMUM OF 2 HOURS; AND
5. ANY INDIVIDUAL OVERRIDE SWITCH SHALL CONTROL THE LIGHTING FOR A MAXIMUM AREA OF 5,000 SQUARE FEET (465 M2).

EXCEPTION: WITHIN MALLS, ARCADES, AUDITORIUMS, SINGLE TENANT RETAIL SPACES, INDUSTRIAL FACILITIES AND ARENAS:

1. THE TIME LIMIT SHALL BE PERMITTED TO EXCEED 2 HOURS PROVIDED THE OVERRIDE SWITCH IS A CAPTIVE KEY DEVICE; AND
2. THE AREA CONTROLLED BY THE OVERRIDE SWITCH IS PERMITTED TO EXCEED 5,000 SQUARE FEET (465 M2), BUT SHALL NOT EXCEED 20,000 SQUARE FEET (1860 M2).

- OCCUPANCY SENSORS – AUTOMATIC CONTROL DEVICES SHALL BE INSTALLED IN THE FOLLOWING SPACES TO AUTOMATICALLY TURN OFF LIGHTS WITHIN 30 MINUTES OF ALL OCCUPANTS LEAVING THE SPACE AS FOLLOWS:

1. OCCUPANCY SENSORS SHALL BE INSTALLED IN ALL CLASSROOMS (NOT INCLUDING SHOP CLASSROOMS, LABORATORY CLASSROOMS, AND PRESCHOOL CLASSROOMS), CONFERENCE/MEETING ROOMS, EMPLOYEE LUNCH AND BREAK ROOMS, AND OFFICES SMALLER THAN 200 SQUARE FEET (18.5 M2) IN AREA. THESE SHALL BE MANUAL-ON SWITCHES. SUCH SENSORS AND CONTROLS SHALL NOT HAVE AN OVERRIDE SWITCH THAT CONVERTS FROM MANUAL-ON TO AUTOMATIC-ON FUNCTIONALITY. THE OCCUPANCY SENSOR MAY HAVE A GRACE PERIOD OF UP TO 30 SECONDS TO TURN ON THE LIGHTING AUTOMATICALLY AFTER THE SENSOR HAS TURNED OFF THE LIGHTING IF OCCUPANCY IS DETECTED.
2. OCCUPANCY SENSORS SHALL BE INSTALLED IN RESTROOMS, STORAGE ROOMS, PRIVATE OFFICES 200 SQUARE FEET (18.5 M2) IN AREA OR GREATER, JANITORIAL CLOSETS, AND OTHER SPACES 300 SQUARE FEET IN AREA OR LESS ENCLOSED BY FLOOR-TO-CEILING HEIGHT PARTITIONS, EXCEPT FOR SPACES LISTED IN ITEM 1. THESE AUTOMATIC CONTROL DEVICES SHALL BE INSTALLED TO AUTOMATICALLY TURN OFF LIGHTS WITHIN 30 MINUTES OF ALL OCCUPANTS LEAVING THE SPACE, AND SHALL EITHER BE MANUAL-ON OR SHALL BE CONTROLLED TO AUTOMATICALLY TURN THE LIGHTING ON TO NOT MORE THAN 50 PERCENT POWER.

EXCEPTION:

1. FULL AUTOMATIC-ON CONTROLS SHALL BE PERMITTED TO CONTROL LIGHTING IN PUBLIC CORRIDORS, STAIRWAYS, RESTROOMS, PRIMARY BUILDING ENTRANCE AREAS AND LOBBIES, AND AREAS WHERE MANUAL-ON OPERATION WOULD ENDANGER THE SAFETY OR SECURITY OF THE ROOM OR BUILDING OCCUPANTS.

- DAYLIGHT ZONE CONTROL – DAYLIGHT ZONES SHALL BE DESIGNED SUCH THAT LIGHTS IN THE DAYLIGHT ZONE ARE CONTROLLED INDEPENDENTLY OF GENERAL AREA LIGHTING AND ARE CONTROLLED IN ACCORDANCE WITH EITHER SECTION C405.2.2.3.1 OR SECTION C405.2.2.3.2. EACH DAYLIGHT CONTROL ZONE SHALL NOT EXCEED 2,500 SQUARE FEET (232 M2). CONTIGUOUS DAYLIGHT ZONES ADJACENT TO VERTICAL FENESTRATION ARE ALLOWED TO BE CONTROLLED BY A SINGLE CONTROLLING DEVICE PROVIDED THAT THEY DO NOT INCLUDE ZONES FACING MORE THAN TWO ADJACENT CARDINAL ORIENTATIONS (I.E., NORTH, EAST, SOUTH, WEST).DAYLIGHTZONES UNDER SKYLIGHTS MORE THAN 15 FEET (4572 MM) FROM THE PERIMETER SHALL BE CONTROLLED SEPARATELY FROM DAYLIGHT ZONES ADJACENT TO VERTICAL FENESTRATION.

EXCEPTION: DAYLIGHT ZONES ENCLOSED BY WALLS OR CEILING HEIGHT PARTITIONS AND CONTAINING TWO OR FEWER LIGHT FIXTURES ARE NOT REQUIRED TO HAVE A SEPARATE SWITCH FOR GENERAL AREA LIGHTING.

- MANUAL DAYLIGHTING CONTROLS – MANUAL CONTROLS SHALL BE INSTALLED IN DAYLIGHT ZONES

- SPECIFIC APPLICATION CONTROLS – SPECIFIC APPLICATION CONTROLS SHALL BE PROVIDED FOR THE FOLLOWING:

1. DISPLAY AND ACCENT LIGHT SHALL BE CONTROLLED BY A DEDICATED CONTROL WHICH IS INDEPENDENT OF THE CONTROLS FOR OTHER LIGHTING WITHIN THE ROOM OR SPACE.
2. LIGHTING IN CASES USED FOR DISPLAY CASE PURPOSES SHALL BE CONTROLLED BY A DEDICATED CONTROL WHICH IS INDEPENDENT OF THE CONTROLS FOR OTHER LIGHTING WITHIN THE ROOM OR SPACE.
3. HOTEL AND MOTEL SLEEPING UNITS AND GUEST SUITES SHALL HAVE A MASTER CONTROL DEVICE AT THE MAIN ROOM ENTRY THAT CONTROLS ALL PERMANENTLY INSTALLED LUMINAIRES AND SWITCHED RECEPTACLES.
4. SUPPLEMENTAL TASK LIGHTING, INCLUDING PERMANENTLY INSTALLED UNDER-SHELF OR UNDER-CABINET LIGHTING, SHALL HAVE A CONTROL DEVICE INTEGRAL TO THE LUMINAIRES OR BE CONTROLLED BY A WALL-MOUNTED CONTROL DEVICE PROVIDED THE CONTROL DEVICE IS READILY ACCESSIBLE.
5. LIGHTING FOR NONVISUAL APPLICATIONS, SUCH AS PLANT GROWTH AND FOOD WARMING, SHALL BE CONTROLLED BY A DEDICATED CONTROL WHICH IS INDEPENDENT OF THE CONTROLS FOR OTHER LIGHTING WITHIN THE ROOM OR SPACE.
6. LIGHTING EQUIPMENT THAT IS FOR SALE OR FOR DEMONSTRATIONS IN LIGHTING EDUCATION SHALL BE CONTROLLED BY A DEDICATED CONTROL WHICH IS INDEPENDENT OF THE CONTROLS FOR OTHER LIGHTING WITHIN THE ROOM OR SPACE.

- EXTERIOR LIGHTING CONTROLS – ALL EXTERIOR LIGHTING SHALL BE PROVIDED WITH A CONTROL THAT AUTOMATICALLY TURNS OFF THE LIGHTING WHEN DAYLIGHT IS AVAILABLE. WHERE LIGHTING THE BUILDING FAÇADE OR LANDSCAPE, THE LIGHTING SHALL ALSO BE PROVIDED WITH CONTROLS THAT AUTOMATICALLY SHUT OFF THE LIGHTING FROM 12 MIDNIGHT OR WITHIN ONE HOUR OF THE END OF BUSINESS OPERATIONS, WHICHEVER IS LATER UNTIL 6 A.M. OR BUSINESS OPENING WHICHEVER IS EARLIER. EXTERIOR LIGHTING OTHER THAN BUILDING FAÇADE OR LANDSCAPE LIGHTING SHALL BE PROVIDED WITH CONTROLS CONFIGURED TO AUTOMATICALLY REDUCE THE CONNECTED LIGHTING POWER BY AT LEAST 30 PERCENT FROM 12 MIDNIGHT OR WITHIN ONE HOUR OF THE END OF BUSINESS OPERATIONS, WHICHEVER IS LATER UNTIL 6 A.M. OR BUSINESS OPENING WHICHEVER IS EARLIER OR DURING ANY PERIOD WHEN NO ACTIVITY HAS BEEN DETECTED FOR A TIME OF NO LONGER THAN 15 MINUTES. ALL CONTROLS THAT OPERATE AS A FUNCTION OF TIME SHALL BE CAPABLE OF RETAINING PROGRAMMING AND THE TIME SETTING DURING A LOSS OF POWER OF AT LEAST 10 HOURS

EXCEPTION:

1. EMERGENCY LIGHTING THAT IS INTENDED TO BE AUTOMATICALLY OFF DURING BUILDING OPERATION.
2. LIGHTING SPECIFICALLY REQUIRED TO SATISFY HEALTH AND LIFE SAFETY REQUIREMENTS.
3. DECORATIVE GAS LIGHTING SYSTEMS.
4. LIGHTING FOR COVERED VEHICLE ENTRANCES OR EXITS FROM BUILDINGS OR PARKING STRUCTURES WHERE REQUIRED FOR SAFETY, SECURITY, OR EYE ADAPTATION.

- DWELLING UNITS WITHIN COMMERCIAL BUILDINGS SHALL NOT BE REQUIRED TO COMPLY WITH SECTIONS C405.2 THROUGH C405.5 PROVIDED THAT A MINIMUM OF 75 PERCENT OF THE LAMPS IN PERMANENTLY INSTALLED LIGHTING FIXTURES, OTHER THAN LOW VOLTAGE LIGHTING, SHALL BE HIGH-EFFICACY LAMPS.
- EXIT SIGNS SHALL NOT EXCEED 5 WATTS PER SIDE.
- RECESSED LUMINAIRES INSTALLED IN THE BUILDING THERMAL ENVELOPE SHALL BE SEALED TO LIMIT AIR LEAKAGE BETWEEN CONDITIONED AND UNCONDITIONED SPACES. ALL RECESSED LUMINAIRES SHALL BE IC-RATED AND LABELED AS HAVING AN AIR LEAKAGE RATE OF NOT MORE 2.0 CFM (0.944 L/S) WHEN TESTED IN ACCORDANCE WITH ASTM E 283 AT A 1.57 PSF (75 PA) PRESSURE DIFFERENTIAL. ALL RECESSED LUMINAIRES SHALL BE SEALED WITH A GASKET OR CAULK BETWEEN THE HOUSING AND INTERIOR WALL OR CEILING COVERING.

THERMOSTAT NOTES

- THE SUPPLY OF HEATING AND COOLING ENERGY TO EACH ZONE SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROLS CAPABLE OF RESPONDING TO TEMPERATURE WITHIN THE ZONE
- WHERE USED TO CONTROL BOTH HEATING AND COOLING, ZONE THERMOSTATIC CONTROLS SHALL PROVIDE A TEMPERATURE RANGE OR DEADBAND OF AT LEAST 5°F (2.8°C) WITHIN WHICH THE SUPPLY OF HEATING AND COOLING ENERGY TO THE ZONE IS CAPABLE OF BEING SHUT OFF OR REDUCED TO A MINIMUM.
- EACH ZONE SHALL BE PROVIDED WITH THERMOSTATIC SETBACK CONTROLS THAT ARE CONTROLLED BY EITHER AN AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROL SYSTEM
- THERMOSTATIC SETBACK CONTROLS SHALL HAVE THE CAPABILITY TO SET BACK OR TEMPORARILY OPERATE THE SYSTEM TO MAINTAIN ZONE TEMPERATURES DOWN TO 55°F (13°C) OR UP TO 85°F (29°C).
- AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROLS SHALL BE CAPABLE OF STARTING AND STOPPING THE SYSTEM FOR SEVEN DIFFERENT DAILY SCHEDULES PER WEEK AND RETAINING THEIR PROGRAMMING AND TIME SETTING DURING A LOSS OF POWER FOR AT LEAST 10 HOURS. ADDITIONALLY, THE CONTROLS SHALL HAVE A MANUAL OVERRIDE THAT ALLOWS TEMPORARY OPERATION OF THE SYSTEM FOR UP TO 2 HOURS; A MANUALLY OPERATED TIMER CAPABLE OF BEING ADJUSTED TO OPERATE THE SYSTEM FOR UP TO 2 HOURS; OR AN OCCUPANCY SENSOR.

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

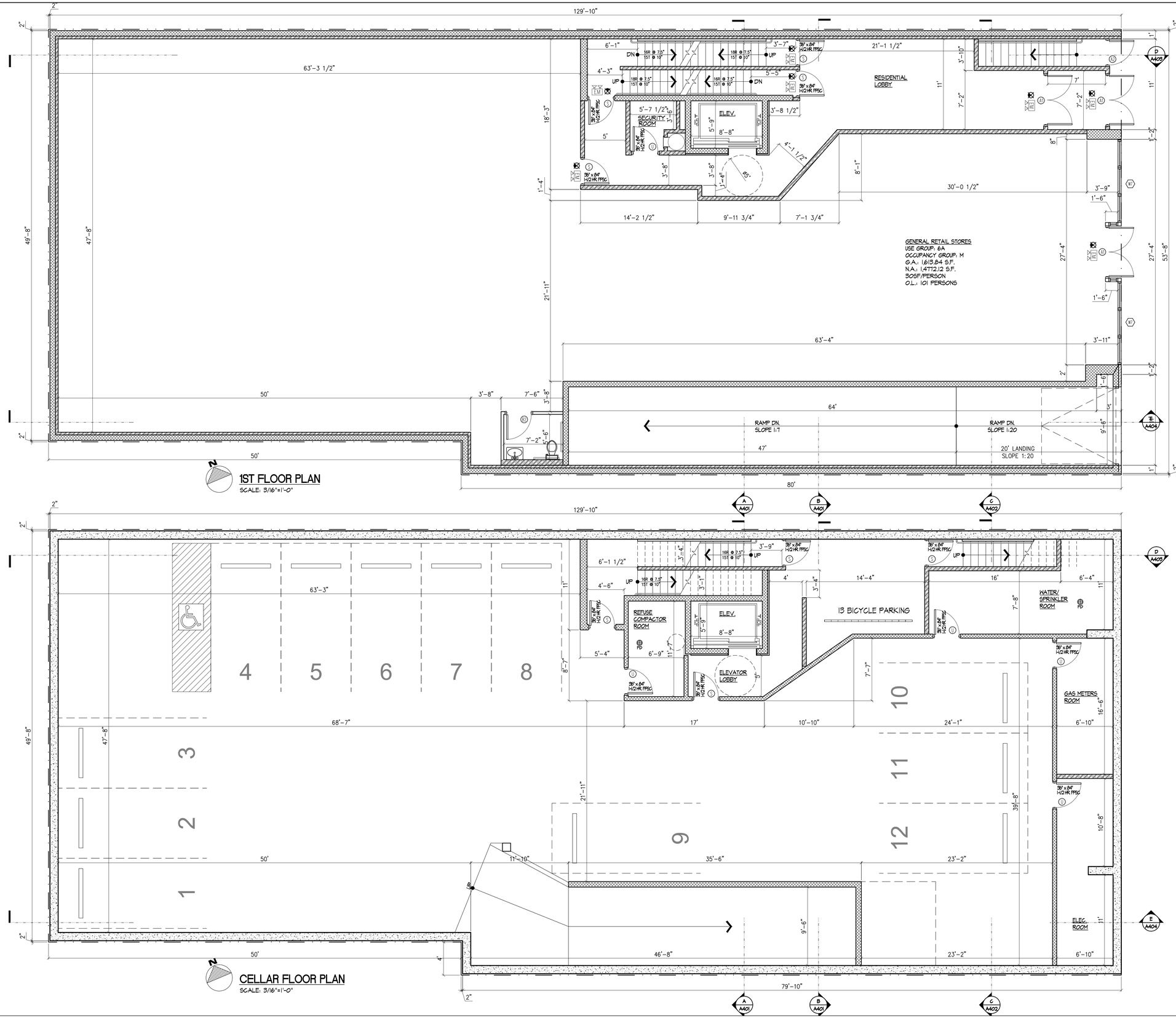
ENERGY ANALYSIS REFLECTED CEILING PLANS

DATE: 01/19/15 | PROJECT #: 20140136

SEAL & SIGNATURE: REGISTERED ARCHITECT GUANG HWA TAN 026376 STATE OF NEW YORK

DRAWN BY: KT
CHKD. BY: CT
DRAWING #:

EN-107.00



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STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

CELLAR FLOOR PLAN
FIRST FLOOR PLAN

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

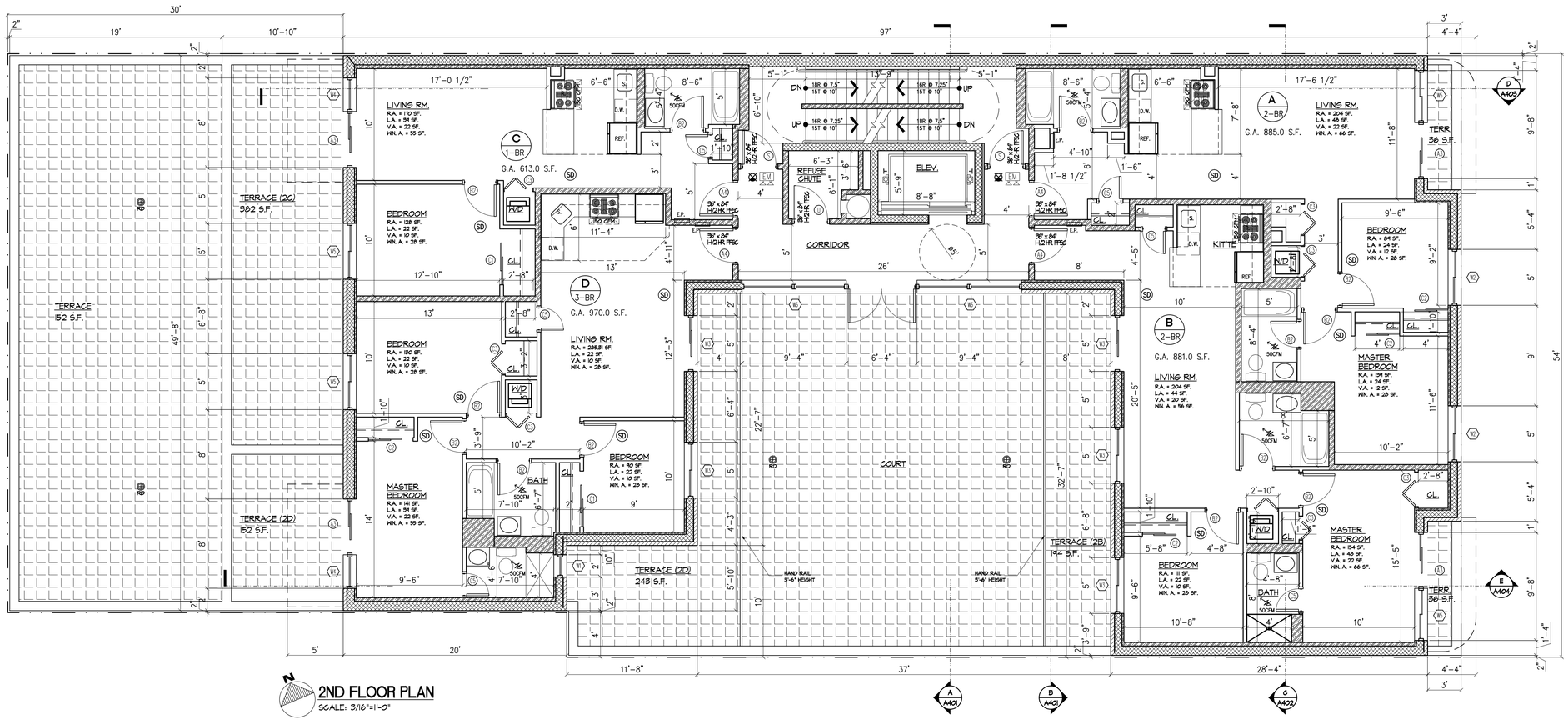
REGISTERED ARCHITECT CHUANG HUA TAN 025376 STATE OF NEW YORK

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-201.00



2ND FLOOR PLAN

SCALE: 3/16"=1'-0"

PROVISIONS APPLICABLE TO ALL MECHANICAL SYSTEMS NOTES

- DESIGN LOADS SHALL BE DETERMINED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN ANSI/ASHRAE/ACCA STANDARD 183. THE DESIGN LOADS SHALL ACCOUNT FOR THE BUILDING ENVELOPE, LIGHTING, VENTILATION AND OCCUPANCY LOADS BASED ON THE PROJECT DESIGN. HEATING AND COOLING LOADS SHALL BE ADJUSTED TO ACCOUNT FOR LOAD REDUCTIONS THAT ARE ACHIEVED WHERE ENERGY RECOVERY SYSTEMS ARE UTILIZED IN THE HVAC SYSTEM IN ACCORDANCE WITH THE ASHRAE HVAC SYSTEMS AND EQUIPMENT HANDBOOK. ALTERNATIVELY, DESIGN LOADS SHALL BE DETERMINED BY AN APPROVED EQUIVALENT COMPUTATION PROCEDURE, USING THE DESIGN PARAMETERS SPECIFIED IN CHAPTER 3.
- THE OUTPUT CAPACITY OF HEATING AND COOLING EQUIPMENT AND SYSTEMS SHALL NOT EXCEED THE LOADS CALCULATED IN ACCORDANCE WITH SECTION C403.2.1. A SINGLE PIECE OF EQUIPMENT PROVIDING BOTH HEATING AND COOLING SHALL SATISFY THIS PROVISION FOR ONE FUNCTION WITH THE CAPACITY FOR THE OTHER FUNCTION AS SMALL AS POSSIBLE, WITHIN AVAILABLE EQUIPMENT OPTIONS.

  EXCEPTIONS:

  - REQUIRED STANDBY EQUIPMENT AND SYSTEMS PROVIDED WITH CONTROLS AND DEVICES THAT ALLOW SUCH SYSTEMS OR EQUIPMENT TO OPERATE AUTOMATICALLY ONLY WHEN THE PRIMARY EQUIPMENT IS NOT OPERATING.
  - MULTIPLE UNITS OF THE SAME EQUIPMENT TYPE WITH COMBINED CAPACITIES EXCEEDING THE DESIGN LOAD AND PROVIDED WITH CONTROLS THAT HAVE THE CAPABILITY TO SEQUENCE THE OPERATION OF EACH UNIT BASED ON LOAD.

BOILER ROOM AND EQUIPMENT NOTES

- BOILER TO BE MEA/BSA APPROVED AND OF CAPACITY TO MEET REQUIREMENTS OF ENERGY CODE AND N.Y.C. BUILDING CODE WHICHEVER IS MOST STRINGENT.
- FIXED VENT FOR BOILER COMBUSTION TO BE PROVIDED AT RATE OF ONE SQUARE-INCH PER 1000 BTU OF BOILER INPUT.
- TEMPERATURE CONTROLS – SERVICE WATER-HEATING EQUIPMENT SHALL BE PROVIDED WITH CONTROLS TO ALLOW A SETPOINT 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). HOLBY VALVE TO BE PROVIDED AS A TEMPERATURE CONTROL
- HEAT TRAPS – WATER-HEATING EQUIPMENT NOT SUPPLIED WITH INTEGRAL HEAT TRAPS AND SERVING NONCIRCULATING SYSTEMS SHALL BE PROVIDED WITH HEAT TRAPS ON THE SUPPLY AND DISCHARGE PIPING ASSOCIATED WITH THE EQUIPMENT.
- PIPE INSULATION – FOR AUTOMATIC-CIRCULATING HOT WATER AND HEAT-TRACED SYSTEMS, PIPING SHALL BE INSULATED WITH NOT LESS THAN 1 INCH (25 MM) OF INSULATION HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/H ×FT² ×°F (1.53 W PER 25 MM/M2 ×K). THE FIRST 8 FEET (2438 MM) OF PIPING IN NON-HOT-WATER-SUPPLY TEMPERATURE MAINTENANCE SYSTEMS SERVED BY EQUIPMENT WITHOUT INTEGRAL HEAT TRAPS SHALL BE INSULATED WITH 0.5 INCH (12.7 MM) OF MATERIAL HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/H ×FT² ×°F (1.53 W PER 25 MM/M² ×K).

  EXCEPTIONS:

  - HEAT-TRACED PIPING SYSTEMS SHALL MEET THE INSULATION THICKNESS REQUIREMENTS PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. UNTRACED PIPING WITHIN A HEAT TRACED SYSTEM SHALL BE INSULATED WITH NOT LESS THAN 1 INCH (25 MM) OF INSULATION HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/H ×FT² ×°F (1.53 W PER 25 MM/M² ×K).
- HOT WATER SYSTEM CONTROLS – CIRCULATING HOT WATER SYSTEM PUMPS OR HEAT TRACE SHALL BE ARRANGED TO BE TURNED OFF EITHER AUTOMATICALLY OR MANUALLY WHEN THERE IS LIMITED HOT WATER DEMAND. READY ACCESS SHALL BE PROVIDED TO THE OPERATING CONTROLS.

PROVISIONS APPLICABLE TO ALL MECHANICAL SYSTEMS NOTES

- CALCULATION OF HEATING AND COOLING LOADS. DESIGN LOADS SHALL BE DETERMINED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN ANSI/ASHRAE/ACCA STANDARD 183. THE DESIGN LOADS SHALL ACCOUNT FOR THE BUILDING ENVELOPE, LIGHTING, VENTILATION AND OCCUPANCY LOADS BASED ON THE PROJECT DESIGN. HEATING AND COOLING LOADS SHALL BE ADJUSTED TO ACCOUNT FOR LOAD REDUCTIONS THAT ARE ACHIEVED WHERE ENERGY RECOVERY SYSTEMS ARE UTILIZED IN THE HVAC SYSTEM IN ACCORDANCE WITH THE ASHRAE HVAC SYSTEMS AND EQUIPMENT HANDBOOK. ALTERNATIVELY, DESIGN LOADS SHALL BE DETERMINED BY AN APPROVED EQUIVALENT COMPUTATION PROCEDURE, USING THE DESIGN PARAMETERS SPECIFIED IN CHAPTER 3 OF THE NYCECC.
- EQUIPMENT AND SYSTEM SIZING. HEATING AND COOLING EQUIPMENT AND SYSTEMS CAPACITY SHALL NOT EXCEED THE LOADS CALCULATED IN ACCORDANCE WITH SECTION 503.2.1. A SINGLE PIECE OF EQUIPMENT PROVIDING BOTH HEATING AND COOLING MUST SATISFY THIS PROVISION FOR ONE FUNCTION WITH THE CAPACITY FOR THE OTHER FUNCTION AS SMALL AS POSSIBLE, WITHIN AVAILABLE EQUIPMENT OPTIONS.

  EXCEPTIONS:

  - REQUIRED STANDBY EQUIPMENT AND SYSTEMS PROVIDED WITH CONTROLS AND DEVICES THAT ALLOW SUCH SYSTEMS OR EQUIPMENT TO OPERATE AUTOMATICALLY ONLY WHEN THE PRIMARY EQUIPMENT IS NOT OPERATING.
  - MULTIPLE UNITS OF THE SAME EQUIPMENT TYPE WITH COMBINED CAPACITIES EXCEEDING THE DESIGN LOAD AND PROVIDED WITH CONTROLS THAT HAVE THE CAPABILITY TO SEQUENCE THE OPERATION OF EACH UNIT BASED ON LOAD.

DUCT AND PLENUM INSULATION AND SEALING NOTES.

- DUCT AND PLENUM INSULATION AND SEALING.
  ALL SUPPLY AND RETURN AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-6 INSULATION WHERE LOCATED IN UNCONDITIONED SPACES AND A MINIMUM OF R-8 INSULATION WHERE LOCATED OUTSIDE THE BUILDING. WHERE LOCATED WITHIN A BUILDING ENVELOPE ASSEMBLY, THE DUCT OR PLENUM SHALL BE SEPARATED FROM THE BUILDING EXTERIOR OR UNCONDITIONED OR EXEMPT SPACES BY A MINIMUM OF R-8 INSULATION.

  EXCEPTIONS:

  - WHEN LOCATED WITHIN EQUIPMENT.
  - WHEN THE DESIGN TEMPERATURE DIFFERENCE BETWEEN THE INTERIOR AND EXTERIOR OF THE DUCT OR PLENUM DOES NOT EXCEED 15°F (8°C).
- ALL DUCTS, AIR HANDLERS AND FILTER BOXES SHALL BE SEALED. JOINTS AND SEAMS SHALL COMPLY WITH SECTION 603.9 OF THE NEW YORK CITY MECHANICAL CODE.
- LOW-PRESSURE DUCT SYSTEMS
  ALL LONGITUDINAL AND TRANSVERSE JOINTS, SEAMS AND CONNECTIONS OF SUPPLY AND RETURN DUCTS OPERATING AT A STATIC PRESSURE LESS THAN OR EQUAL TO 2 INCHES WATER GAUGE (W.G.) (500 PA) 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. PRESSURE CLASSIFICATIONS SPECIFIC TO THE DUCT SYSTEM SHALL BE CLEARLY INDICATED ON THE CONSTRUCTION DOCUMENTS IN ACCORDANCE WITH THE NEW YORK CITY MECHANICAL CODE.

  EXCEPTION:

  - CONTINUOUSLY WELDED AND LOCKING-TYPE LONGITUDINAL JOINTS AND SEAMS ON DUCTS OPERATING AT STATIC PRESSURES LESS THAN 2 INCHES WATER GAUGE (W.G.) (500 PA) PRESSURE CLASSIFICATION.

PIPING INSULATION NOTES

- ALL PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE C403.2.8.

  EXCEPTIONS:

  - FACTORY-INSTALLED PIPING WITHIN HVAC EQUIPMENT TESTED AND RATED IN ACCORDANCE WITH A TEST PROCEDURE REFERENCED BY THIS CODE.
  - FACTORY-INSTALLED PIPING WITHIN ROOM FAN-COILS AND UNIT VENTILATORS TESTED AND RATED ACCORDING TO AHRI STANDARDS 440 (EXCEPT THAT THE SAMPLING AND VARIATION PROVISIONS OF SECTION 6.5 SHALL NOT APPLY) AND 840, RESPECTIVELY.
  - PIPING THAT CONVEYS FLUIDS THAT HAVE A DESIGN OPERATING TEMPERATURE RANGE BETWEEN 60°F (15°C) AND 105°F (41°C).
  - PIPING THAT CONVEYS FLUIDS THAT HAVE NOT BEEN HEATED OR COOLED THROUGH THE USE OF FOSSIL FUELS OR ELECTRIC POWER.
  - STRAINERS, CONTROL VALVES, AND BALANCING VALVES ASSOCIATED WITH PIPING 1 INCH (25 MM) OR LESS IN DIAMETER.
  - DIRECT BURIED PIPING THAT CONVEYS FLUIDS AT OR BELOW 60°F (15°C).

DESIGN CONDITIONS

- THE INTERIOR DESIGN TEMPERATURES USED FOR HEATING AND COOLING LOAD CALCULATIONS SHALL BE A MAXIMUM OF 72°F (22°C) FOR HEATING AND MINIMUM OF 75°F (24°C) FOR COOLING.

PROTECTION OF EXPOSED FOUNDATION INSULATION

- INSULATION APPLIED TO THE EXTERIOR OF BASEMENT WALLS, CRAWLSPACE WALLS AND THE PERIMETER OF SLAB-ON-GRADE FLOORS SHALL HAVE A RIGID, OPAQUE AND WEATHER-RESISTANT PROTECTIVE COVERING TO PREVENT THE DEGRADATION OF THE INSULATION'S THERMAL PERFORMANCE. THE PROTECTIVE COVERING SHALL COVER THE EXPOSED EXTERIOR INSULATION AND EXTEND A MINIMUM OF 6 INCHES (153 MM) BELOW GRADE.

TABLE C403.2.8
MINIMUM PIPE INSULATION THICKNESS (thickness in inches)(a)

FLUID OPERATING TEMPERATURE RANGE AND USAGE(°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (INCHES)				
	CONDUCTIVITY BTU·IN./(H ·FT² ·°F), (b)	MEAN RATING TEMPERATURE, °F	< 1	1 TO < 1½	1½ TO < 4	4 TO < 8	≥ 8
> 350	0.32–0.34	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.29–0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27–0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25–0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21–0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21–0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20–0.26	75	0.5	1.0	1.0	1.0	1.5

(a) FOR PIPING SMALLER THAN 1½ INCH (38 MM) AND LOCATED IN PARTITIONS WITHIN CONDITIONED SPACES, REDUCTION OF THESE THICKNESSES BY 1 INCH (25 MM) SHALL BE PERMITTED (BEFORE THICKNESS ADJUSTMENT REQUIRED IN FOOTNOTE B) BUT NOT TO A THICKNESS LESS THAN 1 INCH (25 MM).
(b) FOR INSULATION OUTSIDE THE STATED CONDUCTIVITY RANGE, THE MINIMUM THICKNESS (T) SHALL BE DETERMINED AS FOLLOWS: $T = r\{(1 + t / r)^{K / k} - 1\}$
WHERE:
T = MINIMUM INSULATION THICKNESS
R = ACTUAL OUTSIDE RADIUS OF PIPE
T = INSULATION THICKNESS LISTED IN THE TABLE FOR APPLICABLE FLUID TEMPERATURE AND PIPE SIZE
K = CONDUCTIVITY OF ALTERNATE MATERIAL AT MEAN RATING TEMPERATURE INDICATED FOR THE APPLICABLE FLUID TEMPERATURE (BTU ×IN/H ×FT2×°F)
k = THE UPPER VALUE OF THE CONDUCTIVITY RANGE LISTED IN THE TABLE FOR THE APPLICABLE FLUID TEMPERATURE.
(C) FOR DIRECT-BURIED HEATING AND HOT WATER SYSTEM PIPING, REDUCTION OF THESE THICKNESSES BY 1½ INCHES (38 MM) SHALL BE PERMITTED (BEFORE THICKNESS ADJUSTMENT REQUIRED IN FOOTNOTE B BUT NOT TO THICKNESSES LESS THAN 1 INCH (25 MM).

NOTES

- DOORS AND ACCESS OPENINGS TO SHAFTS, CHUTES, STAIRWAYS, AND ELEVATOR LOBBIES – DOORS AND ACCESS OPENINGS FROM CONDITIONED SPACE TO SHAFTS, CHUTES, STAIRWAYS AND ELEVATOR LOBBIES SHALL EITHER MEET THE REQUIREMENTS OF SECTION C402.4.3 OR SHALL BE GASKETED, WEATHERSTRIPPED OR SEALED.

  EXCEPTION:

  - DOOR OPENINGS REQUIRED TO COMPLY WITH SECTION 715 OR 715.30F THE NEW YORK CITY BUILDING CODE; OR DOORS AND DOOR OPENINGS REQUIRED BY THE NEW YORK CITY BUILDING CODE TO COMPLY WITH UL 1784 SHALL NOT BE REQUIRED TO COMPLY WITH SECTION C402.4.4.
- AIR INTAKES, EXHAUST OPENINGS, STAIRWAYS AND SHAFTS – STAIRWAY ENCLOSURES AND ELEVATOR SHAFT VENTS AND OTHER OUTDOOR AIR INTAKES AND EXHAUST OPENINGS INTEGRAL TO THE BUILDING ENVELOPE SHALL BE PROVIDED WITH DAMPERS IN ACCORDANCE WITH SECTION C403.2.4.4.
- LOADING DOCK WEATHERSEALS – CARGO DOORS AND LOADING DOCK DOORS SHALL BE EQUIPPED WITH WEATHERSEALS TO RESTRICT INFILTRATION WHEN VEHICLES ARE PARKED IN THE DOORWAY.
- SHUTOFF DAMPER CONTROLS – STAIRWAY AND SHAFT VENT DAMPERS. STAIRWAY AND SHAFT VENTS SHALL BE PROVIDED WITH CLASS I MOTORIZED DAMPERS WITH A MAXIMUM LEAKAGE RATE OF 4 CFM/FT2(20.3 L/S·M2) AT 1.0 INCH WATER GAUGE (W.G.) (249 PA) WHEN TESTED IN ACCORDANCE WITH AMCA 500D. STAIRWAY AND SHAFT VENT DAMPERS SHALL BE INSTALLED WITH CONTROLS SO THAT THEY ARE CAPABLE OF AUTOMATICALLY OPENING UPON THE ACTIVATION OF ANY FIRE ALARM INITIATING DEVICE OF THE BUILDING'S FIRE ALARM SYSTEM OR THE INTERRUPTION OF POWER TO THE DAMPER. OUTDOOR AIR SUPPLY AND EXHAUST OPENINGS IN THE BUILDING ENVELOPE, DUCTS, OR EQUIPMENT SHALL BE PROVIDED WITH CLASS I MOTORIZED DAMPERS WITH A MAXIMUM LEAKAGE RATE OF 4 CFM/FT2(20.3 L/S·M2) AT 1.0 INCH WATER GAUGE (W.G.) (249 PA) WHEN TESTED IN ACCORDANCE WITH AMCA 500D. OUTDOOR AIR SUPPLY AND EXHAUST MOTORIZED DAMPERS SHALL BE CONFIGURED TO CLOSE AUTOMATICALLY WHEN THE SYSTEMS OR SPACES SERVED ARE NOT IN USE.

  EXCEPTIONS:

  - GRAVITY (NONMOTORIZED) DAMPERS HAVING A MAXIMUM LEAKAGE RATE OF 20 CFM/FT² (101.6 L/S·M²) AT 1.0 INCH WATER GAUGE (W.G.) (249 PA) WHEN TESTED IN ACCORDANCE WITH AMCA 500D ARE PERMITTED TO BE USED AS FOLLOWS:IN BUILDINGS LESS THAN THREE STORIES IN HEIGHT ABOVE GRADE FOR EXHAUST AND RELIEF DAMPERS OR WHERE THE DESIGN OUTDOOR AIR INTAKE OR EXHAUST CAPACITY DOES NOT EXCEED 300 CFM (141 L/S). GRAVITY (NONMOTORIZED) DAMPERS FOR VENTILATION AIR INTAKES SHALL BE PROTECTED FROM DIRECT EXPOSURE TO WIND.
  - GRAVITY (NONMOTORIZED) DAMPERS SMALLER THAN 24 INCHES (610MM) IN EITHER DIMENSION SHALL BE PERMITTED TO HAVE A LEAKAGE OF 40 CFM/FT2(203.2 L/S·M2) AT 1.0 INCH WATER GAUGE (W.G.) (249 PA) WHEN TESTED IN ACCORDANCE WITH AMCA 500D.
  - DAMPERS ARE NOT REQUIRED FOR VENTILATION OR EXHAUST SYSTEMS SERVING UNCONDITIONED SPACES AND EXHAUST SYSTEMS SERVING TYPE 1 KITCHEN EXHAUST HOODS.

BOILERS - MANUFACTURED BY WILLIAMSON
MODEL # GWA 070
70,000 BTU INPUT
58,000 BTU OUTPUT
83% AFUE
(TOTAL OF 23 UNITS)
MEA# 411-00-E

HOT WATER HEATER - MANUFACTURED BY A.O. SMITH
MODEL # GCV - 40
40,000 BTU
80% Et
(TOTAL OF 23 UNITS)
MEA# 376-04-E

CLIENT:
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(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

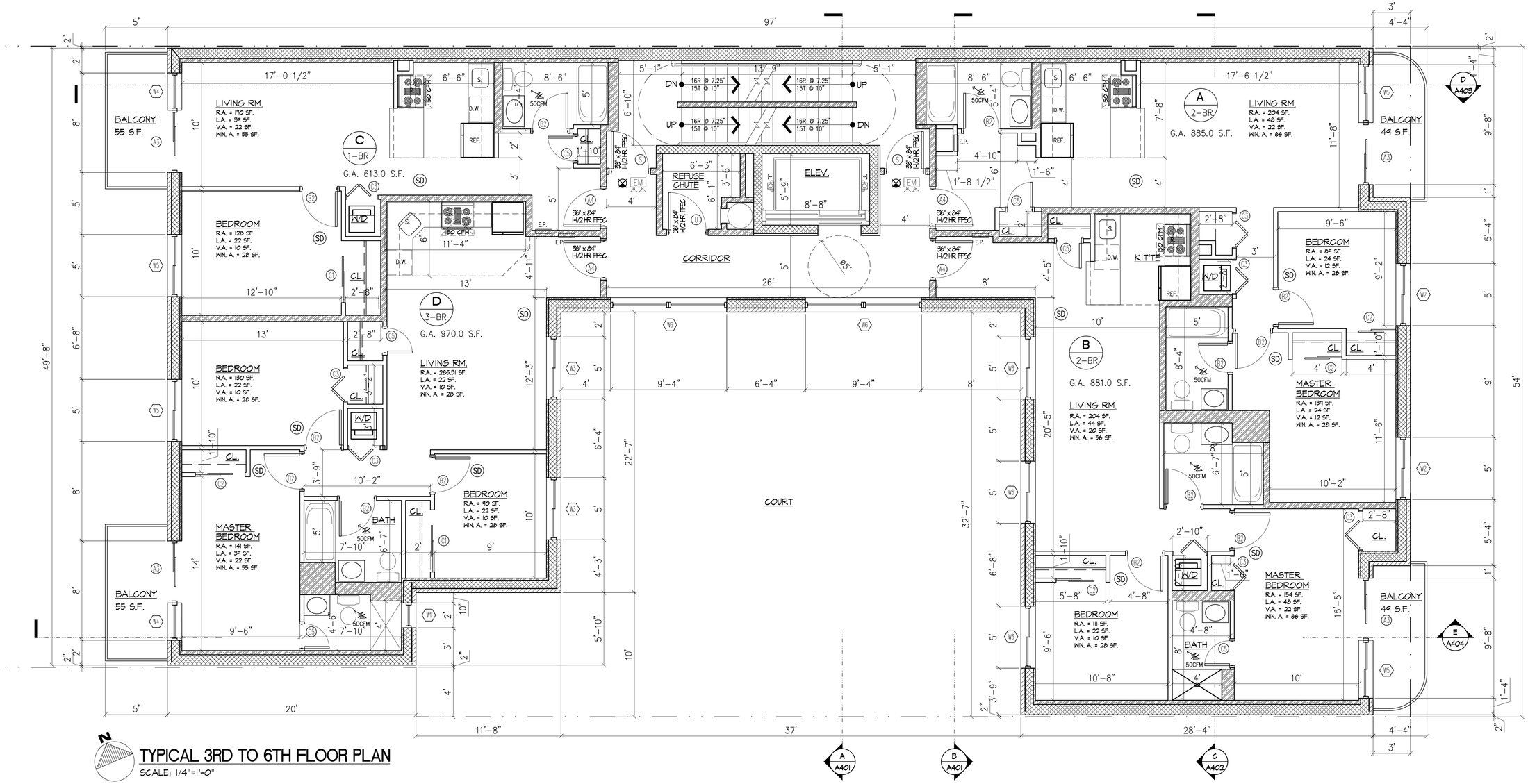
MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:
PROPOSED A 7-STORY MIXED USE BUILDING
109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :
SECOND FLOOR PLAN

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-202.00



N

TYPICAL 3RD TO 6TH FLOOR PLAN

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

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

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STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

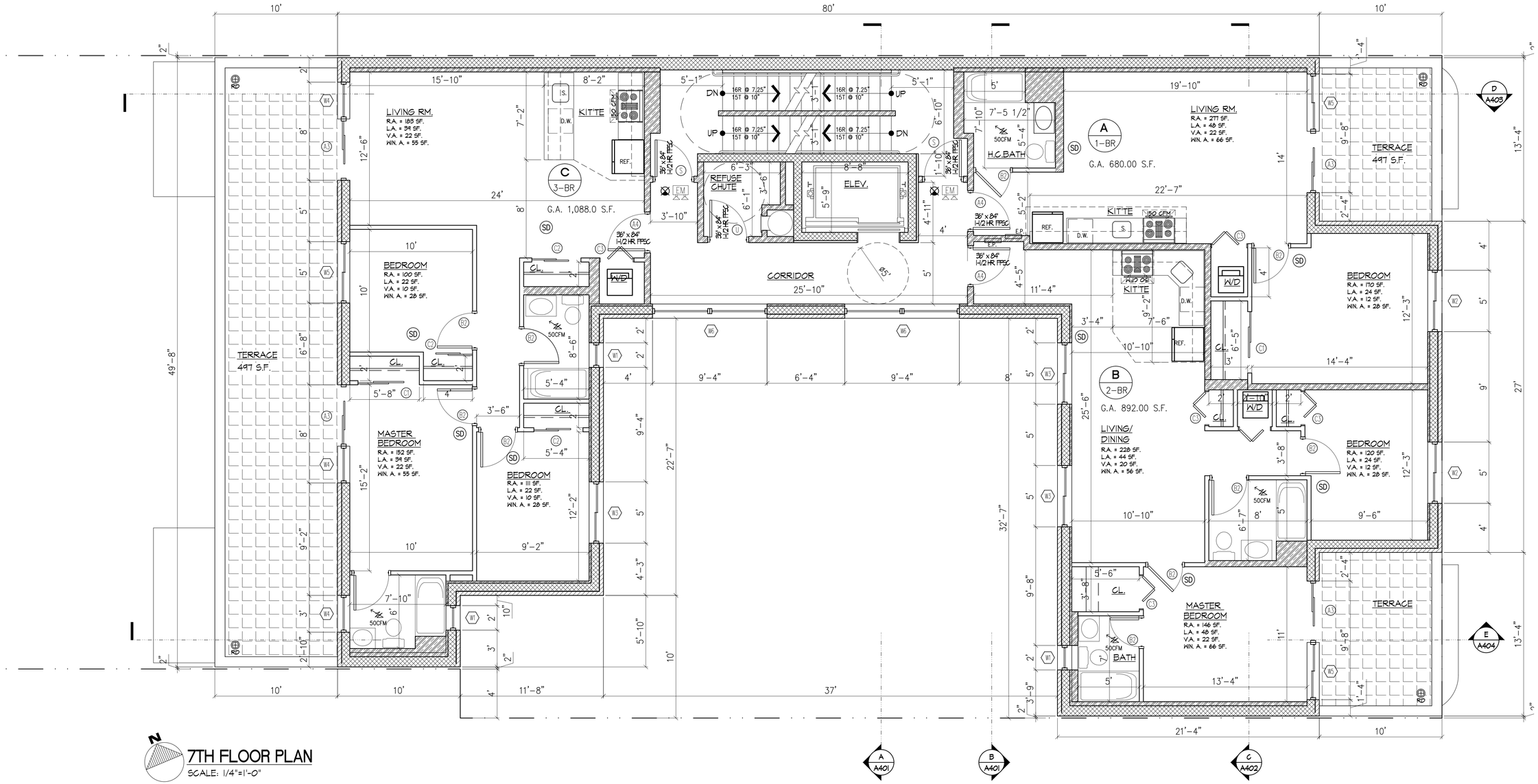
109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

THIRD TO SIXTH FLOOR PLAN

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-203.00

REGISTERED ARCHITECT DANG HING TAN 025376 STATE OF NEW YORK



N

7TH FLOOR PLAN

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

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
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STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

SEVENTH FLOOR PLAN

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

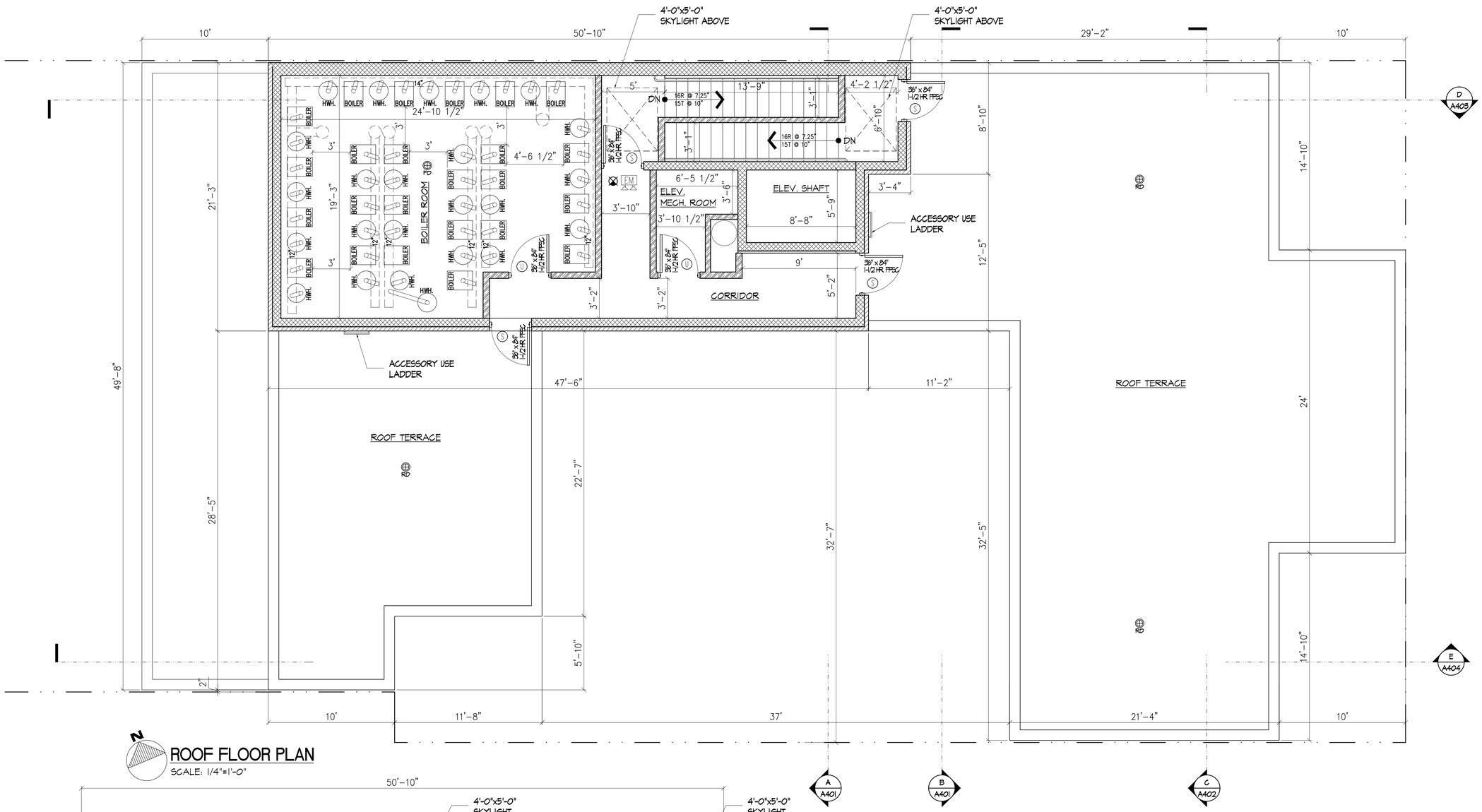
REGISTERED ARCHITECT CHANG HWA TAN 025376 STATE OF NEW YORK

DRAWN BY: KT

CHKD. BY: CT

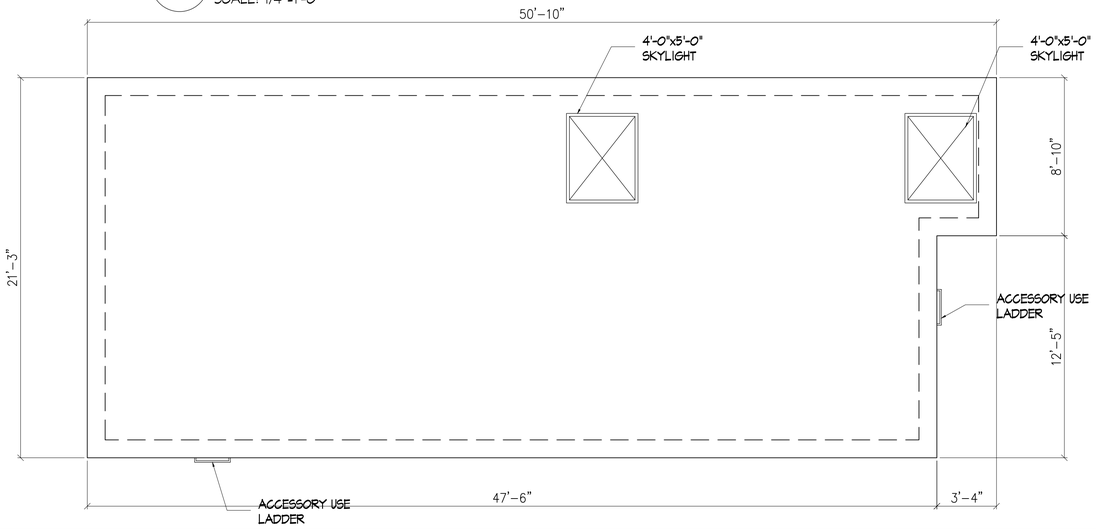
DRAWING #:

A-204.00



ROOF FLOOR PLAN

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



BULKHEAD ROOF PLAN

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

CLIENT:

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FORREST HILLS, NY, 11357

DRAWING TITLE :

SEVENTH FLOOR PLAN

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

REGISTERED ARCHITECT CHING HWA TAN STATE OF NEW YORK 025376

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-205.00

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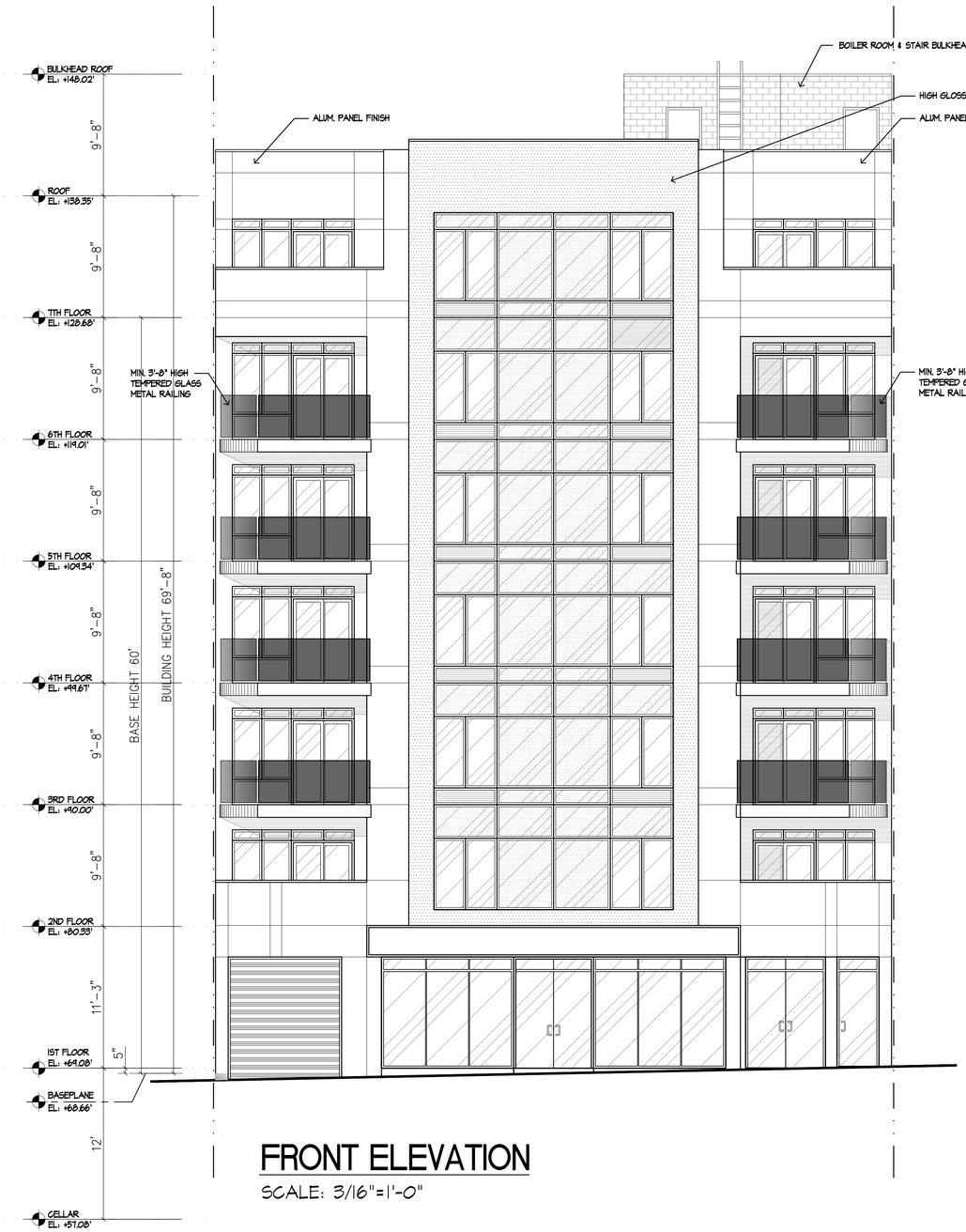
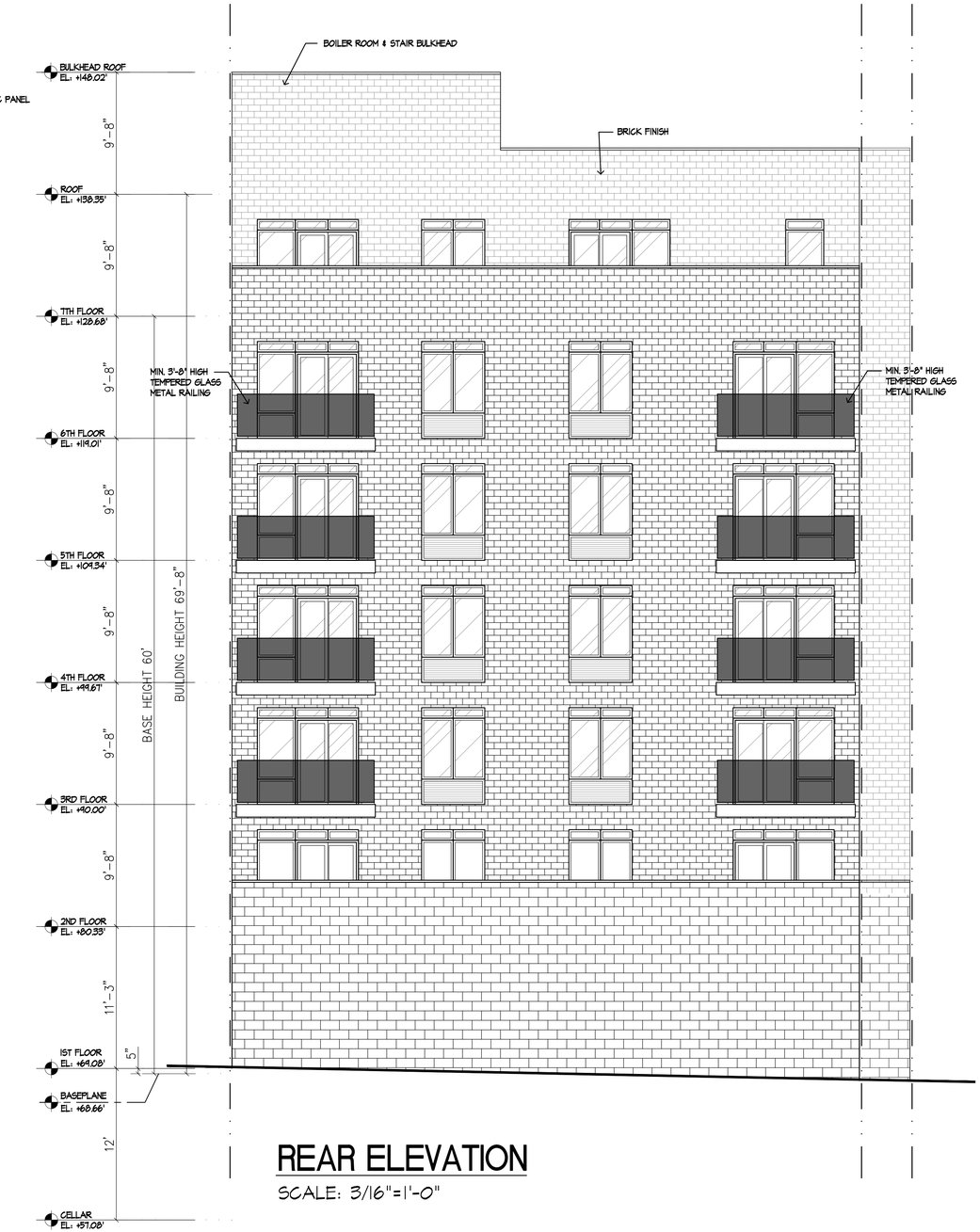


FRONT ELEVATION

SCALE: 3/16"=1'-0"



REAR ELEVATION

SCALE: 3/16"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

FRONT ELEVATION
REAR ELEVATION

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

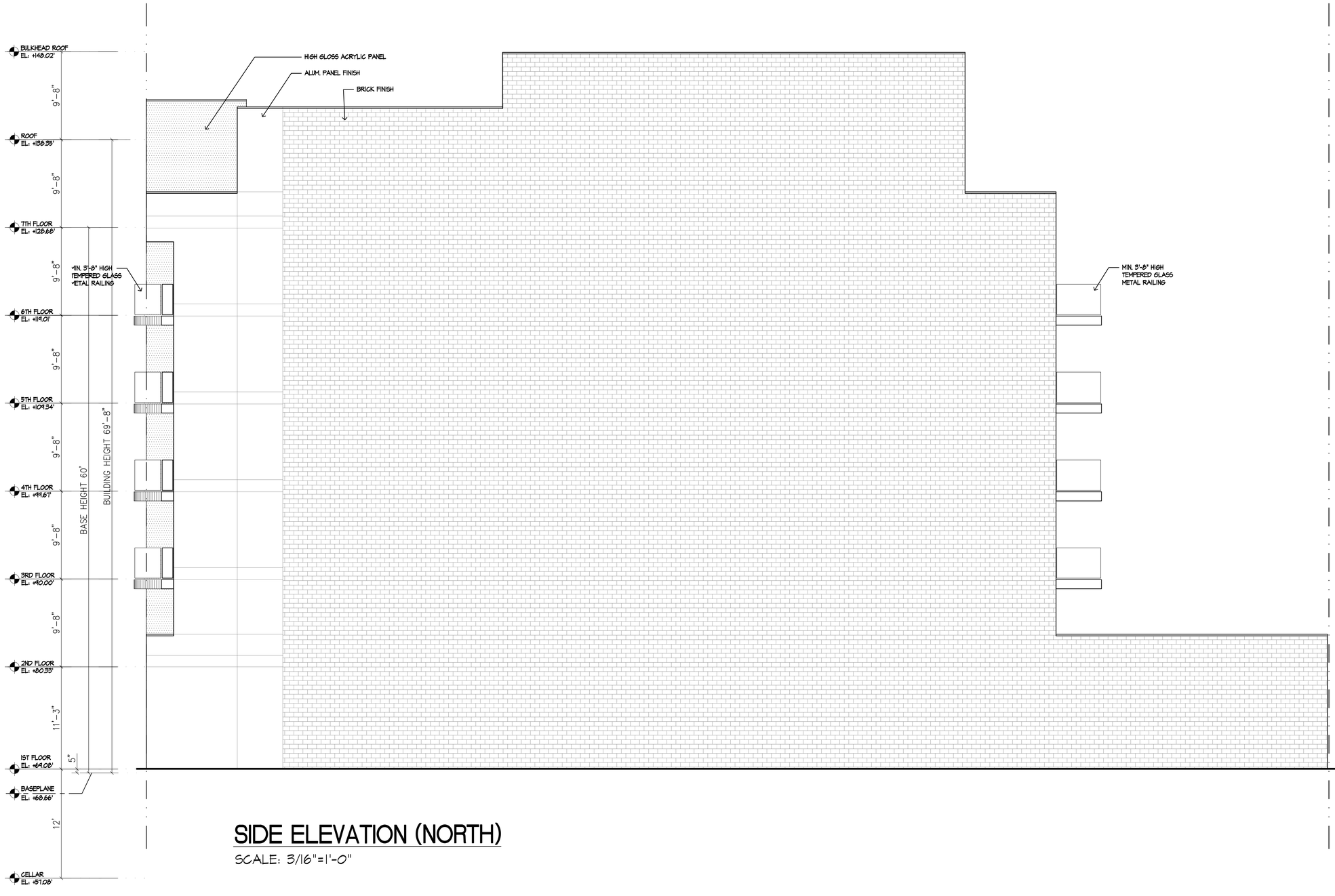
REGISTERED ARCHITECT
CHUNG HWA TAN
025376
STATE OF NEW YORK

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-301.00



SIDE ELEVATION (NORTH)

SCALE: 3/16"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

SIDE ELEVATION (NORTH)

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

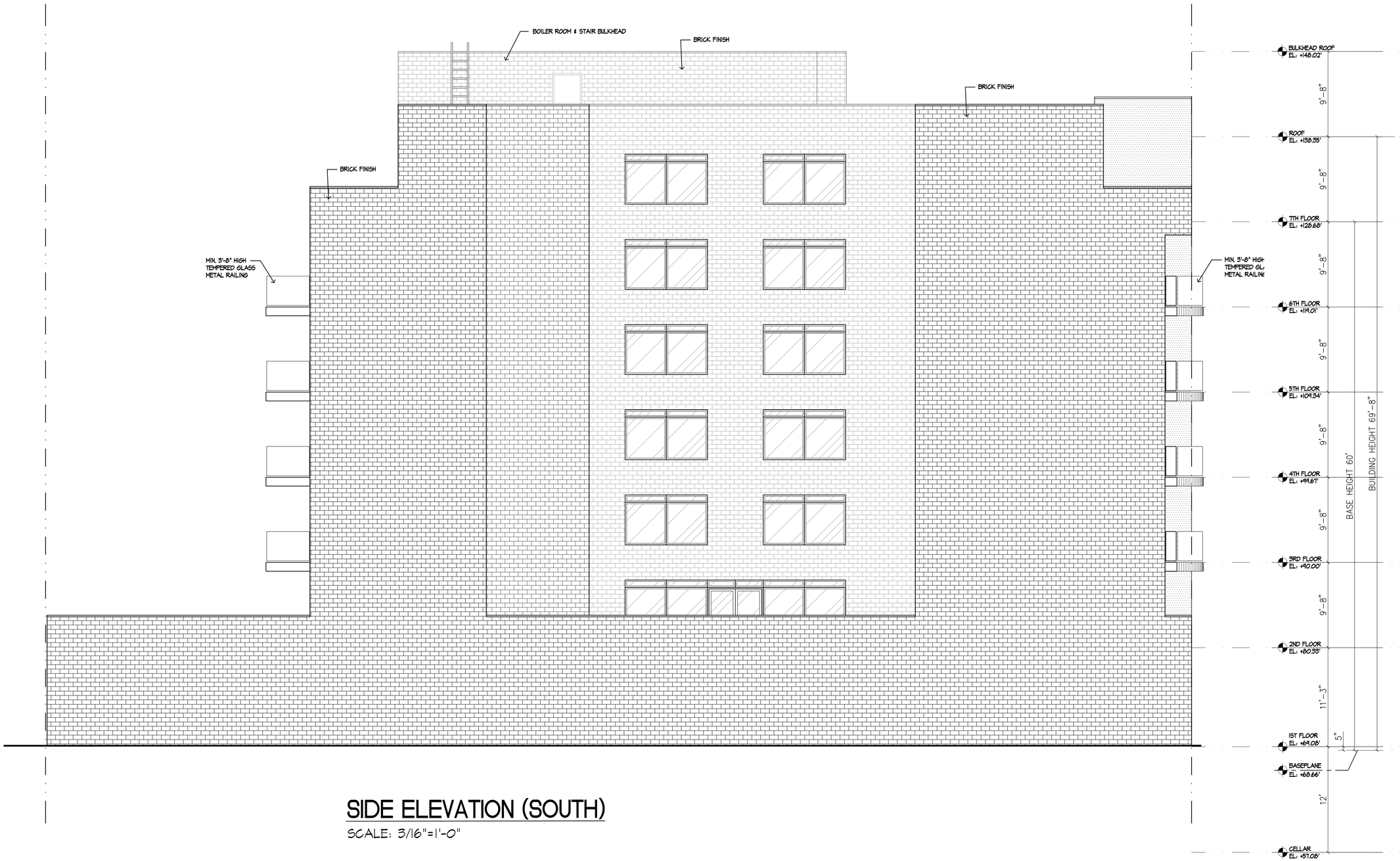
REGISTERED ARCHITECT
CHANG HWA TAN
025376
STATE OF NEW YORK

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-302.00



SIDE ELEVATION (SOUTH)

SCALE: 3/16"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

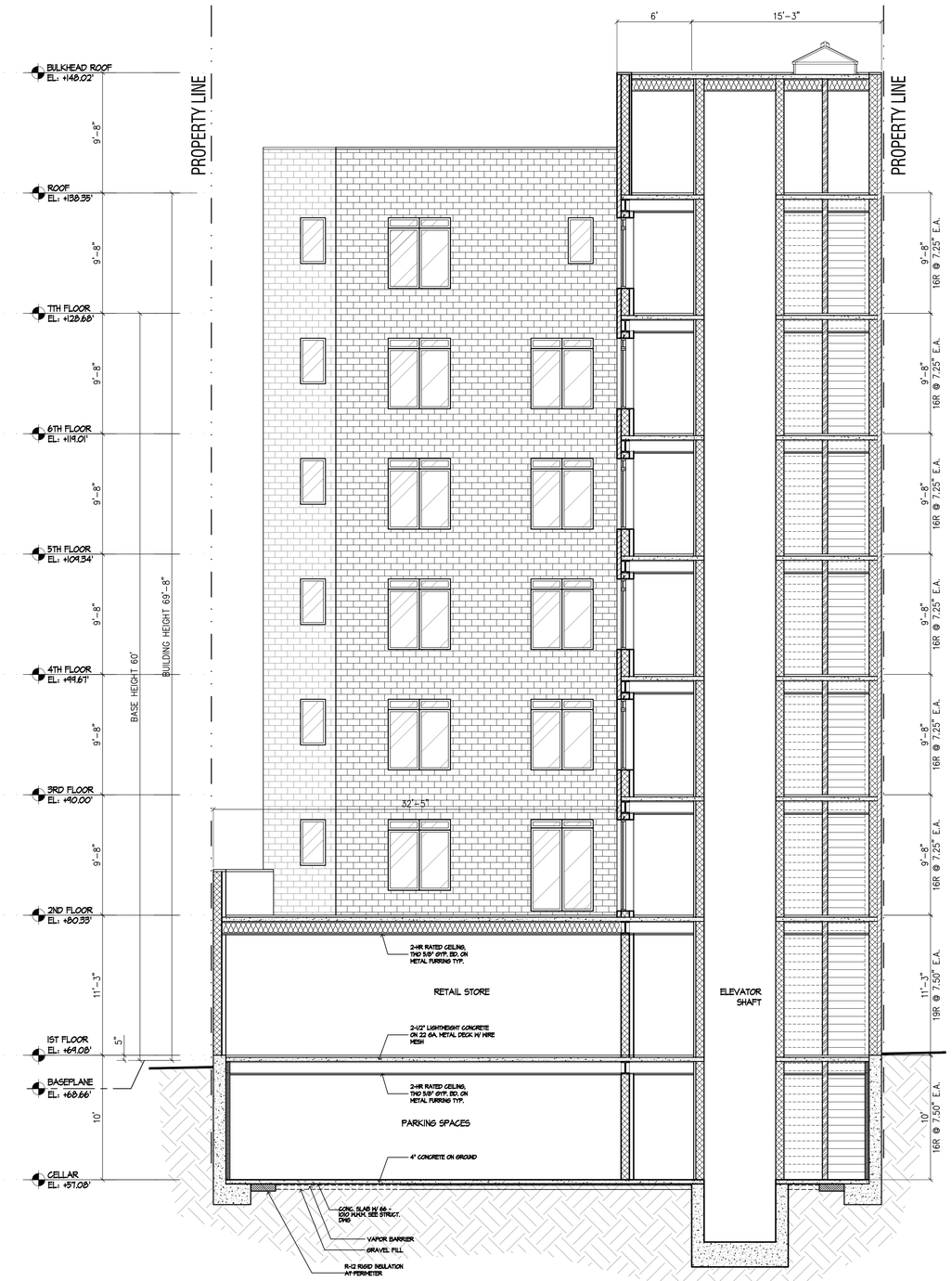
109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

SIDE ELEVATION (SOUTH)

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-303.00

REGISTERED ARCHITECT CHANG HWA TAN 025376 STATE OF NEW YORK



SECTION A-A

SCALE: 3/16"=1'-0"

SECTION B-B

SCALE: 3/16"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

SECTION A-A
SECTION B-B

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-401.00

FINISH SCHEDULE

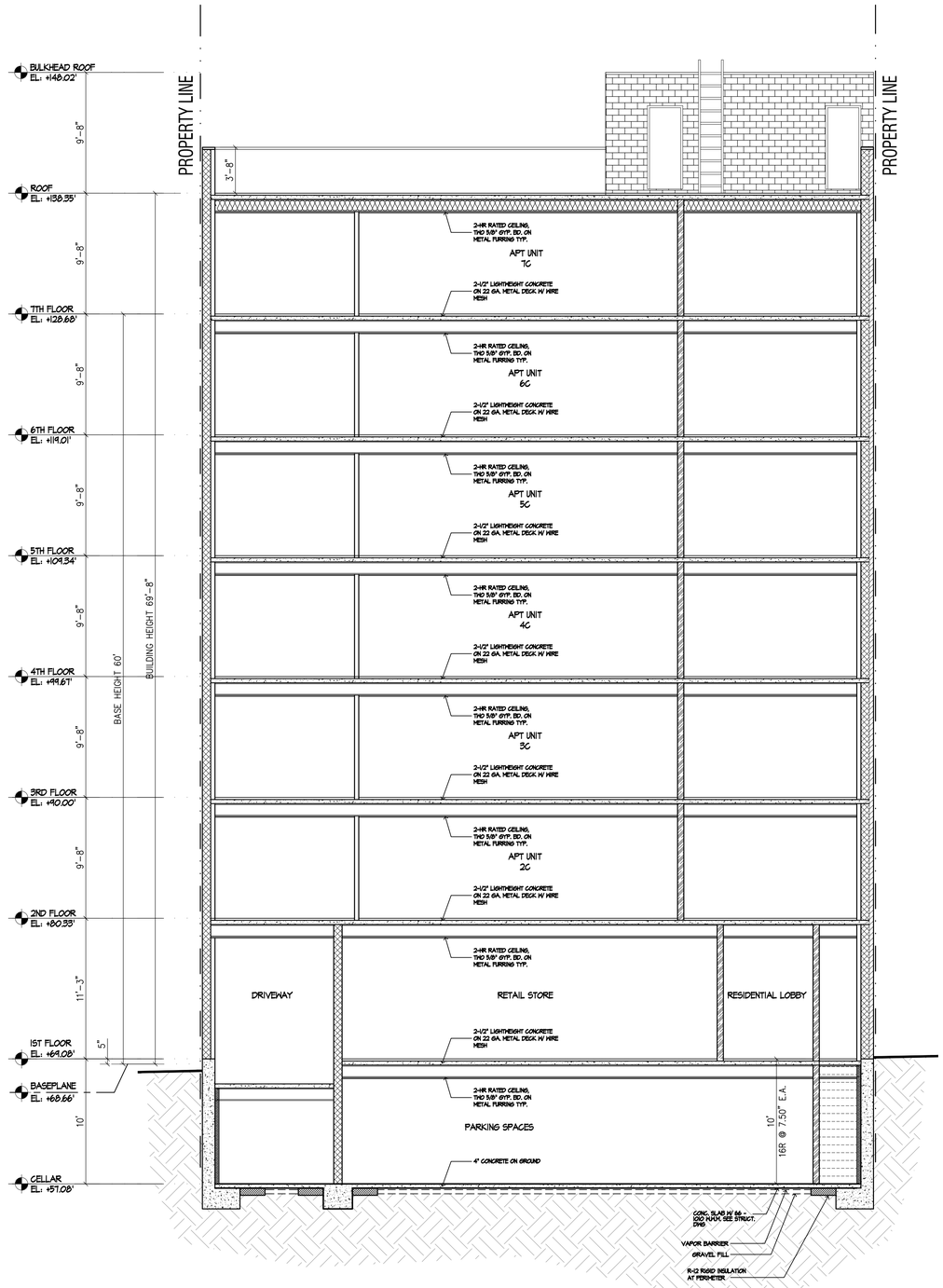
LOCATION	FLOOR	BASE	WALLS	CEILING	CELING HT.	REMARKS
CELLAR						
STAIR	CERAMIC TILE	CERAMIC	PAINT	G.W.B.- PAINT	8'-0"	2-HR RATED ENCLOSURE
ELECTRIC METERS ROOM	EXP. CONC.	NONE	PAINT	PAINT	8'-6"	-
WATER & SPRINKLER ROOM	EXP. CONC.	NONE	PAINT	PAINT	8'-6"	-
REFUSE/ COMPACTOR RM	EXP. CONC.	NONE	PAINT	PAINT	8'-6"	2-HR RATED ENCLOSURE
BOILER ROOM	EXP. CONC.	NONE	PAINT	PAINT	8'-6"	2-HR RATED ENCLOSURE
GAS METERS ROOM	EXP. CONC.	NONE	PAINT	PAINT	8'-6"	2-HR RATED ENCLOSURE
STORAGE ROOM	CERAMIC TILE	VINYL	PAINT	G.W.B.- PAINT	8'-6"	2-HR RATED ENCLOSURE
AMBULATORY TREATMENT	CERAMIC TILE	VINYL	PAINT	G.W.B.- PAINT	8'-6"	2-HR RATED ENCLOSURE
JANITOR'S CL.	CERAMIC TILE	VINYL	PAINT	G.W.B.- PAINT	8'-6"	-
ELEVATOR LOBBY	PORCELAIN TILE	PORCELAIN	PAINT	PAINT	8'-6"	2-HR RATED ENCLOSURE
ELEVATOR CAB	PORCELAIN TILE	NONE	-	-	-	-
ELEVATOR MACHINE ROOM	EXP. CONC.	NONE	PAINT	EXP. CONC.	8'-6"	2-HR RATED ENCLOSURE
PARKING	EXP. CONC.	NONE	PAINT	EXP. CONC.	8'-6"	-
FIRST FLOOR						
STAIR	CERAMIC TILE	CERAMIC	PAINT	G.W.B.- PAINT	8'-0"	2-HR RATED ENCLOSURE
LOBBY	PORCELAIN TILE	NONE	PORCELAIN TILE	PAINT	10'-4"	2-HR RATED ENCLOSURE
CORRIDOR	PORCELAIN TILE	NONE	PORCELAIN TILE	PAINT	10'-4"	2-HR RATED ENCLOSURE
BATHROOM	CERAMIC TILE	CERAMIC TILE	PAINT	G.W.B.- PAINT	8'-0"	-
AMBULATORY TREATMENT	CERAMIC TILE	VINYL	PAINT	G.W.B.- PAINT	8'-6"	2-HR RATED ENCLOSURE
ELEVATOR LOBBY	PORCELAIN TILE	PORCELAIN	PAINT	PAINT	8'-6"	2-HR RATED ENCLOSURE
ELEVATOR CAB	PORCELAIN TILE	NONE	-	-	-	-
SECOND AND THIRD FLOORS						
STAIR	CERAMIC TILE	CERAMIC	PAINT	G.W.B.- PAINT	8'-0"	2-HR RATED ENCLOSURE
CORRIDOR	PORCELAIN TILE	PORCELAIN	PAINT	PAINT	8'-0"	2-HR RATED ENCLOSURE
REFUSE CHUTE ROOM	CERAMIC TILE	CERAMIC TILE	PAINT	PAINT	8'-0"	2-HR RATED ENCLOSURE
LIVING/DINING	HARD WOOD	H. WOOD	PAINT	PAINT	8'-0"	-
KITCHENETTE	CERAMIC TILE	H. WOOD	PAINT	PAINT	8'-0"	-
BEDROOMS	HARD WOOD	H. WOOD	PAINT	PAINT	8'-0"	-
BATHROOM	CERAMIC TILE	-	CERAMIC TILE	PAINT	8'-0"	-
W/D CLOSETS	HARD WOOD	H. WOOD	PAINT	PAINT	8'-0"	-
CLOSETS	HARD WOOD	H. WOOD	PAINT	PAINT	8'-0"	-
ELEVATOR CAB	PORCELAIN TILE	NONE	-	-	-	-

ABBREVIATIONS

EXP. CONC.	EXPOSED CONCRETE
G.W.B.	GYPSUM WALLBOARD
V.C.T.	VINYL COMPOSITION TILE
C.T.	CERAMIC TILE
H. WOOD	HARD WOOD

NOTES

PROVIDE MOISTURE RESISTANT GYPSUM WALLBOARD ON ALL BATHROOM WALLS.
FOR CERAMIC TILE APPLICATIONS, PROVIDE CEMENTITIOUS BACKER BOARD.
PROVIDE WATERPROOF ASSEMBLY FOR ALL BATHROOM AND TOILETS.



SECTION C-C

SCALE: 3/16"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

SIDE ELEVATION (NORTH) FINISHED SCHEDULE

DATE: 01/19/15

PROJECT #: 20140136

SEAL & SIGNATURE:

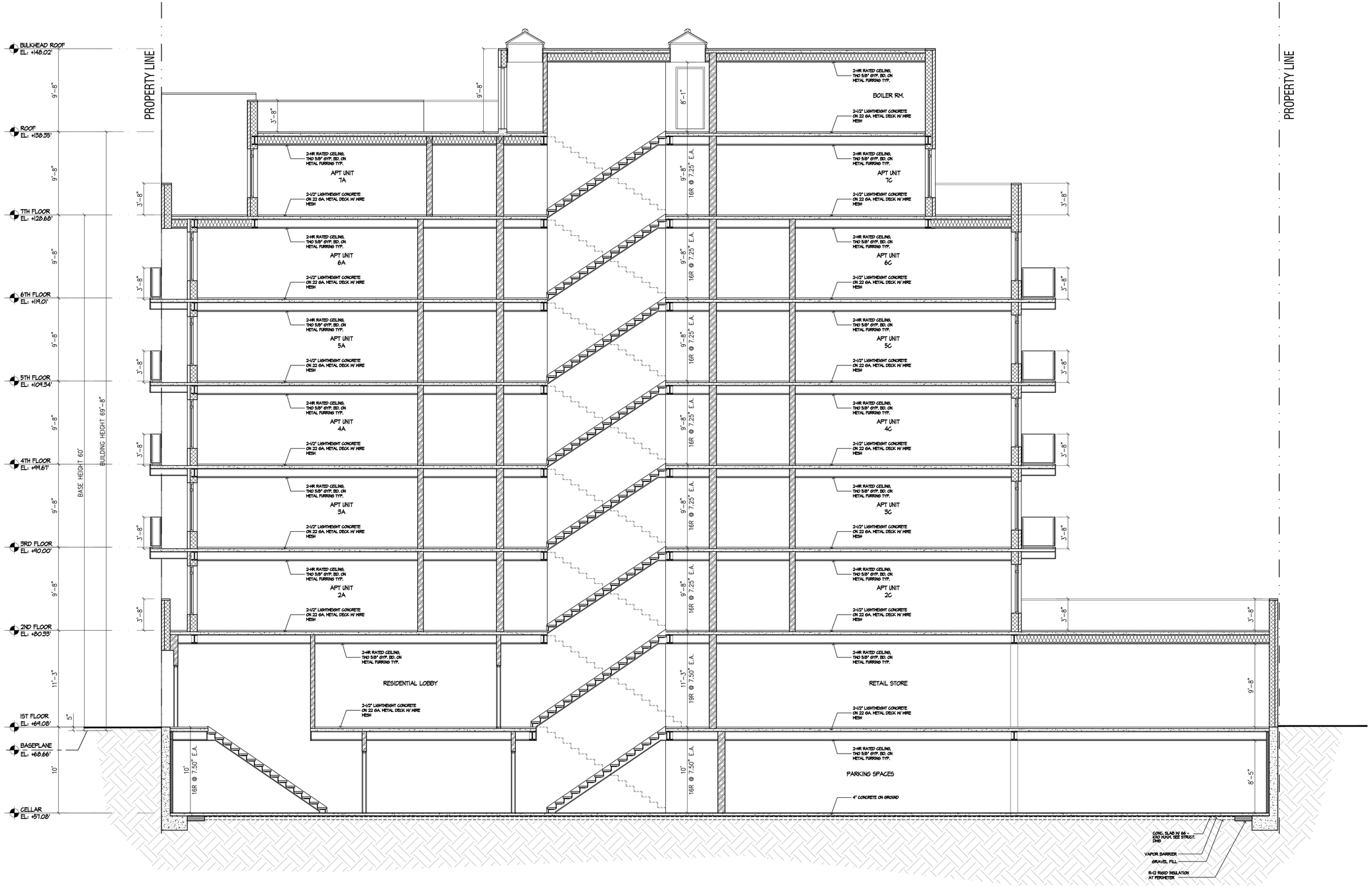
REGISTERED ARCHITECT
CHIANG HWA TAN
025376
STATE OF NEW YORK

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-402.00



SECTION D-D

SCALE: 3/16"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

SECTION D-D

DATE: 01/19/15

PROJECT #: 20140136

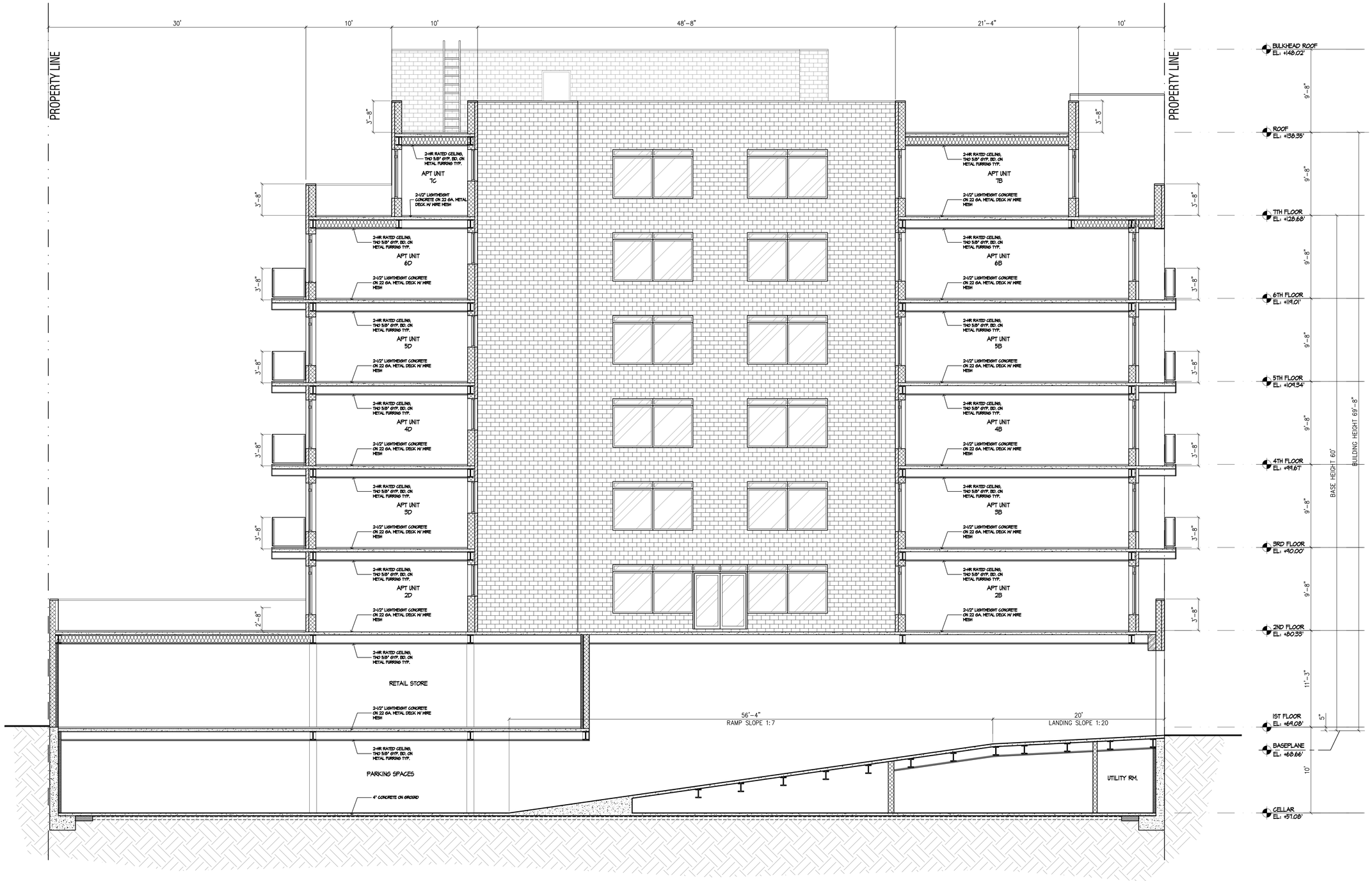
SEAL & SIGNATURE:

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-403.00



SECTION E-E

SCALE: 3/16"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

SECTION E-E

DATE: 01/19/15

PROJECT #: 20140136

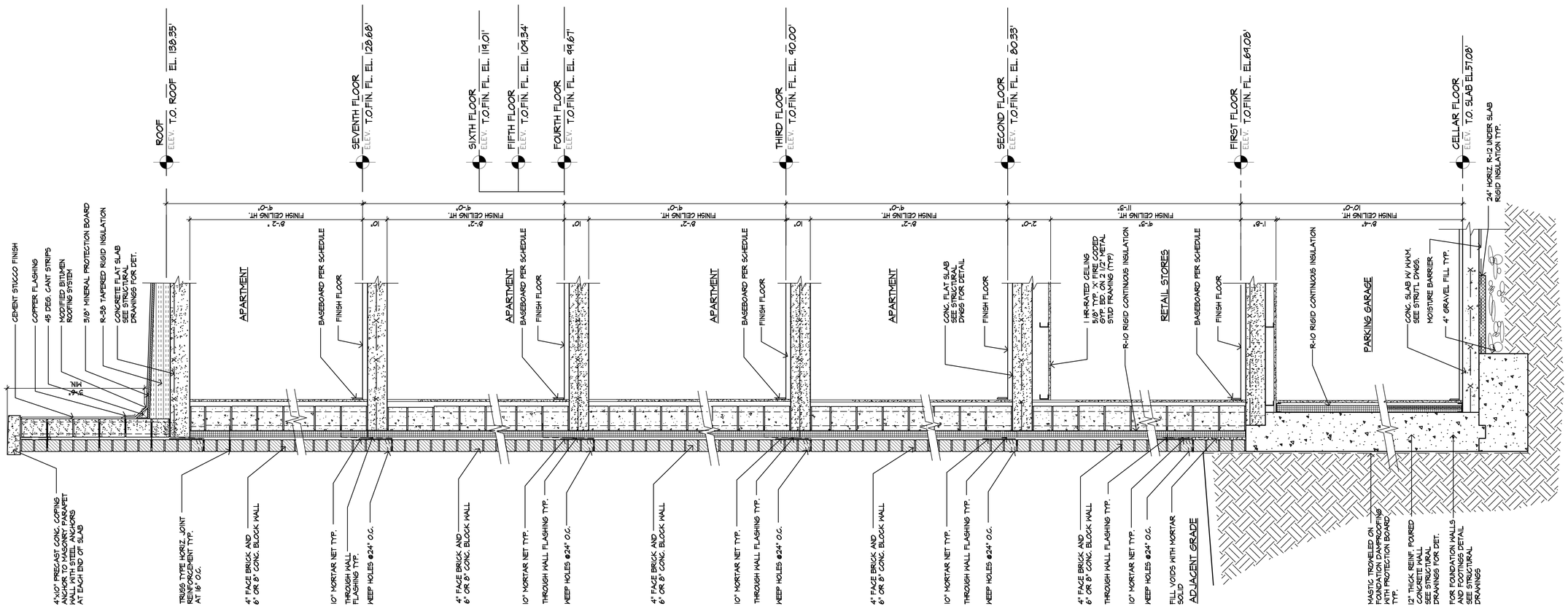
SEAL & SIGNATURE:

DRAWN BY: KT

CHKD. BY: CT

DRAWING #:

A-404.00



A A-405 TYPICAL WALL SECTION AT SIDE WALLS

SCALE: 3/4"=1'-0"

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.

194-02 NORTHERN BLVD, SUITE# 205, FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

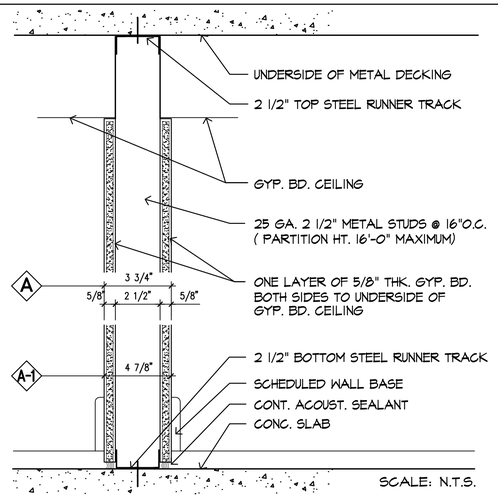
109-15 72nd ROAD, FORREST HILLS, NY, 11357

DRAWING TITLE :

WALL SECTION AND DETAILS

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-405.00

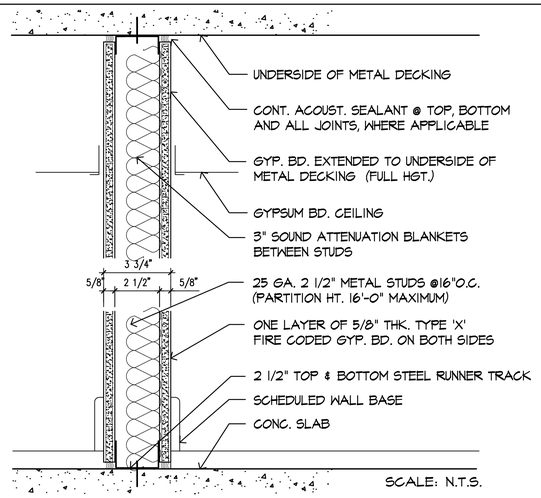
REGISTERED ARCHITECT CHUNG HWA TAN 025376 STATE OF NEW YORK



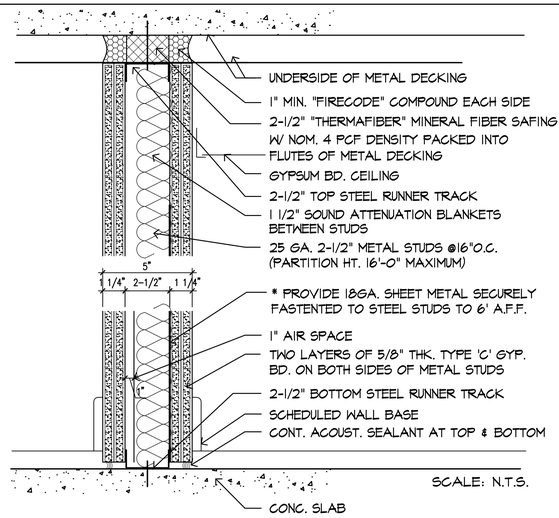
TYPE (A) TYPICAL INTERIOR DRYWALL PARTITION
W/ 2 1/2" METAL STUDS

TYPE (A-1) INTERIOR PARTITION W/ 3 5/8" METAL STUDS

NOTE: PROVIDE WATER RESISTANCE GYP. BD. IN ALL WET AREAS
ie. TOILET ROOMS AND BATHROOMS

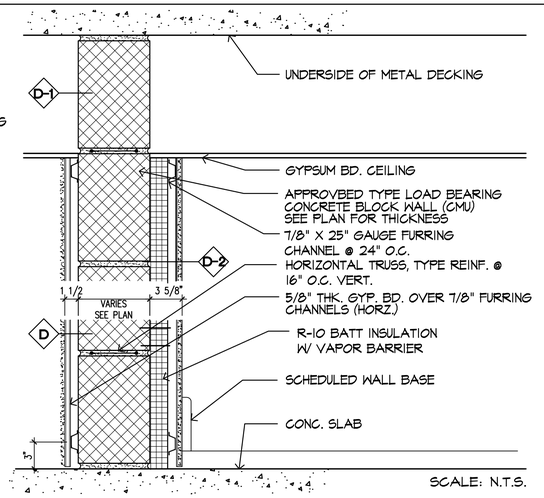


TYPE (B) ONE HOUR RATED PARTITION



TYPE (C) TWO HOUR RATED DEMISING PARTITION - 50 STC
UL DESIGN U411 BSA# 301-60-SM W/ 2 1/2" METAL STUDS

* MASONRY EQUIVALENT STAIR ENCLOSURE ADD 18GA. SHEET METAL TO STEEL STUDS. SEE DETAIL NOTES ABOVE.
2-HR RATED STAIR ENCLOSURE ASSEMBLIES BSA# 542-68-SM

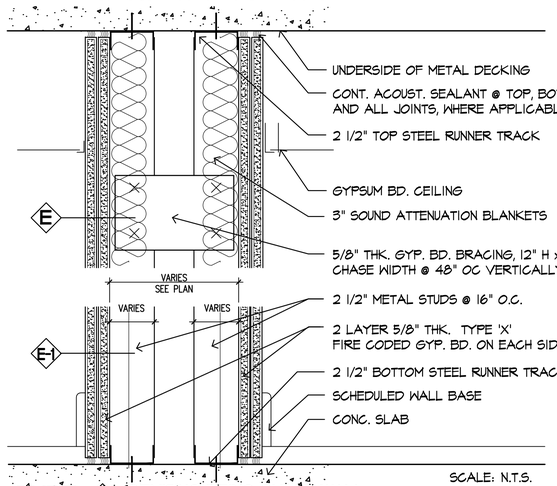


TYPE (D) LOAD BEARING CMU PARTITION
W/ 7/8" FURRING CHANNELS

TYPE (D-1) LOAD BEARING CMU PARTITION
LAMINATE GYP. BD. ON WALL

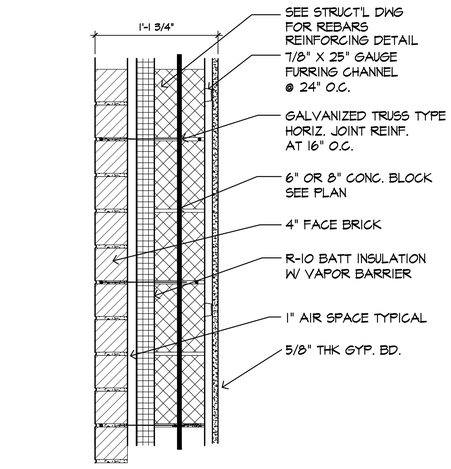
TYPE (D-2) LOAD BEARING CMU PARTITION
W/ 7/8" FURRING CHANNELS

CONCRETE BLOCK ASSEMBLIES BSA# 1-74-M

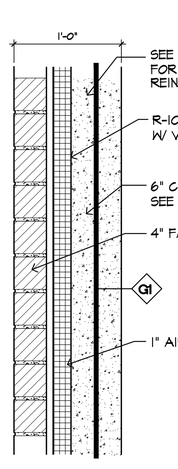


TYPE (E) DEMISING PIPING CHASE WALL
W/ 2-LAYER 5/8" GYP. BD. ON BOTH SIDES
UL DESIGN U420
BSA# 173-77-SM

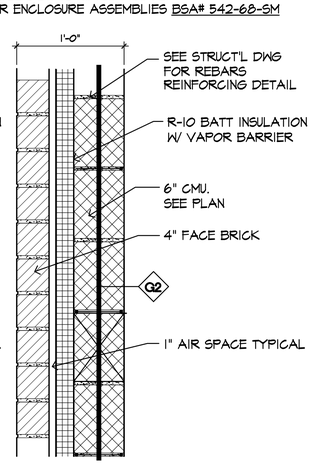
TYPE (E-1) PIPING CHASE WALL
W/ 1-LAYER 5/8" GYP. BD. ON BOTH SIDES



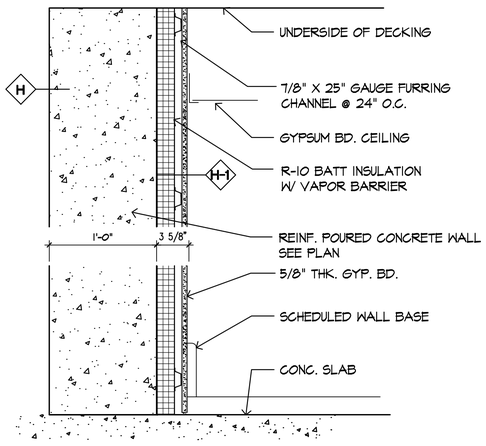
TYPE (F) 2-HR RATED EXTERIOR MASONRY WALL



TYPE (G1) SECTION / WALL • BULK HEAD
CONCRETE WALL

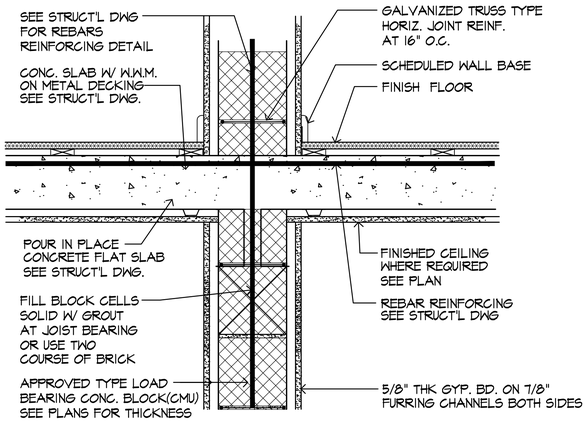


TYPE (G2) SECTION / WALL • BULK HEAD
CMU BLOCK

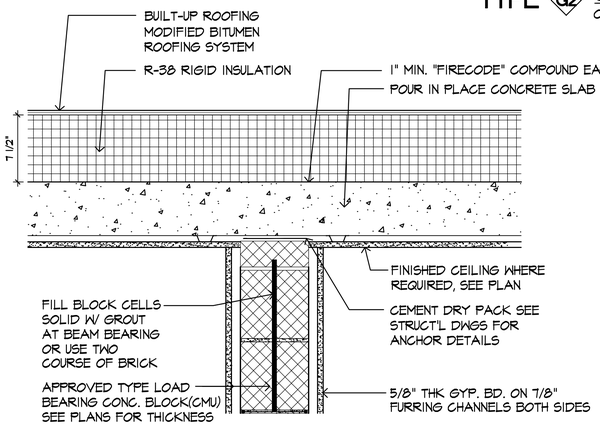


TYPE (H) 12" EXTERIOR CONCRETE WALL
EXPOSED CONCRETE

TYPE (H-1) 12" EXTERIOR CONCRETE WALL
W/ 7/8" FURRING CHANNELS



TYPE (I) DETAIL AT 2-HR RATED DEMISING WALL
CONCRETE BLOCK WALL ASSEMBLIES BSA# 1-74-M



TYPE (J) 1 HR RATED ROOF ASSEMBLIES DETAIL
CONCRETE BLOCK WALL ASSEMBLIES BSA# 1-74-M
DRYWALL CEILING 1-HR ASSEMBLIES BSA# 344-78-SM

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

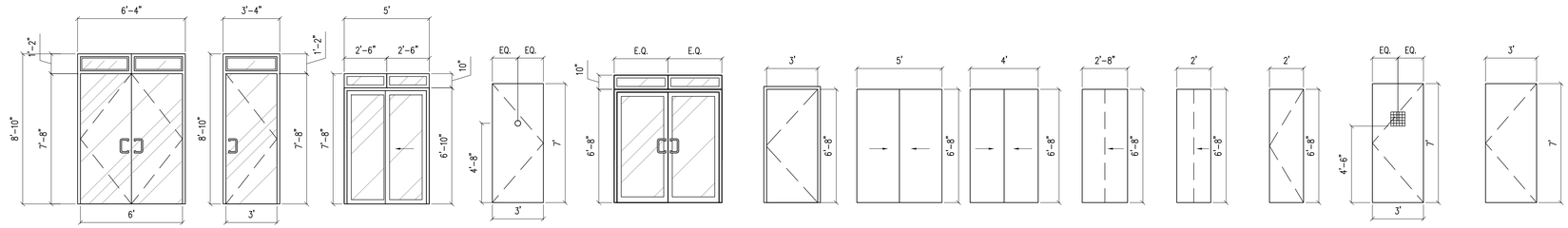
109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

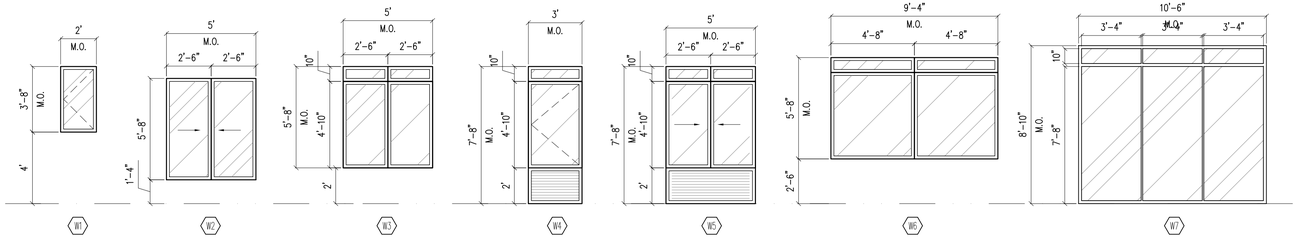
PARTITION TYPES

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE:	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-501.00

REGISTERED ARCHITECT CHUNG HWA TAN 025376 STATE OF NEW YORK



TYPE	A1	A2	A3	A4	A5	B1	C1	C2	C3	C4	C5	S	U
DOOR MATERIAL	ALUMINUM/ GLASS	ALUMINUM/ GLASS	ALUMINUM/ GLASS	METAL	ALUMINUM/ GLASS	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	METAL	METAL
FRAME MATERIAL	ALUMINUM	ALUMINUM	ALUMINUM	METAL-6	ALUMINUM	WOOD-1	WOOD-1	WOOD-1	WOOD-1	WOOD-1	WOOD-1	METAL-3, 4 OR 6	METAL-1 OR 6
SADDLE	1	1	1	2	1	2 OR NONE	NONE	NONE	NONE	NONE	NONE	2 OR NONE	NONE
LOCATION	DOUBLE ENTRY DOORS	SINGLE ENTRY DOOR	BALCONY	APT ROOM ENTRY	2ND FL. COURT YARD	ACC. BATH/ BEDROOM	CLOSET	CLOSET	CLOSET	CLOSET	CLOSET	STAIR DOOR	UTILITY/ STORAGE DOOR
REMARKS	WEATHER STRIPPING WITH LOCK HARDWARE U-VALUE=0.35, SHGC=0.40, VT=0.6	WEATHER STRIPPING WITH LOCK HARDWARE U-VALUE=0.35, SHGC=0.40, VT=0.6	WEATHER STRIPPING WITH LOCK HARDWARE U-VALUE=0.35, SHGC=0.40, VT=0.6	1 1/2 HR RATED FPSC COMBINATION CHIME AND INTERVIEWER	WEATHER STRIPPING WITH LOCK HARDWARE U-VALUE=0.35, SHGC=0.40, VT=0.6	3/4" UNDERCUT B2 = 2'-10" DOOR	DOUBLE SLIDING CLOSET DOOR	DOUBLE SLIDING CLOSET DOOR	BI FOLDING CLOSET DOOR	BI FOLDING CLOSET DOOR		1 1/2 HR RATED FPSC WITH VISION PANEL WEATHER STRIPPING ON EXTERIOR STAIR DOORS	1 1/2 HR RATED FPSC



WINDOW SCHEDULE

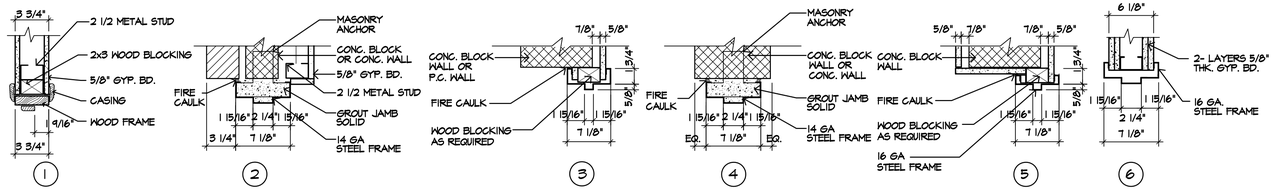
ITEM	SIZE	MATERIAL	LOCATION	REMARK
W1	2'-0" X 3'-8"	GLASS/ ALUM.	BATH ROOM	DOUBLE HUNG
W2	5'-0" X 5'-8"	GLASS/ ALUM.	BED/ LIVING ROOM	DOUBLE HUNG
W3	5'-0" X 5'-8"	GLASS/ ALUM.	BED/ LIVING ROOM	DOUBLE HUNG
W4	8'-0" X 7'-8"	GLASS/ ALUM.	BED/ LIVING ROOM	CASEMENT
W5	9'-8" X 7'-8"	GLASS/ ALUM.	LOBBY	CASEMENT
W6	5'-8" X 9'-4"	GLASS/ ALUM.	HALLWAY	CASEMENT
W7	8'-10" X 10'-6"	GLASS/ ALUM.	HALLWAY	CASEMENT

NOTES:
1. ALL WINDOWS TO BE MANUFACTURED BY "CRYSTAL" OR APPROVED EQUAL
2. ALL OPERABLE WINDOWS TO HAVE INSECT SCREENS.
3. ALL WINDOWS SHALL BE WHITE, COMMERCIAL GRADE ALUMINUM FRAME AND HAVE INSULATED GLASS
4. ALL WINDOWS SHALL BE DOUBLE GLAZED

TABLE C402.4.3
MAXIMUM AIR INFILTRATION RATE FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT²)	TEST PROCEDURE
WINDOWS, SLIDING DOORS, SWINGING DOORS, SKILIGHTS (ALL OTHER)	0.20 (a)	AAMA/WDMA/CSA101/I.S.2/A44 00RNFRC 400
SKYLIGHTS – WITH CONDENSATION WEEPAGE OPENINGS	0.30	
CURTAIN WALLS, STOREFRONT GLAZING	0.06	NFRC 400 OR ASTM E 283 AT 1.57 PSF (75 PA)
COMMERCIAL GLAZED SWINGING ENTRANCE DOORS, REVOLVING DOORS	1.00	
GARAGE DOORS	0.40	ANSI/DASMA 105, NFRC 400, OR ASTM E 283 AT 1.57 PSF (75 PA)
ROLLING DOORS	1.00	
(a) THE MAXIMUM RATE FOR WINDOWS, SLIDING AND SWINGING DOORS, AND SKYLIGHTS IS PERMITTED TO BE 0.3 CFM PER SQUARE FOOT OF FENESTRATION OR DOOR AREA WHEN TESTED IN ACCORDANCE WITH AAMA/WDMA/CSA101/I.S.2/A440 AT 6.24 PSF (300 PA).		

DOOR FRAME DETAILS



DOOR SILL DETAILS

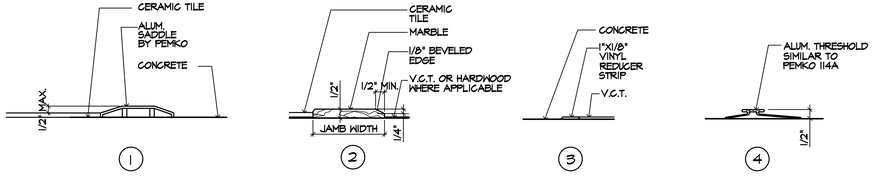


TABLE C303.1.3(1)
DEFAULT GLAZED FENESTRATION U-FACTOR

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT	
			SINGLE	DOUBLE
METAL	1.20	0.80	2.00	1.30
METAL WITH THERMAL BREAK	1.10	0.65	1.90	1.10
NONMETAL OR METAL CLAD	0.95	0.55	1.75	1.05
GLAZED BLOCK	0.60			

TABLE C303.1.3(2)
DEFAULT DOOR U-FACTORS

DOOR TYPE	U-FACTOR
UNINSULATED METAL	1.20
INSULATED METAL	0.60
WOOD	0.50
INSULATED, NONMETAL EDGE, MAX 45% GLAZING, ANY GLAZING DOUBLE PANE	0.35

TABLE C303.1.3(3)
DEFAULT GLAZED FENESTRATION SHGC AND VT

	SINGLE GLAZED		DOUBLE GLAZED		GLAZED BLACK
	CLEAR	TINTED	CLEAR	TINTED	
SHGC	0.8	0.7	0.7	0.6	0.6
VT	0.6	0.3	0.6	0.3	0.6

FENESTRATION PRODUCT RATING

- U-FACTORS OF FENESTRATION PRODUCTS (WINDOWS, DOORS AND SKYLIGHTS) SHALL BE DETERMINED IN ACCORDANCE WITH NFRC 100 BY AN ACCREDITED, INDEPENDENT LABORATORY, AND LABELED AND CERTIFIED BY THE MANUFACTURER. PRODUCTS LACKING SUCH A LABELED U-FACTOR SHALL BE ASSIGNED A DEFAULT U-FACTOR FROM TABLE C303.1.3(1) OR C303.1.3(2).
- THE SOLAR HEAT GAIN COEFFICIENT (SHGC) AND VISIBLE TRANSMITTANCE (VT) OF GLAZED FENESTRATION PRODUCTS (WINDOWS, GLAZED DOORS AND SKYLIGHTS) SHALL BE DETERMINED IN ACCORDANCE WITH NFRC 200 BY AN ACCREDITED, INDEPENDENT LABORATORY, AND LABELED AND CERTIFIED BY THE MANUFACTURER. PRODUCTS LACKING SUCH A LABELED SHGC OR VT SHALL BE ASSIGNED A DEFAULT SHGC OR VT FROM TABLE C303.1.3(3).

AIR BARRIER NOTES

- THE AIR BARRIER SHALL BE CONTINUOUS FOR ALL ASSEMBLIES THAT ARE THE THERMAL ENVELOPE OF THE BUILDING AND ACROSS THE JOINTS AND ASSEMBLIES.
- AIR BARRIER JOINTS AND SEAMS SHALL BE SEALED, INCLUDING SEALING TRANSITIONS IN PLACES AND CHANGES IN MATERIALS.AIR BARRIER PENETRATIONS SHALL BE SEALED IN ACCORDANCE WITH SECTION C402.4.2.THE JOINTS AND SEALS SHALL BE SECURELY INSTALLED IN OR ON THE JOINT FOR ITS ENTIRE LENGTH SO AS NOT TO DISLODGE, LOOSEN OR OTHERWISE IMPAIR ITS ABILITY TO RESIST POSITIVE AND NEGATIVE PRESSURE FROM WIND, STACK EFFECT AND MECHANICAL VENTILATION.
- RECESSEDLIGHTING FIXTURES SHALL COMPLY WITH SECTION C402.4.8. WHERE SIMILAR OBJECTS ARE INSTALLED WHICH PENETRATE THE AIR BARRIER, PROVISIONS SHALL BE MADE TO MAINTAIN THE INTEGRITY OF THE AIR BARRIER.

FINISH SCHEDULE

LOCATION	FLOOR	BASE	WALLS	CEILING	CEILING HEIGHT	REMARKS
CELLAR FLOOR						
STAIR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
CORRIDOR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
WATER METER/SPRINKLER ROOM	EXP. CONC.	NONE	PAINT	PAINT	8'-0"	-
ELECTRICAL ROOM	EXP. CONC.	NONE	PAINT	PAINT	8'-0"	-
AMBULATORY	V.C.T.	VINYL	PAINT	PAINT	8'-0"	-
BATHROOM	CERAMIC TILE	CERAMIC	PAINT	G.W.B. - PAINT	8'-0"	-
FIRST FLOOR						
STAIR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
CORRIDOR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
BEDROOM	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
LIVING/DINING	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
CLOSET	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
BATHROOM	CERAMIC TILE	CERAMIC	PAINT	G.W.B. - PAINT	8'-0"	-
TERRACE	PAVERS	-	-	-	-	-
SECOND - SIXTH FLOOR						
STAIR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
CORRIDOR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
BEDROOM	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
LIVING/DINING	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
CLOSET	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
BATHROOM	CERAMIC TILE	CERAMIC	PAINT	G.W.B. - PAINT	8'-0"	-
BALCONY	PAVERS	-	-	-	-	-
SEVENTH FLOOR						
STAIR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
CORRIDOR	V.C.T.	VINYL	PAINT	G.W.B. - PAINT	8'-0"	2-HR RATED ENCLOSURE
BEDROOM	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
LIVING/DINING	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
CLOSET	H.WOOD	H.WOOD	PAINT	G.W.B. - PAINT	8'-0"	-
BATHROOM	CERAMIC TILE	CERAMIC	PAINT	G.W.B. - PAINT	8'-0"	-
BALCONY	PAVERS	-	-	-	-	-
TERRACE	PAVERS	-	-	-	-	-
OUTDOOR RECREATION	PAVERS	-	-	-	-	-
ROOF						
STAIR BULKHEAD	EXP. CONC.	-	EXP. CONC.	PAINT	8'-0"	2-HR RATED ENCLOSURE
ELEVATOR CONTROL ROOM	EXP. CONC.	-	EXP. CONC.	PAINT	8'-0"	2-HR RATED ENCLOSURE
BOILER ROOM	EXP. CONC.	-	EXP. CONC.	PAINT	8'-0"	2-HR RATED ENCLOSURE

ABBREVIATIONS

EXP. CONC.	EXPOSED CONCRETE
G.W.B.	GYPSUM WALLBOARD
V.C.T.	VINYL COMPOSITION TILE
C.T.	CERAMIC TILE
H. WOOD	HARD WOOD

NOTES

PROVIDE MOISTURE RESISTANT GYPSUM WALLBOARD ON ALL BATHROOM WALLS.
FOR CERAMIC TILE APPLICATIONS, PROVIDE CEMENTITIOUS BACKER BOARD.
PROVIDE WATERPROOF ASSEMBLY FOR ALL BATHROOM AND TOILETS.

CLIENT:

CONSTRUCTION MALL INC.

1501 WASHINGTON AVE., PHILADELPHIA, PA 19146

ARCHITECT:

TAN ARCHITECT P.C.
194-02 NORTHERN BLVD, SUITE# 205,
FLUSHING, NY 11358

(718) 224-1130/Tel
(718) 224-1137/Fax

STRUCTURE ENGINEER:

MEP ENGINEER:

DATE:	REV.	DESCRIPTION:

PROJECT:

PROPOSED A 7-STORY MIXED USE BUILDING

109-15 72nd ROAD,
FORREST HILLS, NY, 11357

DRAWING TITLE :

DOORS SCHEDULE
WINDOWS SCHEDULE
DOOR FRAMES AND SILL DETAILS

DATE: 01/19/15	PROJECT #: 20140136
SEAL & SIGNATURE: REGISTERED ARCHITECT CHANG HWA TAN 025376 STATE OF NEW YORK	DRAWN BY: KT
	CHKD. BY: CT
	DRAWING #: A-502.00
	22 OF 22

APPENDIX 2

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and East Broadway Real Estate Holdings LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, enrollee 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, Katherine Glass, 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:

Queens Library at Forest Hills
108-19 71st Avenue, Flushing, NY 11375
718-268-7934

Monday	9:00 am – 8:00 pm
Tuesday	1:00 – 6:00 pm
Wednesday	10:00 am – 6:00 pm
Thursday	12:00 – 8:00 pm
Friday	10:00 am – 6:00 pm
Saturday	10:00 am – 5:30 pm
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: None

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 East Broadway Real Estate Holdings LLC. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

Citizen Participation Milestones: Public notice and public comment activities occur at several steps during a typical NYC VCP project. 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.

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.

Stormwater Retention: Stormwater retention improves water quality by lowering the rate of combined stormwater 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 stormwater 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: East Broadway Real Estate Holdings LLC is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

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

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

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

APPENDIX 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 East Broadway Real Estate Holdings LLC 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 East Broadway Real Estate Holdings LLC. 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. The backfill and cover soil quality objectives are listed in Section 4.2. Imported soils will not exceed groundwater protection standards established in Part 375. Imported soils for Track 1 remedial action projects will not exceed Track 1 SCO's. A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

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

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;

- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.
- All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this remedial plan. The final remedial report will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.
- All material will be subject to source screening and chemical testing.
- Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:
- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.
Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the final remedial report. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 Fluids Management

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

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

1.11 Stormwater Pollution Prevention

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

1.12 Contingency Plan for Unknown Contamination Sources

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

1.13 Odor, Dust, and Nuisance Control

Odor Control

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

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

Dust Control

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

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.

- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

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

Other Nuisances

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

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

APPENDIX 5

MANUFACTURER SPECIFICATIONS FOR VAPOR BARRIER

VAPORBLOCK® PLUS™ VBP20

Under-Slab Vapor / Gas Barrier

RAVEN INDUSTRIES

Product Description

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

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

Product Use

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

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

Size & Packaging

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

Under-Slab Vapor/Gas Retarder

Product	Part #
VaporBlock Plus 20	VBP 20

APPLICATIONS

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

VaporBlock® Plus™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

VAPORBLOCK® PLUS™ VBP20

ISO 9001:2008 CERTIFIED MANAGEMENT SYSTEM

Under-Slab Vapor / Gas Barrier

		VAPORBLOCK PLUS 20	
PROPERTIES	**TEST METHOD**	**IMPERIAL**	**METRIC**
Appearance		White/Gold	
Thickness, Nominal		20 mil	0.51 mm
Weight		102 lbs/MSF	498 g/m²
Classification	ASTM E 1745	CLASS A, B & C	
Tensile Strength lbf/in (N/cm) average MD & TD (new material)	ASTM E 154 Section 9 (D-882)	58 lbf	102 N
Impact Resistance	ASTM D 1709	2600 g	
Maximum Use Temperature		180° F	82° C
Minimum Use Temperature		-70° F	-57° C
Permeance (new material)	ASTM E 154 Section 7 ASTM E 96 Procedure B	0.0098 Perms grains/(ft²·hr·in·Hg)	0.0064 Perms g/(24hr·m²·mm Hg)
(after conditioning) Perms (same measurement as above permeance)	ASTM E 154 Section 8, E96 Section 11, E96 Section 12, E96 Section 13, E96	0.0079 0.0079 0.0097 0.0113	0.0052 0.0052 0.0064 0.0074
WVTR	ASTM E 96 Procedure B	0.0040 grains/hr-ft²	0.0028 gm/hr-m²
Radon Diffusion Coeffiecient	K124/02/95	< 1.1 x 10^{-13} m²/s	
Methane Permeance	ASTM D 1434	< 1.7 x 10^{-10} m²/d• atm 0.32 GTR (Gas Transmission Rate) ml/m²•D•ATM	

VaporBlock® Plus™ Placement

All instructions on architectural or structural drawings should be reviewed and followed.
Detailed installation instructions accompany each roll of VaporBlock® Plus™ and can also be located on our website.
ASTM E-1643 also provides general installation information for vapor retarders.

VaporBlock® Plus™
UNDERSLAB VAPOR RETARDER / GAS BARRIER

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

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

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APPENDIX 6

CONSTRUCTION HEALTH AND SAFETY PLAN

CONSTRUCTION
HEALTH AND SAFETY PLAN

109-15 72nd Road
Forest Hills, New York 11375
Block 3258, Lot 20

NYC VCP Project No. 15CVCP159QQ
OER Project No. 15EHAZ519Q

ACT Project No. 8212-FHNY

September 2, 2015

Prepared for:

East Broadway Real Estate Holdings LLC
109-15 72nd Road
Forest Hills, New York 11375

Prepared by:

Advanced Cleanup Technologies, Inc.
110 Main Street, Suite #103
Port Washington, New York 11050

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

The construction of a 7-story mixed-use commercial and residential building is being proposed at the property located at 109-15 72nd Road, Forest Hills, New York (Block 3258, Lot 20) ("the Site"). This Construction Health and Safety Plan (CHASP) has been prepared to identify site-specific health and safety procedures to be followed by on-site contractors during remedial activities at the site. All activities performed under this CHASP are targeted to comply with Occupational Safety and Health Administration (OSHA) Regulations 29 CFR Part 1910, *et seq.*

1.1 Purpose

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

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

1.2 Site Description

The Site is located at 109-15 72nd Road, Queens in the Forest Hills section of Queens, New York and is identified as Block 3258 and Lot 20 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 6,920 square feet and is bounded by a three-story commercial building to the north, a seven-story mixed use building with a dry cleaner to the south, 72nd Road followed by a three and four story church to the east, and a four story commercial to the west.

A map of the site boundary is shown in Figure 2. The most recent use of the property was as a mixed-use apartment building with three commercial units, formerly occupied by a doctor's office and ECG Business Services. Currently, the Site is vacant and contains a three-story, 1,520 square foot building and one-story garage.

1.3 Environmental Concerns

Advanced Cleanup Technologies (ACT) completed a Phase I Environmental Site Assessment on April 27th, 2015. According to the Phase I ESA and historical fire insurance maps, the subject property consisted of undeveloped land until 1914 when a three-story residential building was constructed which remained to the current date.

The Phase I identified the following Recognized Environmental Conditions:

- A hazardous materials E-designation at the subject property.

A remedial investigation was performed and the results are documented in a companion document called "Remedial Investigation Report, 109-15 72nd Road, Forest Hills, NY", dated May, 2015 (RIR).

Soil/fill samples collected during the RI were compared to NYSDEC Part 375-6.8 Unrestricted Use Soil Cleanup Objective (Track 1) and Restricted Commercial Use (Track 2) Soil Cleanup Objectives (SCOs). Soil sampling showed that no VOCs, PCBs or metals were detected above Unrestricted Use SCOs. Trace levels of acetone was detected in in all samples and below Unrestricted Use SCOs. SVOCs consisting of Polycyclic Aromatic Hydrocardbons (PAHs) were detected with benzo(k)fluoranthene (max of 809 µg/kg) exceeding Track 1 Unrestricted Use SCOs in one shallow soil sample. All other SVOCs were below Unrestricted Use SCOs. Two pesticides including 4,4'-DDE (max of 23.3 µg/kg) and 4,4'-DDT (max of 7.95 µg/kg) were detected above their respective Unrestricted Use SCOs in one shallow sample. The majority of soil contamination

is restricted to shallow soils and is indicative of historic fill materials. None of the VOCs, SVOCs, Pesticide, PCBs and metals exceeded Restricted Commercial Use SCOs.

Soil vapor samples collected during the RI were compared to the compounds by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor samples collected during the subsurface investigation showed all four samples contained low levels of petroleum and chlorinated VOCs. All of the detected compounds were below their respective guidance values, with the exception of the chlorinated VOC Tetrachloroethylene (PCE). PCE was identified in all soil vapor samples, with one of the soil vapor samples at a maximum concentration of 46 $\mu g/m^3$, which exceeds the NYSDOH guidance value of 30 $\mu g/m^3$. Petroleum related compounds (BTEX) were detected at a maximum concentration of 2,820 $\mu g/m^3$. Highest concentrations of all compounds were detected in the SV-2 location. Most compounds were detected at less than 20 $\mu g/m^3$. Highest levels were detected for toluene (maximum of 1,500 $\mu g/m^3$) and m&p-xylenes (maximum of 720 $\mu g/m^3$). Trichloroethylene (TCE), 1,1,1-Trichloroethane (TCA) and carbon tetrachloride were not detected in any soil vapor samples.

2.0 SITE PERSONNEL

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

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

ACT's Site Supervisor will have oversight responsibility over the project to ensure that this CHASP is properly implemented and that ACT and its subcontractors adhere to all OSHA regulations

and other established industry health and safety practices.

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

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

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

Title	Name	Telephone Number
Project Manager ACT	Marina Shapiro	516-225-1936 (Mobile)
Health and Safety Officer ACT	Yisong Yang	718-508-2970 (Mobile)

3.0 PROTECTIVE EQUIPMENT

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

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

Level B: This PPE level will be selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is needed. It includes positive pressure, full face-piece SCBA, or NIOSH-approved positive pressure supplied air respirator with escape SCBA and hooded chemical-resistant clothing such as overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit or disposable chemical-resistant overalls.

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

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

PPE shall be selected in accordance with the site air monitoring program (Section 5.3), OSHA 29 CFR 1910.120(c), (g), and 1910.132. Protective equipment shall be NIOSH-approved and respiratory protection shall conform to OSHA 29 CFR Part 1910.133 and 1910.134 specifications; head protection shall conform to 1910.135; eye and face protection shall conform to 1910.133; and foot protection shall conform to 1910.136. The only true difference among the levels of protection from D thru B is the addition of the type of respiratory protection.

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

All Site workers will be required to participate in a comprehensive PPE program. The PPE program will consist of daily "Tailgate" Health and Safety meetings, proper inspection, donning, use, maintenance, storage and decontamination of protective clothing and equipment, use of protective equipment in temperature extremes and monitoring of co-workers and the work environment.

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

4.0 HAZARD EVALUATION

4.1 Chemical Exposure

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

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

4.2 Temperature Hazards

4.2.1 Heat Exposure Hazards

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

Heat Rash

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

Heat Cramps

Cramps result from the inadequate replacement of body electrolytes lost through perspiration. Signs include severe spasms and pain in the extremities and abdomen.

Heat Exhaustion

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

Heat Stroke

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

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

A. Replace body fluids (water and electrolytes) lost through perspiration. Solutions may include a 0.1% salt and water solution or commercial mixes such as "Gatorade". Employees must be encouraged to drink more than the amount required in order to satisfy thirst.

B. Use cooling devices to aid the natural body ventilation. Cooling occurs through evaporation of perspiration and limited body contact with heat-absorbing protective clothing. Utilize fans and air conditioners to assist in evaporation. Long, cotton underwear is suggested to absorb perspiration and limit any contact with heat-absorbing protective clothing (i.e., coated Tyvek suits).

C. Provide shelter against heat and direct sunlight to protect personnel. Take breaks in shaded areas.

D. Rotate workers utilizing protective clothing during hot weather.

E. Establish a work regime that will provide adequate rest periods, with personnel working in shifts.

4.2.2 Cold Exposure Hazards

Work schedules will be adjusted to provide sufficient rest periods in a heated area for warming up during operations conducted in cold weather. Also, thermal protective clothing such as wind and/or moisture resistant outerwear is recommended to be worn.

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

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

4.3 Fire Prevention

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

- Only approved safety cans will be used to transport and store flammable liquids.
- All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool prior to filling.
- Smoking is not allowed during any operations within the work area in which petroleum products or solvents in free-floating, dissolved, or vapor forms, or other flammable liquids may be present.
- No open flame or spark is allowed in any area containing petroleum products or other flammable liquids.

4.4 Operation of Heavy Equipment

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

5.0 MANAGEMENT AND PLANNING

5.1 General Site Control

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

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

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

5.2 Health and Safety Communication

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

Gripping a partners wrist = "Leave area immediately"
Hands on top of head = " I need assistance"
Thumbs up = "OK; I'm alright; I understand"
Thumbs down = "No; Negative"

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

5.3 Air Monitoring

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

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

5.3.1 Community Air Monitoring

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

- VOCs will be monitored at the upwind perimeter of the work area at the start of each work day and periodically thereafter to establish background conditions. The monitoring will be performed utilizing a Photovac 2020 portable Photoionization Detector (PID) equipped with a 10.6 eV lamp capable of detecting the types of contaminants known or suspected to be present.
- VOCs will be monitored at the downwind perimeter of the work area daily at 2 hour intervals. If ambient air concentrations of total organic vapors at the downwind perimeter of the work area exceeds 5 parts per million (ppm) above background, work activities will be halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the work area or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15 minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

5.3.2 Activity-Specific Air Monitoring

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

- Volatile organic compounds will be monitored inside the work area of construction and health and safety personnel on a continuous basis. The PID will be

programmed to calculate 15-minute running average concentrations. If ambient air concentrations of total organic vapors inside the work area exceed 5 ppm above background, work activities will be halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.

- If total organic vapor levels inside the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level inside the work area or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15 minute average.

5.4 Dust Control

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

5.5 Spill Control and Prevention

Spills associated with site activities may be attributed to project specific heavy equipment and include gasoline, diesel and hydraulic oil. In the event of a leak or a release, site personnel will inform their supervisor immediately, locate the source of spillage and stop the flow if it can be done safely. A spill containment kit including absorbent pads, booms and/or granulated speedy dry absorbent material will be available to site personnel to facilitate the immediate recovery of the spilled material.

Daily inspections of site equipment components including hydraulic lines, fuel tanks, etc. will be performed by their respective operators as a preventative measure for equipment leaks and

to ensure equipment soundness. In the event of a spill, site personnel will immediately notify the NYSDEC (1-800-457-7362), and a spill number will be generated.

5.6 Decontamination Procedures

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

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

5.7 Soil Disposal

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

6.0 EMERGENCY MEDICAL CARE AND PROCEDURES

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

Ambulance:	**911**
Fire Department:	**911**
Elmhurst Hospital Center:	**(718) 334-4000**
Police:	**911**
Poison Control Center:	**(516) 542-2323**

The nearest emergency medical facility is the Elmhurst Hospital Center, located at 79-01 Broadway, Queens, New York, which is located 3.3 miles from the Site. Transport will be by on-site vehicle or by calling NYC EMS personnel. A map of the route to this hospital is attached. Directions to the hospital from the site are provided below.

- **Head southwest on 72nd Road towards Austin Street;**
- **Turn left onto Austin Street;**
- **Turn left at the 1st cross street onto Ascan Avenue;**
- **Turn left at the 1st cross street onto NY-25W/Queens Boulevard;**
- **Turn slight right toward NY 25 Service/Queens Boulevard;**
- **Turn slight left onto NY 25 Service/Queens Boulevard;**
- **Turn right onto Broadway;**
- **Elmhurst Hospital Center is located on the right.**

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

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

TABLE 1

NIOSH EXPOSURE LIMITS

TABLE 1

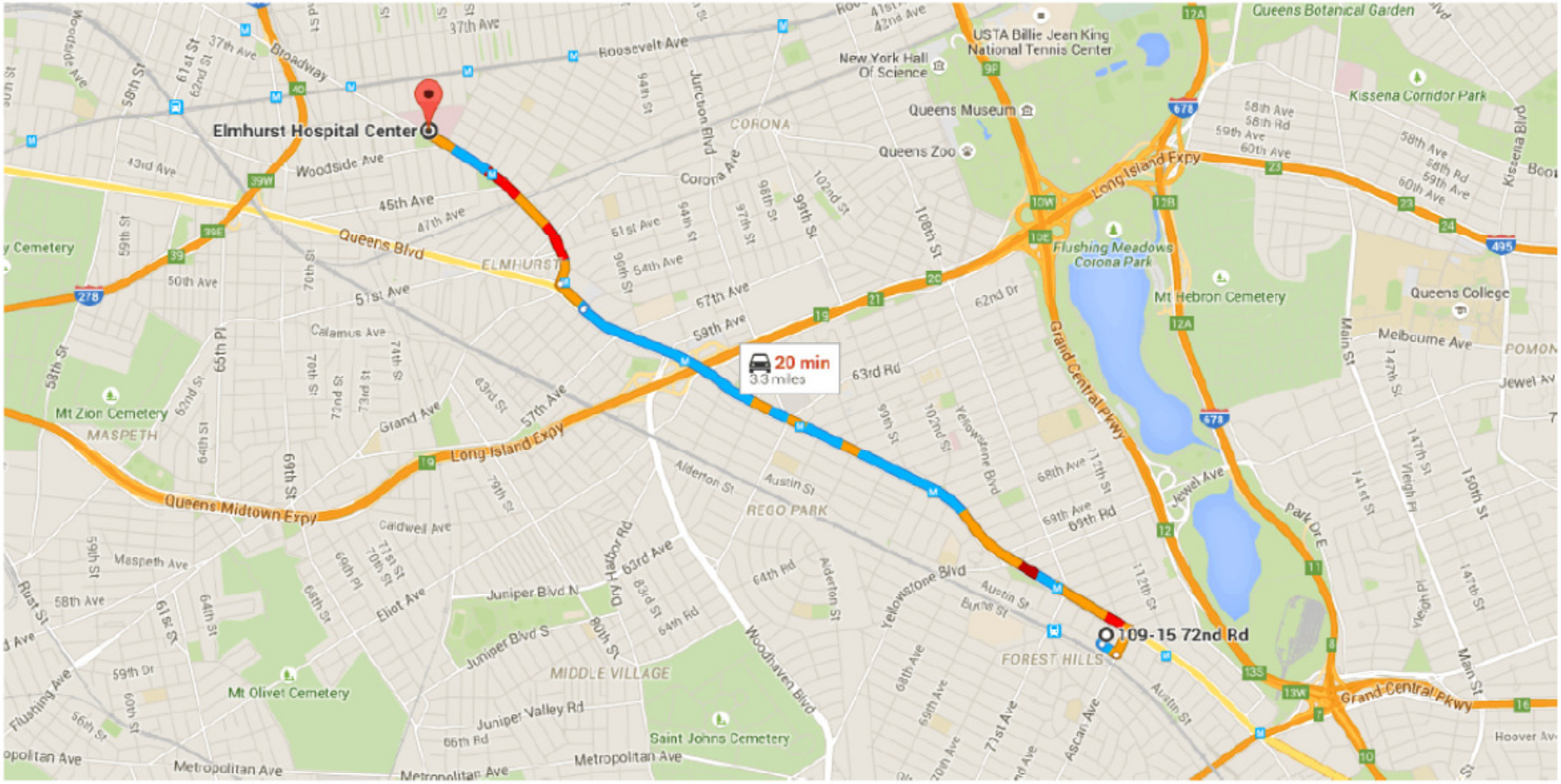
NIOSH EXPOSURE LIMITS (mg/m^3)[1]

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

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

FIGURE 1

HOSPITAL ROUTE



Source: Google Maps

N

Hospital Route

Advanced Cleanup Technologies, Inc.
ENVIRONMENTAL CONSULTANTS
110 Main Street, Suite 103, Port Washington, New York 11050
Tel: 516-441-5800 Fax: 516-441-5511

Project No.: 8212-FHNY	Figure No.: 1
Date: 05/28/2015	Scale: Not To Scale

APPENDIX A

CHEMICAL SAFETY CARDS

International Chemical Safety Cards

BENZENE

ICSC: 0015

UNEP

National Institute for Occupational Safety and Health NIOSH

Cyclohexatriene
Benzol
C_6H_6
Molecular mass: 78.1

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

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

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

Remove all ignition sources. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Fireproof. Separated from food and feedstuffs oxidants halogens	Do not transport with food and feedstuffs. Note: E F symbol T symbol R: 45-46-11-36/38-48/23/24/25-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0015

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

International Chemical Safety Cards

BENZENE

ICSC: 0015

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

	2.13
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. 

NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-30S1114 / 30GF1-II
NFPA Code: H2; F3; R0

ADDITIONAL INFORMATION

ICSC: 0015 **BENZENE**

International Chemical Safety Cards

TOLUENE

ICSC: 0078

Methylbenzene
Toluol
Phenylmethane
$C_6H_5CH_3$ / C_7H_8
Molecular mass: 92.1

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

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

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in large spill! Consult an expert in large spill! Remove all ignition sources. Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus	Fireproof. Separated from strong oxidants.	F symbol Xn symbol R: 11-38-48/20-63-65-67 S: 2-36/37-46-62 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0078

International Chemical Safety Cards

TOLUENE

ICSC: 0078

IMPORTANT

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour mixes well with air, explosive mixtures are formed easily. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Reacts violently with strong oxidants causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 50 ppm as TWA (skin) A4 BEI issued (ACGIH 2004).
MAK:
Pregnancy risk group: C
(DFG 2004).
EU OEL: 192 mg/m³ 50 ppm as TWA 384 mg/m³ 100 ppm as STEL (skin) (EU 2006).
OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
NIOSH IDLH: 500 ppm See: 108883

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

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract The substance may cause effects on the central nervous system If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. Exposure at high levels may result in cardiac dysrhythmia and unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the central nervous system Exposure to the substance may enhance hearing damage caused by exposure to noise. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Boiling point: 111°C
Melting point: -95°C
Relative density (water = 1): 0.87
Solubility in water: none

Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01
Flash point: 4°C c.c.
Auto-ignition temperature: 480°C

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

NOTES

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

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

ADDITIONAL INFORMATION

ICSC: 0078 **TOLUENE**

International Chemical Safety Cards

ETHYLBENZENE

ICSC: 0268

Ethylbenzol
Phenylethane
EB
$C_8H_{10}/C_6H_5C_2H_5$
Molecular mass: 106.2

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Dry powder. Foam. Carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
•INHALATION	Cough. Sore throat. Dizziness. Drowsiness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain. crimation; deleted at update Nov 07 - only at very high levels.	Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Burning sensation in the throat and chest. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

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

liquid in covered containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer Do NOT let this chemical enter the environment.		S: 2-16-24/25-29 UN Hazard Class: 3 UN Packing Group: II Signal: Danger Flame-Excl mark-Health haz Highly flammable liquid and vapour May be harmful if swallowed Harmful if inhaled vapour Causes mild skin irritation Causes eye irritation Suspected of causing cancer May cause respiratory irritation May cause drowsiness or dizziness May be harmful if swallowed and enters airways Toxic to aquatic life

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0268

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

International Chemical Safety Cards

ICSC: 0268

ETHYLBENZENE

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH AROMATIC ODOUR. **PHYSICAL DANGERS:** The vapour mixes well with air, explosive mixtures are easily formed. **CHEMICAL DANGERS:** Reacts with strong oxidants. Attacks plastic and rubber. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 100 ppm as TWA 125 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2007). EU OEL: 442 mg/m³ 100 ppm as TWA 884 mg/m³ 200 ppm as STEL (skin) (EU 2006). OSHA PEL†: TWA 100 ppm (435 mg/m³) NIOSH REL: TWA 100 ppm (435 mg/m³) ST 125 ppm (545 mg/m³) NIOSH IDLH: 800 ppm 10%LEL See: 100414	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour, and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure above the OEL could cause lowering of consciousness. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans. The substance may have effects on the kidneys and liver , resulting in impaired functions Repeated contact with skin may cause dryness and cracking.
PHYSICAL PROPERTIES	Boiling point: 136°C Melting point: -95°C Relative density (water = 1): 0.9	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.02 Flash point: 18°C c.c.

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

NOTES

The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-305 1135 or 30GF1- I+II
NFPA Code: H2; F3; R0

ADDITIONAL INFORMATION

ICSC: 0268 **ETHYLBENZENE**

International Chemical Safety Cards

ICSC: 0086

p-XYLENE

UNEP

National Institute for Occupational Safety and Health NIOSH

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

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

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

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

possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: filter respirator for organic gases and vapours.)		R: 10-20/21-38 S: 2-25 UN Hazard Class: 3 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0086

International Chemical Safety Cards

p-XYLENE

ICSC: 0086

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

NOTES

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

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

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

ADDITIONAL INFORMATION

ICSC: 0086 **p-XYLENE**

IMPORTANT LEGAL NOTICE:

International Chemical Safety Cards

NAPHTHALENE

ICSC: 0667

Naphthene
$C_{10}H_8$
Molecular mass: 128.18

ICSC # 0667
CAS # 91-20-3
RTECS # QJ0525000
UN # 1334 (solid); 2304 (molten)
EC # 601-052-00-2
April 21, 2005 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 80°C explosive vapour/air mixtures may be formed. Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Headache. Weakness. Nausea. Vomiting. Sweating. Confusion. Jaundice. Dark urine.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! (Further see Inhalation).	Protective gloves.	Rinse skin with plenty of water or shower.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: filter respirator for organic gases and vapours. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, food and feedstuffs Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Marine pollutant. Xn symbol N symbol R: 22-40-50/53 S: 2-36/37-46-60-61

		UN Hazard Class: 4.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0667	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

NAPHTHALENE

ICSC: 0667

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** WHITE SOLID IN VARIOUS FORMS , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** On combustion, forms irritating and toxic gases. Reacts with strong oxidants **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 10 ppm as TWA 15 ppm as STEL (skin) A4 (not classifiable as a human carcinogen); (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 2; Germ cell mutagen group: 3B; (DFG 2004). OSHA PEL†: TWA 10 ppm (50 mg/m^3) NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3) NIOSH IDLH: 250 ppm See: 91203	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. See Notes. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance may cause effects on the blood , resulting in lesions of blood cells (haemolysis) See Notes. The effects may be delayed. Exposure by ingestion may result in death. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the blood , resulting in chronic haemolytic anaemia. The substance may have effects on the eyes , resulting in the development of cataract. This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 218°C Sublimation slowly at room temperature Melting point: 80°C Density: 1.16 g/cm³ Solubility in water, g/100 ml at 25°C: none	Vapour pressure, Pa at 25°C: 11 Relative vapour density (air = 1): 4.42 Flash point: 80°C c.c. Auto-ignition temperature: 540°C Explosive limits, vol% in air: 0.9-5.9 Octanol/water partition coefficient as log Pow: 3.3
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.	

NOTES

Some individuals may be more sensitive to the effect of naphthalene on blood cells.

Transport Emergency Card: TEC (R)-41S1334 (solid); 41GF 1 -II+III (solid); 4 1 S2304 (molten)
NFPA Code: H2; F2; R0;

ADDITIONAL INFORMATION	

ICSC: 0667 **NAPHTHALENE**

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International Chemical Safety Cards

ACENAPHTHENE

ICSC: 1674

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

ICSC # 1674
CAS # 83-32-9
RTECS # AB1000000
UN # 3077
October 12, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See NOTES.	PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P2 filter respirator for harmful particles. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers: if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	UN Hazard Class: 9 UN Packing Group: III Signal: Warning Enviro Very toxic to aquatic life with long lasting effects

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1674	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994 No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values

International Chemical Safety Cards

ACENAPHTHENE

ICSC: 1674

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
WHITE TO BEIGE CRYSTALS

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

CHEMICAL DANGERS:
On combustion, forms toxic gases including carbon monoxide. Reacts with strong oxidants

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established.
MAK not established.

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

INHALATION RISK:
A harmful concentration of airborne particles can be reached quickly when dispersed

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
See Notes.

PHYSICAL PROPERTIES

Boiling point: 279°C
Melting point: 95°C
Density: 1.2 g/cm³
Solubility in water, g/100 ml at 25°C: 0.0004

Vapour pressure, Pa at 25°C: 0.3
Relative vapour density (air = 1): 5.3
Flash point: 135°C o.c.
Auto-ignition temperature: >450 °C
Octanol/water partition coefficient as log Pow: 3.9 - 4.5

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised that this substance does not enter the environment.

NOTES

Acenaphthene occurs as a pure substance and also as a component of polyaromatic hydrocarbon (PAH) mixtures. Human population studies have associated PAH's exposure with cancer and cardiovascular diseases. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

Transport Emergency Card: TEC (R)-90GM7-III

ADDITIONAL INFORMATION

ICSC: 1674	ACENAPHTHENE

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ANTHRACENE

ICSC: 0825

UNEP

National Institute for Occupational Safety and Health NIOSH

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

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough. Sore throat.	Ventilation (not if powder), local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles, face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain.	Do not eat, drink, or smoke during work.	Rinse mouth. Rest. 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. (Extra personal protection: P2 filter respirator for harmful particles).	Separated from strong oxidants. Well closed.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0825

International Chemical Safety Cards

ANTHRACENE

ICSC: 0825

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** WHITE CRYSTALS OR FLAKES. **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** The substance decomposes on heating, under influence of strong oxidants producing acrid, toxic fume , causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance slightly irritates the skin and the respiratory tract. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis under the influence of UV light.
PHYSICAL PROPERTIES	Boiling point: 342°C Melting point: 218°C Density: 1.25-1.28 g/cm³ Solubility in water, g/100 ml at 20 °C: 0.00013 Vapour pressure, Pa at 25°C: 0.08	Relative vapour density (air = 1): 6.15 Flash point: 121°C Auto-ignition temperature: 538°C Explosive limits, vol% in air: 0.6-? Octanol/water partition coefficient as log Pow: 4.5 (calculated)
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment.	

NOTES

Green oil, Tetra-olive N2G are trade names.

NFPA Code: H0; F1; R;

ADDITIONAL INFORMATION

ICSC: 0825 **ANTHRACENE**

	relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

PYRENE

ICSC: 1474

Benzo (d,e,f) phenanthrene
beta-Pyrene
$C_{16}H_{10}$
Molecular mass: 202.26

ICSC # 1474
CAS # 129-00-0
RTECS # UR2450000
November 27, 2003 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Water spray, carbon dioxide, dry powder, alcohol-resistant foam, foam.
EXPLOSION			
EXPOSURE			
•INHALATION		Avoid inhalation of dust	Fresh air, rest.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Safety spectacles.	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.	Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder Do NOT let this chemical enter the environment. (Extra personal protection: P2 filter respirator for harmful particles.)	Separated from strong oxidants. Keep in a well-ventilated room.	Do not transport with food and feedstuffs.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1474

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

International Chemical Safety Cards

PYRENE

ICSC: 1474

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** YELLOW COLOURLESS SOLID IN VARIOUS FORMS **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance decomposes on heating producing irritating fumes **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK 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 when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** Exposure to sun may provoke an irritating effect of pyrene on skin and lead to chronic skin discoloration. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 404°C Melting point: 151°C Density: 1.27 g/cm³	Solubility in water: 0.135 mg/l at 25°C Vapour pressure, Pa at °C: 0.08 Octanol/water partition coefficient as log Pow: 4.88
ENVIRONMENTAL DATA	Bioaccumulation of this chemical may occur in crustacea,in fish,in milk,in algae andin molluscs. It is strongly advised that this substance does not enter the environment.	

NOTES

Pyrene is one of many polycyclic aromatic hydrocarbons - standards are usually established for them as mixtures, e.g., coal tar pitch volatiles. However, pyrene may be encountered as a laboratory chemical in its pure form. Health effects of exposure to the substance have not been investigated adequately. See ICSC 1415 Coal-tar pitch.

ADDITIONAL INFORMATION

ICSC: 1474 PYRENE

	relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHRYSENE

ICSC: 1672

Benzoaphenanthrene
1,2-Benzophenanthrene
1,2,5,6-Dibenzonaphthalene
$C_{18}H_{12}$
Molecular mass: 228.3

ICSC # 1672
CAS # 218-01-9
RTECS # GC0700000
UN # 3077
EC # 601-048-00-0
October 12, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray. Dry powder. Foam. Carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	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	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: P3 filter respirator for toxic particles. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place.	Separated from strong oxidants, Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.	T symbol N symbol R: 45-68-50/53 S: 53-45-60-61 UN Hazard Class: 9 UN Packing Group: III

		Signal: Warning Health haz-Enviro Suspected of causing cancer Very toxic to aquatic life Toxic to aquatic life with long lasting effects

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1672

International Chemical Safety Cards

ICSC: 1672

CHRYSENE

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS TO BEIGE CRYSTALS OR POWDER **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** The substance decomposes on burning producing toxic fumes Reacts violently with strong oxidants. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2006). MAK: skin absorption (H); Carcinogen category: 2 (DFG 2007).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion. **INHALATION RISK:** A harmful concentration of airborne particles can be reached quickly when dispersed **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 448°C Melting point: 254 - 256°C Density: 1.3 g/cm³	Solubility in water: very poor Octanol/water partition coefficient as log Pow: 5.9
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in seafood. It is strongly advised that this substance does not enter the environment.	

NOTES

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

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

ADDITIONAL INFORMATION

ICSC: 1672 **CHRYSENE**

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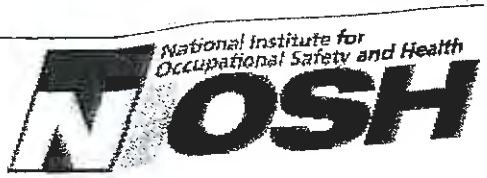
International Chemical Safety Cards

ICSC: 0720

BENZO(b)FLUORANTHENE



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

ICSC # 0720
CAS # 205-99-2
RTECS # CU1400000
EC # 601-034-00-4
March 25, 1999 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE			In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Provision to contain effluent from fire extinguishing. Well closed.	T symbol N symbol R: 45-50/53 S: 53-45-60-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0720

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

International Chemical Safety Cards

BENZO(b)FLUORANTHENE

ICSC: 0720

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS CRYSTALS

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed.

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

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

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

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
This substance is possibly carcinogenic to humans. May cause genetic damage in humans.

PHYSICAL PROPERTIES

Boiling point: 481°C
Melting point: 168°C
Solubility in water:
none

Octanol/water partition coefficient as log Pow:
6.12

ENVIRONMENTAL DATA

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

NOTES

Benzo(b)fluoranthene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.ACGIH recommends environment containing benzo(b)fluoranthene should be evaluated in terms of the TLV-TWA for coal tar pitch volatile, as benzene soluble 0.2 mg/m³. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

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International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

UNEP

National Institute for Occupational Safety and Health NIOSH

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

ICSC # 0104
CAS # 50-32-8
RTECS # DJ3675000
EC # 601-032-00-3
October 17, 2005 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Water spray, foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•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.
•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.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder,	Separated from strong oxidants.	T symbol N symbol R: 45-46-60-61-43-50/53 S: 53-45-60-61

then remove to safe place.		

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0104

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

International Chemical Safety Cards

BENZO(a)PYRENE

ICSC: 0104

I M P O R T A N T	**PHYSICAL STATE; APPEARANCE:** PALE-YELLOW CRYSTALS **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Reacts with strong oxidants causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: Exposure by all routes should be carefully controlled to levels as low as possible A2 (suspected human carcinogen); (ACGIH 2005). MAK: Carcinogen category: 2; Germ cell mutagen group: 2; (DFG 2005).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** This substance is carcinogenic to humans. May cause heritable genetic damage to human germ cells. Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Boiling point: 496°C Melting point: 178.1°C Density: 1.4 g/cm³	Solubility in water: none (<0.1 g/100 ml) Vapour pressure: negligible Octanol/water partition coefficient as log Pow: 6.04
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish, in plants and in molluscs. The substance may cause long-term effects in the aquatic environment.	

NOTES

Do NOT take working clothes home. Benzo(a)pyrene is present as a component of polycyclic aromatic hydrocarbons (PAHs) in the environment, usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco.

ADDITIONAL INFORMATION

ICSC: 0104	BENZO(a)PYRENE

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZO(ghi)PERYLENE

ICSC: 0739

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

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	NO open flames.	In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles, or eye protection in combination with breathing protection 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.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into covered containers. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Well closed.	

SEE IMPORTANT INFORMATION ON BACK

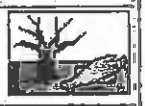
ICSC: 0739

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

International Chemical Safety Cards

BENZO(ghi)PERYLENE

ICSC: 0739

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** PALE YELLOW-GREEN CRYSTALS. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. **OCCUPATIONAL EXPOSURE LIMITS:** 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:**
PHYSICAL PROPERTIES	Boiling point: 550°C Melting point: 278°C Density: 1.3 g/cm³	Solubility in water: none Octanol/water partition coefficient as log Pow: 6.58
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to air and water.	

NOTES

Benzo(ghi)perylene is present as a component of polycyclic aromatic hydrocarbons (PAH) content in the environment usually resulting from the incomplete combustion or pyrolysis of organic matters, especially fossil fuels and tobacco. Data are insufficiently available on the effect of this substance on human health, therefore utmost care must be taken.

ADDITIONAL INFORMATION

ICSC: 0739 **BENZO(ghi)PERYLENE**

International Chemical Safety Cards

POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939

UNEP

National Institute for Occupational Safety and Health NIOSH

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

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•INHALATION		Ventilation.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Headache. Numbness.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.	Separated from food and feedstuffs Cool. Dry Keep in a well-ventilated room.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Severe marine pollutant. Note: C Xn symbol N symbol R: 33-50/53 S: 2-35-60-61 UN Hazard Class: 9 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

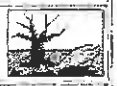
ICSC: 0939

International Chemical Safety Cards

POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939

I M	PHYSICAL STATE; APPEARANCE: LIGHT YELLOW VISCOUS LIQUID.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

P O R T A N T D A T A	**PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance decomposes in a fire producing irritating and toxic gases **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.5 mg/m³ as TWA (skin) A3 (ACGIH 2004). MAK: 0.05 ppm 0.70 mg/m³ H Peak limitation category: II(8) Carcinogen category: 3B Pregnancy risk group: B (DFG 2004). OSHA PEL: TWA 0.5 mg/m³ skin NIOSH REL*: Ca TWA 0.001 mg/m³ See Appendix A *Note: The REL also applies to other PCBs. NIOSH IDLH: Ca 5 mg/m³ See: IDLH INDEX	**INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver Animal tests show that this substance possibly causes toxic effects upon human reproduction.
PHYSICAL PROPERTIES	Relative density (water = 1): 1.5 Solubility in water: none	Vapour pressure, Pa at 25°C: 0.01 Octanol/water partition coefficient as log Pow: 6.30 (estimated)
ENVIRONMENTAL DATA	In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment.	

NOTES

Changes into a resinous state (pour point) at 10°C. Distillation range: 365°-390°C.

Transport Emergency Card: TEC (R)-90GM2-II-L

ADDITIONAL INFORMATION

ICSC: 0939 **POLYCHLORINATED BIPHENYL (AROCLOR 1254)**

International Chemical Safety Cards

ALDRIN

ICSC: 0774

1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-exo-1,4-endo-5,8-dimethanonaphthalene
1,45,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4aß,5alpha,8alpha,8aß)
HHDN
$C_{12}H_8Cl_6$
Molecular mass: 364.9

ICSC # 0774
CAS # 309-00-2
RTECS # IO2100000
UN # 2761
EC # 602-048-00-3
March 26, 1998 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
•INHALATION	(See Ingestion).	Ventilation (not if powder).	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! See Ingestion.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Safety goggles, or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Convulsions. Dizziness. Headache. Nausea. Vomiting. Muscle twitching.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. (Extra personal protection: chemical protection suit including self-contained breathing apparatus).	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs and incompatible materials: See Chemical Dangers. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 24/25-40-48/24/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0774

International Chemical Safety Cards

ALDRIN

ICSC: 0774

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS CRYSTALS **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance decomposes on heating producing toxic and corrosive fumes including hydrogen chloride. Reacts with acids and oxidants. Attacks many metals in presence of water. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.25 mg/m³ (as TWA), A3 (skin) (ACGIH 1997). MAK: (Inhalable fraction) 0.25 mg/m³ skin absorption (H); Peak limitation category: II(8) (DFG 2006). OSHA PEL: TWA 0.25 mg/m^3 skin NIOSH REL: Ca TWA 0.25 mg/m^3 skin See Appendix A NIOSH IDLH: Ca 25 mg/m^3 See: 309002	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body through the skin and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance may cause effects on the central nervous system , resulting in convulsions. The effects may be delayed. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance accumulates in the human body. Cumulative effects are possible: see Acute Hazards/Symptoms.
PHYSICAL PROPERTIES	Boiling point at 0.27kPa: 145°C Melting point: 104-105°C Density: 1.6 g/cm³	Solubility in water: none Vapour pressure, Pa at 20°C: 0.009 Octanol/water partition coefficient as log Pow: 7.4
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds, honey bees. In the food chain important to humans, bioaccumulation takes place, specifically in aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists	

	in the environment. The substance may cause long-term effects in the aquatic environment. Avoid release to the environment in circumstances different to normal use.

NOTES

Other melting points: 49-60°C (technical grade). Depending on the degree of exposure, periodic medical examination is indicated. If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. The recommendations on this Card also apply to ICSC 0787 (dieldrin). Aldrec, Aldrex, Aldrite, Aldron, Aldrosol, Algran, Altox, Drinox, Octalene, Seedrin, and Toxadrin are trade names.

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

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

ADDITIONAL INFORMATION

ICSC: 0774 **ALDRIN**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

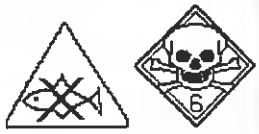
ENDRIN

ICSC: 1023

UNEP

National Institute for Occupational Safety and Health NIOSH

$C_{12}H_8Cl_6O$
Molecular mass: 380.9



ICSC # 1023
CAS # 72-20-8
RTECS # IO1575000
UN # 2761
EC # 602-051-00-X
March 10, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	(See Ingestion).	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.
•EYES		Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Dizziness. Weakness. Headache. Nausea. Vomiting. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection:	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. T+ symbol N symbol R: 24-28-50/53

chemical protection suit including self-contained breathing apparatus).		S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: I

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1023

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

International Chemical Safety Cards

ENDRIN

ICSC: 1023

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** WHITE CRYSTALS **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance decomposes on heating above 245°C, producing hydrogen chloride phosgene **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.1 mg/m³ (skin) (ACGIH 2000). OSHA PEL: TWA 0.1 mg/m^3 skin NIOSH REL: TWA 0.1 mg/m^3 skin NIOSH IDLH: 2 mg/m^3 See: 72208	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance may cause effects on the central nervous system , resulting in convulsions and death. The effects may be delayed. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Decomposes below boiling point at 245°C Melting point: 200°C Density: 1.7 g/cm³	Solubility in water, g/100 ml at 25°C: none Vapour pressure, Pa at 25°C: negligible Octanol/water partition coefficient as log Pow: 5.34
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to honey bees birds mammals It is strongly advised not to let the chemical enter into the environment because it persists in the environment. In the food chain important to humans, bioaccumulation takes place, specifically in fish seafood Avoid release to the environment in circumstances different to normal use.	

NOTES

If the substance is formulated with solvent(s) also consult the card(s) (ICSC) of the solvent(s). Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home.

Transport Emergency Card: TEC (R)-61G41a

NFPA Code: H3; F0; R; 0

ADDITIONAL INFORMATION

ICSC: 1023 **ENDRIN**

International Chemical Safety Cards

CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740

1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene
1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene
$C_{10}H_6Cl_8$
Molecular mass: 409.8

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Alcohol-resistant foam, powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	(See Ingestion).	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.
•EYES	Redness. Pain.	Safety goggles face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Confusion. Convulsions. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. Personal protection: chemical protection suit	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs bases and incompatible materials See Chemical Dangers. Well closed. Keep in a well-ventilated room.	Do not transport with food and feedstuffs. Severe marine pollutant. Xn symbol N symbol

including self-contained breathing apparatus.		R: 21/22-40-50/53 S: 2-36/37-60-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0740

International Chemical Safety Cards

CHLORDANE (TECHNICAL PRODUCT)

ICSC: 0740

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
TECHNICAL: LIGHT YELLOW TO AMBER VISCOUS LIQUID

PHYSICAL DANGERS:

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

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.5 mg/m³ as TWA (skin) A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).
MAK: (Inhalable fraction) 0.5 mg/m³
Peak limitation category: II(8);
skin absorption (H);
Carcinogen category: 3B;
(DFG 2004).
OSHA PEL: TWA 0.5 mg/m^3 skin
NIOSH REL: Ca TWA 0.5 mg/m^3 skin See Appendix A
NIOSH IDLH: Ca 100 mg/m^3 See: 57749

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

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

EFFECTS OF SHORT-TERM EXPOSURE:
Exposure at high levels may result in disorientation, tremors, convulsions, respiratory failure and death. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver immune system , resulting in tissue lesions and liver impairment. This substance is possibly carcinogenic to humans.

PHYSICAL PROPERTIES

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

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

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to soil organisms, honey bees. It is strongly advised that this substance does not enter the environment. The substance may cause long-term effects in the aquatic environment.

NOTES

If the substance is formulated with solvents also consult the ICSCs of these materials. Carrier solvents used in commercial formulations may change physical and toxicological properties. Belt, Chlor Kil, Chlortox, Corodan, Gold Crest, Intox,

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

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

ADDITIONAL INFORMATION

ICSC: 0740 **CHLORDANE (TECHNICAL PRODUCT)**

September 2005

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Synonyms & Trade Names | Chemical Names | CAS Numbers | RTECS Numbers | Appendices | Search

Chlorinated camphene

CAS 8001-35-2

$C_{10}H_{10}Cl_8$

RTECS XW5250000

Synonyms & Trade Names
Chlorocamphene, Octachlorocamphene, Polychlorocamphene, Toxaphene

DOT ID & Guide
2761 151

Exposure Limits
NIOSH REL: Ca [skin] See Appendix A
OSHA PEL†: TWA 0.5 mg/m^3 [skin]

IDLH Ca [200 mg/m^3] See: 8001352

Conversion

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

MW: 413.8	BP: Decomposes	MLT: 149-194°F	Sol: 0.0003%
VP(77°F): 0.4 mmHg	IP: ?		Sp.Gr: 1.65
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but may be dissolved in flammable liquids.

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

Measurement Methods
NIOSH 5039
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection codes)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

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

Target Organs central nervous system, skin

Cancer Site [in animals: liver cancer]

See also: INTRODUCTION See ICSC CARD: 0843

NIOSH Home | NIOSH Search | Site Index | Topic List | Contact Us

International Chemical Safety Cards

DDT

ICSC: 0034

Dichlorodiphenyltrichloroethane
1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane
1,1'-(2,2,2-Trichloroethylidene)bis(4-chlorobenzene)
p,p'-DDT
$C_{14}H_9Cl_5$
Molecular mass: 354.5

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, water spray, foam, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness.	Safety goggles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Tremors. Diarrhoea. Dizziness. Headache. Vomiting. Numbness. Paresthesias. Hyperexcitability. Convulsions.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT let this chemical enter the environment. Sweep spilled substance into sealable non-metallic containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Provision to contain effluent from fire extinguishing. Separated from iron, aluminum and its salts, food and feedstuffs See Chemical Dangers.	Do not transport with food and feedstuffs. Severe marine pollutant. T symbol N symbol R: 25-40-48/25-50/53 S: 1/2-22-36/37-45-60-61 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0034

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

International Chemical Safety Cards

DDT

ICSC: 0034

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS CRYSTALS WHITE POWDER. TECHNICAL PRODUCT IS WAXY SOLID. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** On combustion, forms toxic and corrosive fumesincludinghydrogen chloride. Reacts with aluminium and iron. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 1 mg/m³ as TWA A3 (ACGIH 2004). MAK: 1 mg/m³ H Peak limitation category: II(8) (DFG 2003). OSHA PEL: TWA 1 mg/m^3 skin NIOSH REL: Ca TWA 0.5 mg/m^3 See Appendix A NIOSH IDLH: Ca 500 mg/m^3 See: 50293	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly especially if powdered. **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation. The substance may cause effects on the central nervous system , resulting in convulsions and respiratory depression Exposure at high levels may result in death. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the central nervous system and liver. This substance is possibly carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.
PHYSICAL PROPERTIES	Boiling point: 260°C Melting point: 109°C Density: 1.6 g/cm³	Solubility in water: poor Octanol/water partition coefficient as log Pow: 6.36
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. This substance may be hazardous to the environment; special attention should be given to birds. Bioaccumulation of this chemical may occur along the food chain, for example in milk and aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be given to avoid any additional release, e.g. through inappropriate disposal. 	

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. Carrier solvents used in commercial formulations may change physical and toxicological properties. Do NOT take working clothes home. Consult national legislation. Agritan, Azotox, Anofex, Ixodex, Gesapon, Gesarex, Gesarol, Guesapon, Clofenotane, Zeidane, Dicophane, Neocid are trade names.

Transport Emergency Card: TEC (R)-61GT7-III

ADDITIONAL INFORMATION

ICSC: 0034 **DDT**

International Chemical Safety Cards

SILVER

ICSC: 0810

UNEP

National Institute for Occupational Safety and Health NIOSH

Argentium
C.I. 77820
Ag

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible, except as powder.		
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Rinse skin with plenty of water or shower.
•EYES		Safety spectacles, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Do NOT let this chemical enter the environment.	Separated from ammonia, strong hydrogen peroxide solutions, strong acids.	

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0810

International Chemical Safety Cards

SILVER

ICSC: 0810

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** WHITE METAL, TURNS DARK ON EXPOSURE TO OZONE, HYDROGEN SULFIDE OR SULFUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Shock-sensitive compounds are formed with acetylene. Reacts with acids causing fire hazard. Contact with strong hydrogen peroxide solution will cause violent decomposition to oxygen gas. Contact with ammonia may cause formation of compounds that are explosive when dry. **OCCUPATIONAL EXPOSURE LIMITS:** TLV (metal): 0.1 mg/m³ (ACGIH 1997). EU OEL: 0.1 mg/m³ as TWA (EU 2000). OSHA PEL: TWA 0.01 mg/m^3 NIOSH REL: TWA 0.01 mg/m^3 NIOSH IDLH: 10 mg/m^3 (as Ag) See: IDLH INDEX	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of high amounts of metallic silver vapours may cause lung damage with pulmonary oedema. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may cause a grey-blue discoloration of the eyes, nose, throat and skin (argyria/argyrosis).
PHYSICAL PROPERTIES	Boiling point: 2212°C Melting point: 962°C	Relative density (water = 1): 10.5 Solubility in water: none
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to aquatic organisms.	

NOTES

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

ADDITIONAL INFORMATION

ICSC: 0810 SILVER

International Chemical Safety Cards

BARIUM

ICSC: 1052

Ba
Atomic mass: 137.3

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable. Many reactions may cause fire or explosion.	NO open flames, NO sparks, and NO smoking. NO contact with water.	Special powder, dry sand, NO hydrous agents, NO water.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness. Pain.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT wash away into sewer.	Separated from halogenated solvents, strong oxidants, acids. Dry. Keep under inert gas, oil or oxygen-free liquid.	UN Hazard Class: 4.3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 1052	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BARIUM

ICSC: 1052

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** YELLOWISH TO WHITE LUSTROUS SOLID IN VARIOUS FORMS. **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** The substance may spontaneously ignite on contact with air (if in powder form). The substance is a strong reducing agent and reacts violently with oxidants and acids. Reacts violently with halogenated solvents. Reacts with water, forming flammable/explosive gas (hydrogen - see ICSC0001), causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.5 mg/m³ (as TWA) (ACGIH 1999).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by ingestion. **INHALATION RISK:** **EFFECTS OF SHORT-TERM EXPOSURE:** The substance irritates the eyes, the skin and the respiratory tract. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 1640°C Melting point: 725°C Density: 3.6 g/cm³	Solubility in water: reaction
ENVIRONMENTAL DATA		

NOTES

Reacts violently with fire extinguishing agents such as water, bicarbonate, powder, foam, and carbon dioxide. Rinse contaminated clothes (fire hazard) with plenty of water.

Transport Emergency Card: TEC (R)-43G12

ADDITIONAL INFORMATION

NOTICE:	of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

ICSC: 0020

CADMIUM

Cd
Atomic mass: 112.4

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable in powder form and spontaneously combustible in pyrophoric form. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking. NO contact with heat or acid(s).	Dry sand. Special powder. NO other agents.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system. dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Headache. Nausea. Vomiting.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Sweep spilled substance into containers. Carefully collect remainder, then remove to safe place.	Fireproof. Dry. Keep under inert gas. Separated from igntion sources, oxidants acids, food and feedstuffs	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Note: E T- symbol N symbol

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

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0020	Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CADMIUM

ICSC: 0020

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** SOFT BLUE-WHITE METAL LUMPS OR GREY POWDER. MALLEABLE. TURNS BRITTLE ON EXPOSURE TO 80°C AND TARNISHES ON EXPOSURE TO MOIST AIR. **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Reacts with acids forming flammable/explosive gas (hydrogen - see ICSC0001). Dust reacts with oxidants, hydrogen azide, zinc, selenium or tellurium , causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (Total dust) 0.01 mg/m³ (Respirable fraction) 0.002 mg/m³ as TWA A2 (suspected human carcinogen); BEI issued (ACGIH 2005). MAK: skin absorption (H); Carcinogen category: 1; Germ cell mutagen group: 3A; (DFG 2004). OSHA PEL*: 1910.1027 TWA 0.005 mg/m^3 *Note: The PEL applies to all Cadmium compounds (as Cd). NIOSH REL*: Ca See Appendix A *Note: The REL applies to all Cadmium compounds (as Cd). NIOSH IDLH: Ca 9 mg/m^3 (as Cd) See: IDLH INDEX	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and by ingestion. **INHALATION RISK:** A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered. **EFFECTS OF SHORT-TERM EXPOSURE:** The fume is irritating to the respiratory tract Inhalation of fume may cause lung oedema (see Notes). Inhalation of fumes may cause metal fume fever. The effects may be delayed. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Lungs may be affected by repeated or prolonged exposure to dust particles. The substance may have effects on the kidneys , resulting in kidney impairment This substance is carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 765°C Melting point: 321°C Density: 8.6 g/cm³	Solubility in water: none Auto-ignition temperature: (cadmium metal dust) 250°C
ENVIRONMENTAL DATA		

NOTES

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

ADDITIONAL INFORMATION

ICSC: 0020 **CADMIUM**

International Chemical Safety Cards

SELENIUM

ICSC: 0072

Se
(powder)

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with oxidants.	Powder, AFFF, foam, carbon dioxide. NO water
EXPLOSION	Risk of fire and explosion on contact with oxidants.		
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•INHALATION	Irritation of nose. Cough. Dizziness. Headache. Laboured breathing. Nausea. Sore throat. Vomiting. Weakness. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness. Skin burns. Pain. Discolouration.	Protective gloves. Protective clothing.	Rinse skin with plenty of water or shower. Refer for medical attention. Remove and isolate contaminated clothes.
•EYES	Redness. Pain. Blurred vision.	Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Metallic taste. Diarrhoea. Chills. Fever. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Do NOT wash away into sewer. Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place. Personal protection: P3 filter respirator for toxic particles.	Fireproof. Separated from strong oxidants, strong acids, food and feedstuffs Dry.	Airtight. Do not transport with food and feedstuffs. T symbol R: 23/25-33-53 S: 1/2-20/21-28-45-61

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0072

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

International Chemical Safety Cards

SELENIUM

ICSC: 0072

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS SOLID IN VARIOUS FORMS. DARK RED-BROWN TO BLUISH-BLACK AMORPHOUS SOLID OR RED TRANSPARENT CRYSTALS OR METALLIC GREY TO BLACK CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with oxidants strong acids Reacts withwater at 50°C forming flammable/explosive gas (hydrogen - see ICSC0001) and selenious acids. Reacts with incandescence on gentle heating with phosphorous and metals such as nickel, zinc, sodium, potassium, platinum.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.2 mg/m³ as TWA (ACGIH 2004).
MAK: (Inhalable fraction) 0.05 mg/m³
Peak limitation category: II(4); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).
OSHA PEL*: TWA 0.2 mg/m^3 *Note: The PEL also applies to other selenium compounds (as Se) except Selenium hexafluoride.
NIOSH REL*: TWA 0.2 mg/m^3 *Note: The REL also applies to other selenium compounds (as Se) except Selenium hexafluoride.
NIOSH IDLH: 1 mg/m^3 (as Se) See: 7782492

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 when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes and the respiratory tract Inhalation of dust may cause lung oedema (see Notes). Inhalation of fume may cause symptoms of asphyxiation, chills and fever and bronchitis. The effects may be delayed.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the respiratory tract, gastrointestinal tract, and skin, resulting in nausea, vomiting, cough, yellowish skin discolouration, loss of nails, garlic breath and bad teeth.

PHYSICAL PROPERTIES

Boiling point: 685°C
Melting point: 170-217°C
Relative density (water = 1): 4.8

Solubility in water:
none
Vapour pressure, Pa at 20°C: 0.1

ENVIRONMENTAL DATA

NOTES

Do NOT take working clothes home.

ADDITIONAL INFORMATION

ICSC: 0072	**SELENIUM**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

LEAD

ICSC: 0052

Lead metal
Plumbum
Pb
(powder)

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE	See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE.	PREVENT DISPERSION OF DUST! AVOID EXPOSURE OF (PREGNANT) WOMEN!	
•INHALATION		Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Nausea. Vomiting.	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Give plenty of water to drink. Refer for medical attention.

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

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0052

International Chemical Safety Cards

LEAD

ICSC: 0052

IMPORTANT

PHYSICAL STATE; APPEARANCE:
BLUISH-WHITE OR SILVERY-GREY SOLID IN VARIOUS FORMS. TURNS TARNISHED ON EXPOSURE TO AIR.

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

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

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 0.05 mg/m³ as TWA A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 2; Germ cell mutagen group: 3A;
(DFG 2006).
EU OEL: as TWA 0.15 mg/m³ (EU 2002).
OSHA PEL*: 1910.1025 TWA 0.050 mg/m^3 See Appendix C *Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C *Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.
NIOSH IDLH: 100 mg/m^3 (as Pb) See: 7439921

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

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

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the blood bone marrow central nervous system peripheral nervous system kidneys , resulting in anaemia, encephalopathy (e.g., convulsions), peripheral nerve disease, abdominal cramps and kidney impairment. Causes toxicity to human reproduction or development. This substance is probably carcinogenic to humans. fast track change Oct 06 - IARC 2A.

PHYSICAL PROPERTIES		
	Boiling point: 1740°C	Density: 11.34 g/cm³
	Melting point: 327.5°C	Solubility in water: none

ENVIRONMENTAL DATA

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

NOTES

Depending on the degree of exposure, periodic medical examination is suggested. Do NOT take working clothes home. Card has been partly updated in April 2005. See section Occupational Exposure Limits. Card has been partly updated in October 2006: see section Occupational Exposure Limits, Effects Long Tem Exposure.

ADDITIONAL INFORMATION	
ICSC: 0052	**LEAD**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

MERCURY

ICSC: 0056

UNEP

National Institute for Occupational Safety and Health NIOSH

Quicksilver
Liquid silver
Hg

ICSC # 0056
CAS # 7439-97-6
RTECS # OV4550000
UN # 2809
EC # 080-001-00-0
April 22, 2004 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION	Risk of fire and explosion.		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		STRICT HYGIENE! AVOID EXPOSURE OF (PREGNANT) WOMEN! AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Abdominal pain. Cough. Diarrhoea. Shortness of breath. Vomiting. Fever or elevated body temperature.	Local exhaust or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work. Wash hands before eating.	Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area in case of a large spill! Consult an expert! Ventilation. Collect leaking and spilled liquid in	Provision to contain effluent from fire extinguishing. Separated from food and feedstuffs Well closed.	Special material. Do not transport with food and feedstuffs. T symbol

sealable non-metallic containers as far as possible. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Chemical protection suit including self-contained breathing apparatus.		N symbol R: 23-33-50/53 S: 1/2-7-45-60-61 UN Hazard Class: 8 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0056

International Chemical Safety Cards

MERCURY

ICSC: 0056

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** ODOURLESS, HEAVY AND MOBILE SILVERY LIQUID METAL. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** Upon heating, toxic fumes are formed. Reacts violently with ammonia and halogens causing fire and explosion hazard. Attacks aluminium and many other metals forming amalgams. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 0.025 mg/m³ as TWA (skin) A4 BEI issued (ACGIH 2004). MAK: 0.1 mg/m³ Sh Peak limitation category: II(8) Carcinogen category: 3B (DFG 2003). OSHA PEL†: C 0.1 mg/m^3 NIOSH REL: Hg Vapor: TWA 0.05 mg/m^3 skin Other: C 0.1 mg/m^3 skin NIOSH IDLH: 10 mg/m^3 (as Hg) See: 7439976
	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its vapour and through the skin, also as a vapour! **INHALATION RISK:** A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the skin. Inhalation of the vapours may cause pneumonitis. The substance may cause effects on the central nervous system and kidneys. The effects may be delayed. Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the central nervous system kidneys, resulting in irritability, emotional instability, tremor, mental and memory disturbances, speech disorders. Danger of cumulative effects. Animal tests show that this substance possibly causes toxic effects upon human reproduction.
PHYSICAL PROPERTIES	Boiling point: 357°C Melting point: -39°C Relative density (water = 1): 13.5 Solubility in water: none Vapour pressure, Pa at 20°C: 0.26 Relative vapour density (air = 1): 6.93 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.009
ENVIRONMENTAL DATA	The substance is very toxic to aquatic organisms. In the food chain important to humans, bioaccumulation takes place, specifically in fish. 

NOTES

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

Transport Emergency Card: TEC (R)-80GC9-II+III

ADDITIONAL INFORMATION

ICSC: 0056 **MERCURY**

International Chemical Safety Cards

ICSC: 0013

ARSENIC

Grey arsenic
As
Atomic mass: 74.9

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

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

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

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

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

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

International Chemical Safety Cards

ARSENIC

ICSC: 0013

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants and halogens, causing fire and explosion hazard. Reacts with acids to produce

OCCUPATIONAL EXPOSURE LIMITS:
OSHA PEL: 1910.1018 TWA 0.010 mg/m^3
NIOSH REL: Ca C 0.002 mg/m^3 15-minute See Appendix A
NIOSH IDLH: Ca 5 mg/m^3 (as As) See: 7440382
TLV: 0.01 mg/m^3 as TWA A1 (confirmed human carcinogen); BEI issued (ACGIH 2004).
MAK:
Carcinogen category: 1; Germ cell mutagen group: 3A;
(DFG 2004).

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

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

EFFECTS OF SHORT-TERM EXPOSURE:
The substance is irritating to the eyes the skin and the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys , resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions and kidney impairment Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow , resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes toxicity to human reproduction or development.

PHYSICAL PROPERTIES

Sublimation point: 613°C
Density: 5.7 g/cm^3

Solubility in water:
none

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

NOTES

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

Transport Emergency Card: TEC (R)-61GT5-II

ADDITIONAL INFORMATION

ICSC: 0013 **ARSENIC**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

Chrome
Cr
Atomic mass: 52.0
(powder)

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

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions.	No open flames if in powder form.	In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION		Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN		Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Personal protection: P2 filter respirator for harmful particles.		

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0029

International Chemical Safety Cards

ICSC: 0029

CHROMIUM

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** GREY POWDER **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Chromium is a catalytic substance and may cause reaction in contact with many organic and inorganic substances , causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (as Cr metal, Cr(III) compounds) 0.5 mg/m³ as TWA A4 (ACGIH 2004). MAK not established. OSHA PEL*: TWA 1 mg/m^3 See Appendix C *Note: The PEL also applies to insoluble chromium salts. NIOSH REL: TWA 0.5 mg/m^3 See Appendix C NIOSH IDLH: 250 mg/m^3 (as Cr) See: 7440473	**ROUTES OF EXPOSURE:** **INHALATION RISK:** A harmful concentration of airborne particles can be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** May cause mechanical irritation tothe eyesandthe respiratory tract. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 2642°C Melting point: 1900°C Density: 7.15 g/cm³	Solubility in water: none
ENVIRONMENTAL DATA		

NOTES

The surface of the chromium particles is oxidized to chromium(III)oxide in air. See ICSC 1531 Chromium(III) oxide.

ADDITIONAL INFORMATION

ICSC: 0029 **CHROMIUM**

IMPORTANT LEGAL NOTICE: Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

Appendix B

Respirator Fit Test Procedures

- **Part Number:** 1910
- **Part Title:** Occupational Safety and Health Standards
- **Subpart:** I
- **Subpart Title:** Personal Protective Equipment
- **Standard Number:** 1910.134 App A
- **Title:** Fit Testing Procedures (Mandatory).

Appendix A to § 1910.134: Fit Testing Procedures (Mandatory)

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures -- General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

(a) Position of the mask on the nose

(b) Room for eye protection

(c) Room to talk

(d) Position of mask on face and cheeks

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

(a) Chin properly placed;

(b) Adequate strap tension, not overly tightened;

(c) Fit across nose bridge;

(d) Respirator of proper size to span distance from nose to chin;

(e) Tendency of respirator to slip;

(f) Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

14. Test Exercises.

(a) Employers must perform the following test exercises for all fit testing methods prescribed in this appendix, except for the CNP quantitative fit testing protocol and the CNP REDON quantitative fit testing protocol. For these two protocols, employers must ensure that the test subjects (***i.e.***, employees) perform the exercise procedure specified in Part I.C.4(b) of this appendix for the CNP quantitative fit testing protocol, or the exercise procedure described in Part I.C.5(b) of this appendix for the CNP REDON quantitative fit-testing protocol. For the remaining fit testing methods, employers must ensure that employees perform the test exercises in the appropriate test environment in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

(8) Normal breathing. Same as exercise (1).

(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

B. Qualitative Fit Test (QLFT) Protocols

1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1 liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the

solutions.

(3) The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

(6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the

nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a \3/4\ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the

fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in 4. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

5. Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

(a) General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

(2) Only stannic chloride smoke tubes shall be used for this protocol.

(3) No form of test enclosure or hood for the test subject shall be used.

(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

(c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Generated Aerosol Quantitative Fit Testing Protocol

(a) Apparatus.

(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.

(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50

(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

(b) Procedural Requirements.

(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

(8) Calculation of fit factors.

(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

(A) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

(B) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where ff_1, ff_2, ff_3, etc. are the fit factors for exercises 1, 2, 3, etc.

(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol.

The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount ^{TM}) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Portacount Fit Test Requirements.

(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

(3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.

(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of

respirator.

(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

(b) Portacount Test Instrument.

(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4. Controlled negative pressure (CNP) quantitative fit testing protocol.

The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Occupational Health Dynamics of Birmingham, Alabama also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

(1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

(2) The CNP system defaults selected for test pressure shall be set at -- 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(**Note:** CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

(3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

(4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve

downstream from the manifold either needs to be temporarily removed or propped open.

(5) The employer must train the test subject to hold his or her breath for at least 10 seconds.

(6) The test subject must don the test respirator without any assistance from the test administrator who is conducting the CNP fit test. The respirator must not be adjusted once the fit-test exercises begin. Any adjustment voids the test, and the test subject must repeat the fit test.

(7) The QNFT protocol shall be followed according to section I. C. 1. of this appendix with an exception for the CNP test exercises.

(b) CNP Test Exercises.

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

(c) CNP Test Instrument.

(1) The test instrument must have an effective audio-warning device, or a visual-warning device in the form of a screen tracing, that indicates when the test subject fails to hold his or her breath during the test. The test must be terminated and restarted from the beginning when the test subject fails to hold his or her breath during the test. The test subject then may be refitted and retested.

(2) A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used; and date tested.

5. Controlled negative pressure (CNP) REDON quantitative fit testing protocol.

(a) When administering this protocol to test subjects, employers must comply with the requirements specified in paragraphs (a) and (c) of Part I.C.4 of this appendix ("Controlled negative pressure (CNP) quantitative fit testing protocol"), as well as use the test exercises described below in paragraph (b) of this protocol instead of the test exercises specified in paragraph (b) of Part I.C.4 of this appendix.

(b) Employers must ensure that each test subject being fit tested using this protocol follows the exercise and measurement procedures, including the order of administration, described below in Table A-1 of this appendix.

Table A-1. -- CNP REDON Quantitative Fit Testing Protocol

Exercises[(1)]	Exercise procedure	Measurement procedure
Facing Forward	Stand and breathe normally, without talking, for 30 seconds.	Face forward, while holding breath for 10 seconds.
Bending Over	Bend at the waist, as if going to touch his or her toes, for 30 seconds.	Face parallel to the floor, while holding breath for 10 seconds
Head Shaking	For about three seconds, shake head back and forth vigorously several times while shouting.	Face forward, while holding breath for 10 seconds.
REDON 1	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask.	Face forward, while holding breath for 10 seconds.

REDON 2	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask again.	Face forward, while holding breath for 10 seconds.

[1] Exercises are listed in the order in which they are to be administered.

(c) After completing the test exercises, the test administrator must question each test subject regarding the comfort of the respirator. When a test subject states that the respirator is unacceptable, the employer must ensure that the test administrator repeats the protocol using another respirator model.

(d) Employers must determine the overall fit factor for each test subject by calculating the harmonic mean of the fit testing exercises as follows:

$$\text{Overall Fit Factor} = \frac{N}{\left[1/FF_1 + 1/FF_2 + \ldots\ 1/FF_N\right]}$$

Where:
N = The number of exercises;
FF1 = The fit factor for the first exercise;
FF2 = The fit factor for the second exercise; and
FFN = The fit factor for the nth exercise.

Part II. New Fit Test Protocols

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.

[63 FR 20098, April 23, 1998; 69 FR 46993, August 4, 2004]

Next Standard (1910.134 App B-1)

Regulations (Standards - 29 CFR) - Table of Contents